INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-1

EVIDENCE REFERENCE:

[Ex.1]

QUESTION(S):

Please provide a copy of Hydro Ottawa's most recent business plan.

RESPONSE(S):

Please see Schedule 1-2-3 - Business Plan for Hydro Ottawa's most recent business plan.

The 2021-2025 Strategic Direction for Hydro Ottawa Holding Inc. is appended as Attachment 1-SEC-1(A) - 2021-2025 Strategic Direction.

HydroOttawa Holding Inc.

A leading partner in a smart energy future



2021-2025 Strategic Direction



Our Mission

To create long-term value for our shareholder, benefitting our customers and the communities we serve

Our Vision

Hydro Ottawa – a leading partner in a smart energy future

Our Organizational Values

Teamwork, Integrity, Excellence, Service

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1. Overview of Strategic Direction

1.1 INTRODUCTION

This 2021–2025 Strategic Direction provides an overview of Hydro Ottawa's business strategy and financial projections for the next five years. It is designed to inform our shareholder and all other stakeholders about the most important trends shaping our business environment, and how the company intends to respond to them.

This refreshed strategy builds upon the strong record of success from our recent strategic planning cycles. Signature milestones have included increasing our renewable energy portfolio by over 500 percent since 2012, achieving industry-leading performance in the reliability of our local grid, and growing our energy and utility service offerings as a core area of business. In addition, a relentless focus on putting the customer at the centre of everything we do has elevated customer service to new levels of excellence.

Alongside these accomplishments, we have never lost sight of our responsibility to support the well-being of our community. Indeed, over the 2016–2020 period, our dedication to the community was on display like never before. During this time, the lives of our customers and stakeholders were profoundly impacted by a wave of unprecedented events, ranging from floods to tornadoes to the global COVID-19 pandemic. In the midst of each of these disruptions, Hydro Ottawa rose to the occasion and ensured peace of mind for our community by maintaining a safe and reliable supply of electricity.

A hallmark of our evolution as a company has been a commitment to sustainability and Environmental, Social, and Governance (ESG) performance in our growth, operations, and business practices. This strategy has yielded significant benefits, including stable financial returns for our shareholder, the City of Ottawa; enhanced value across the customer experience; a higher quality of life for our community; and a safe, secure, and healthy work environment for our employees.

This commitment to sustainable business operations has served Hydro Ottawa and our stakeholders very well. More importantly, it is exactly what is needed to address the greatest challenge of the present and the future – climate change. We have witnessed firsthand, in our own backyard, the devastating impacts of the growing frequency of severe weather. With the pattern of such events increasingly the norm worldwide, a consensus is emerging in international financial markets that action to combat climate change has become a business and investment imperative.



We are therefore anchoring this 2021–2025 Strategic Direction in bold, decisive action aimed at doing our part to address the climate change challenge. The focal point of our corporate strategy over the next five years (and beyond) will be achieving net zero operations by 2030. Hydro Ottawa will become the first municipally-owned utility in Canada to reach this critical milestone, and we will harness every ounce of innovation and ingenuity that we have to get there.

We look forward to this next exciting chapter and to the opportunities ahead for creating greater value for our shareholder and community.

1.2 STRATEGY

This 2021–2025 Strategic Direction represents both a continuation and an expansion of the robust foundation that Hydro Ottawa has built in our strategic planning framework. In light of our success in recent years, together with the trajectory of the company's business and policy environments, we are renewing – rather than replacing – the planning framework for our activity and operations.

First and foremost, our core mission and mandate remain the same – we will continue to create value for our shareholder, our customers, and our community through excellence in the delivery of electricity and related services.

Likewise, we are re-affirming our vision of being a leading partner in a smart energy future. At the same time, however, we are bringing this vision into sharper focus, by identifying "net zero" as a critical characteristic of the future we wish to reach.

Moreover, our core business lines remain unchanged. While we will continue to pursue new opportunities to expand and diversify revenue streams, our activity will be rooted in the areas of electricity distribution, renewable energy generation, and energy and utility services.

Alongside this continuity, we are placing a new emphasis on how sustainability is integrated into all of our business practices. For more than a decade, Hydro Ottawa has been on a journey of balancing growth with environmental protection and social responsibility. Our 2021–2025 plan presents a timely opportunity to reinforce this commitment in a more visible manner.



Our new emphasis is two-fold. First, we are refreshing our approach to how we organize our planning and operations through our Four Key Areas of Focus: Customer Value, Financial Strength, Organizational Effectiveness, and Corporate Citizenship. These areas of performance will be retained, with the most important driver of our strategy remaining Customer Value. However, we are now highlighting how sustainability underpins all of our business activity across these categories of performance.

Secondly, as noted above, we are committing to achieving net zero operations, with 2030 as our targeted timeframe. This overarching objective is consistent with our obligations to help build a vibrant and sustainable national capital, combat climate change, and manage our business responsibly. Through this whole-of-company effort, we will pursue every opportunity – big or small – to improve our sustainability profile.

With respect to the business, operating, and political environments in which we carry out our activity, they have all shifted significantly. Five key change drivers – what we call the "5 Ds" – now define our strategic context: decarbonization; digitization; decentralization; diversification; and demographics. Collectively, and in varying measure, these drivers are shaping the landscape within which we will seek out opportunity and measure our performance, while mitigating risk.

As we cast our glance forward over this five-year horizon, we are excited by the possibilities that await. At the same time, we acknowledge that numerous aspects of our business environment highlight a need for a prudent and disciplined approach to pursuing opportunities, and we plan to calibrate our approach accordingly.

Hydro Ottawa has been around for more than 100 years and has a history of evolving to meet our City's and our customers' ever-changing energy needs. And now we must transform again – in perhaps the most far-reaching way we ever have. Our company is ready, willing, and able to rise to this challenge.



Our 8-Point Strategy



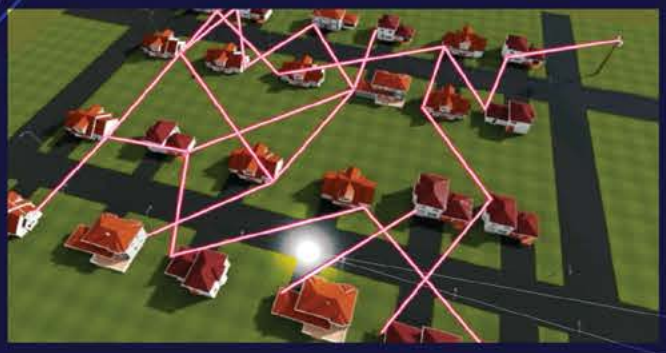
1. Achieve net zero operations by 2030



2. Become the partner of first choice for signature green energy and carbon reduction projects in our community



3. Accelerate digital transformation to enable sustainable business practices



4. Leverage and promote distributed energy resources

5. Continue to grow and diversify our revenue sources



6. Grow our social license to operate



7. Ensure organizational capacity, culture, and leadership to deliver in a post-pandemic environment



8. Continue to provide best-in-class customer service




envari
energy solutions

2. Our Business

Hydro Ottawa Holding Inc. (Hydro Ottawa) is 100 percent owned by the City of Ottawa. We are a private company, registered under Ontario's *Business Corporations Act*, and overseen by an independent Board of Directors consisting of 11 members appointed by City Council.

Hydro Ottawa owns and operates three primary subsidiary companies, around which our core businesses are organized: electricity distribution, renewable energy generation, and energy and utility services. With the Corporation continuing to grow and diversify our business, other operating companies may be created over the course of this Strategic Direction.

Hydro Ottawa Limited

Hydro Ottawa Limited is a regulated electricity distribution company operating in the City of Ottawa and the Village of Casselman. As the third-largest municipally-owned electrical utility in Ontario, Hydro Ottawa Limited maintains one of the safest, most reliable, and cost-effective electricity distribution systems in the province, serving approximately 354,000 residential and commercial customers across a service area of 1,100 square kilometres.

Energy Ottawa Inc. (Portage Power)

Energy Ottawa Inc. operates under the brand Portage Power and is the largest municipally-owned producer of green power in Ontario. It owns and operates six run-of-the-river hydroelectric generation plants at Chaudière Falls in Ottawa's core, along with the historic Ottawa River Ring Dam. In addition, its hydroelectric fleet includes 10 other run-of-the-river facilities in Ontario and New York. Portage Power also holds majority interests in two landfill gas-to-energy joint ventures that convert methane gas into renewable energy at the Trail Road and Laflèche landfill sites in Ottawa and Moose Creek, Ontario. Rounding out its green energy portfolio are 16 solar installations located across the City of Ottawa. In total, the company has over 128 megawatts of installed green generation capacity – enough to power approximately 107,000 homes.

Envari Holding Inc. (Envari)

Envari offers large-scale sustainable energy solutions for municipalities, industrial and commercial clients, and utilities. It manages large energy transformation projects on behalf of its clients, offers a portfolio of energy efficient and environmentally friendly products and services, and provides operations and maintenance capabilities to its customers. The company provides extensive energy services to the City of Ottawa, while also serving a diverse and expanding client base.

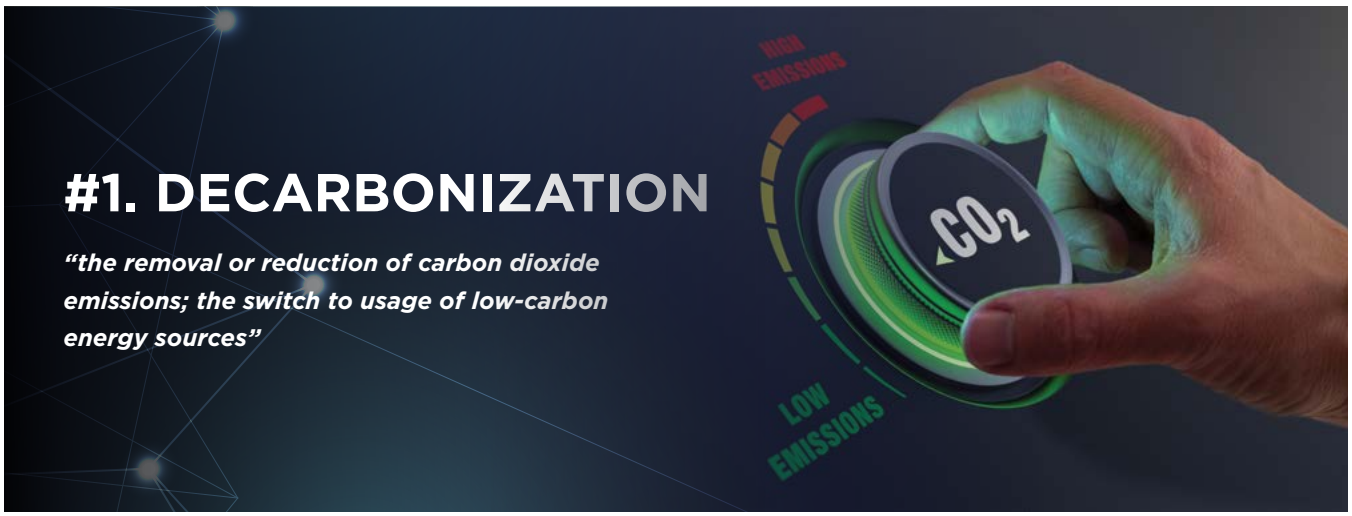

HydroOttawa
PORTAGE

3. Strategic Context

Hydro Ottawa has formulated our 2021–2025 strategy and financial outlook against the backdrop of numerous trends and shifts in our operational, business, and policy environments. Collectively, we refer to these key change drivers as the "5 Ds" – decarbonization, digitization, decentralization, diversification, and demographics.

Each of these factors presents both risks and opportunities, which Hydro Ottawa must successfully navigate as we pursue the vision of being a leading partner in a smart energy future.

3.1 THE "5 Ds"



Climate Change

Our previous five-year strategy followed on the heels of the United Nations Paris Agreement on climate change in 2015. Since that time, the calls from countless governments, scientists, and civil society stakeholders for urgent action to reduce greenhouse gas (GHG) emissions have amplified significantly.

Many of the jurisdictions in which Hydro Ottawa operates are demonstrating leadership on this front. In 2019, the City of Ottawa declared a climate change emergency and later finalized its "Energy Evolution" strategy aimed at boosting the use of local renewables and lowering city-wide emissions by 100 percent by 2050. Across Canada, carbon pricing is now an established cost of everyday living, and will play a key part in the federal government's plans for building a net-zero electricity grid by 2035 and a net-zero economy by 2050. The economy-wide net zero by 2050 target has likewise been codified in New York State, where Hydro Ottawa operates four run-of-the-river hydropower plants.

Emissions reduction is one side of the climate change coin, with the other being adaptation. Hydro Ottawa is no stranger to the push for enhanced measures to adapt to the effects of climate change, having experienced firsthand the adverse effects from the growing frequency of severe weather. From 2017 to 2019, the company was impacted by a 1-in-100-year flood, a 1-in-1000-year flood, six tornadoes, and an array of ice and wind storms. The National Capital Region suffered economic losses in the hundreds of millions of dollars as a result of these events.

Whether from the emissions mitigation or adaptation angle, climate change is one of the biggest challenges –

if not *the* greatest – facing our planet. By committing to achieving net zero operations by 2030, Hydro Ottawa is striving to take action that measures up to the magnitude and urgency of the challenge at hand.

Environmental, Social, and Governance Reporting

Advocacy by government bodies across the world to tackle climate change is not a new phenomenon. What is new, however, is the intensifying push within the international investment and financial community for corporations to address the risks associated with climate change.

In recent years, more investors have sought to integrate climate-related considerations into their investment analysis and decision-making. In turn, disclosures of climate risks are increasingly informing assessments of a company's performance and long-term value.

In addition to climate disclosures, financial markets have also signalled a growing appetite for information related to companies' practices around social issues and corporate governance (e.g. workplace culture, supply chain management, Board diversity, and executive compensation). This movement for increased disclosure of non-financial performance indicators – or what are generally referred to as ESG factors – continues to evolve, with expectations for reporting extending to all for-profit corporations. Many in the private sector are embracing the elevated profile of ESG, arguing that effectively addressing these issues can yield a range of benefits in relation to environmental sustainability, risk management, corporate resilience, cost savings, increased revenue, employee engagement, reputational value, and customer loyalty.

"Greening" Global Energy Investment

In step with the ESG movement, financial markets are also re-shuffling their priorities for energy investments. With climate change risk viewed as investment risk, the cost of new renewable projects dipping below those of conventional power plants in many parts of the world, and institutional investors facing pressure over their fossil fuel holdings, the capitalization of clean energy is flourishing. According to the International Energy Agency, renewables represented 90 percent of new power generating capacity installed in 2020. Similarly, Goldman Sachs projected that 2021 would mark the first year in which global spending on renewable power would eclipse that of oil and gas exploration.

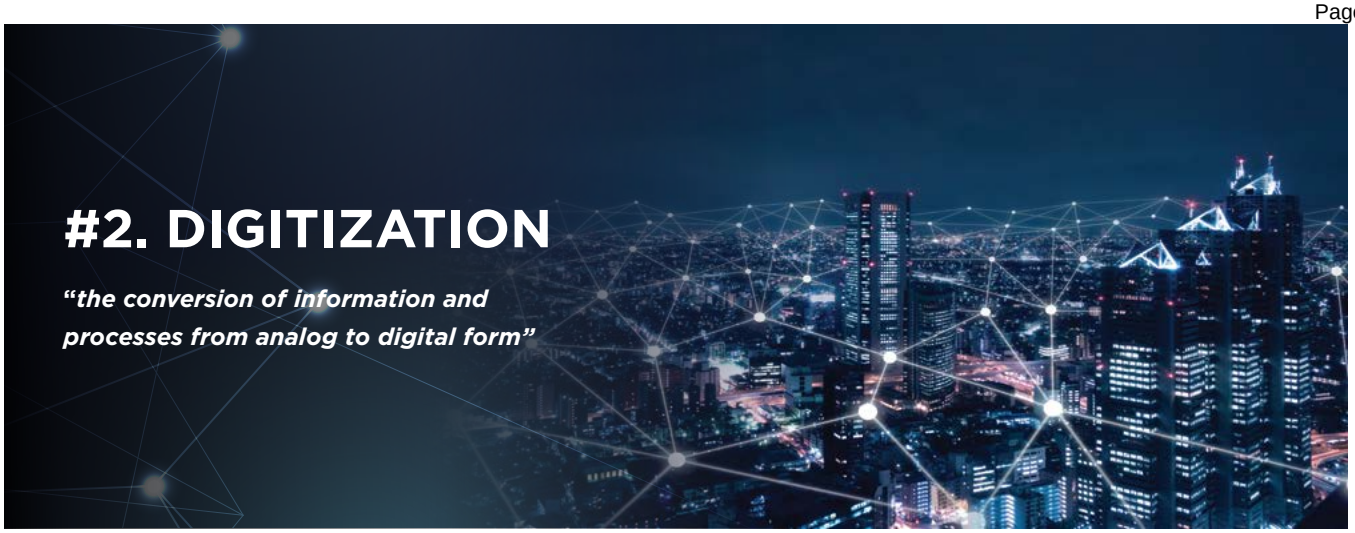
This trend bodes favourably and will open new doors for renewable energy providers like Hydro Ottawa who have established themselves as champions of the transition to a cleaner, smarter energy future.

Increased Electrification of the Economy

The trajectory of climate change policy and private sector investment is moving firmly in the direction of greater electrification across economic sectors, especially transportation, to help lower their emissions profile.

The examples are numerous and continue to multiply. Here in Ottawa, a signature public infrastructure and environmental initiative has been the construction of electrified Light Rail Transit. In its latest long-term outlook for Ontario's electricity grid, the Independent Electricity System Operator (IESO) estimated that the system demand associated with transportation electrification in the province will grow annually by 20 percent through 2040. The federal government, meanwhile, is aiming for 100 percent of light-duty vehicles sold by 2035 to be zero-emitting. Events on the domestic stage mirror developments at the international level, where a critical mass of major economies are engaged in such efforts as incentivizing the manufacture of electric and hybrid vehicles, and promoting greater use of clean electricity in heating and industrial applications.

The continued substitution of non-emitting electricity for fossil fuels will play a critical role in helping Canada to achieve its economy-wide target of net zero emissions by 2050. In fact, Electricity Alliance Canada anticipates that this shift will entail a doubling or tripling of current levels of electric power demand. Under such a massive power system expansion scenario, electricity providers will assume a bigger role in the economy and society. This will present both a need and an opportunity for investments in new infrastructure and value-added services, while further positioning utilities to serve as trusted advisors for customers and enablers of smart energy solutions.



#2. DIGITIZATION

"the conversion of information and processes from analog to digital form"

The Fourth Industrial Revolution

According to the World Economic Forum, the 21st century is in the throes of a Fourth Industrial Revolution. This revolution is characterized by the exponential growth and connectivity of electronics and information technology (IT). Entire industries and systems of production are being transformed by a seemingly continuous cycle of technological breakthroughs in such domains as the Internet of Things (IoT) and artificial intelligence (AI).

Within this landscape, the operational and IT systems that underpin utilities' activities are rapidly evolving. The systems and processes supporting frontline operations and back-office functions are steadily migrating towards digital, mobile-friendly, and cloud-based solutions. Core operational systems continue their convergence with enterprise information systems. Automation is on the rise and is being heralded as having incredible potential to accelerate the transition to a fully autonomous and intelligent electric grid.

Taken together, these trends present a wide spectrum of opportunity for Hydro Ottawa. This includes introducing new service offerings made possible by advanced data analytics, deploying sophisticated tools which can minimize the duration of outages, and accelerating the integration of more distributed forms of energy.

Cyber Security

While the benefits of technological progress are indisputable, the digitization of much of modern life is not without risk. The proliferation of digital platforms and devices presents a wider attack surface in cyberspace for malicious actors. In recent years, the number of ransomware attacks on critical infrastructure – pipelines, hospitals, government agencies, telecommunications providers – has increased by orders of magnitude. In light of the essential function they perform, utilities rank among the most high-value targets. The risk is magnified for an electricity distributor like Hydro Ottawa, which serves the capital city of a G7 country and large customers with unique service quality and data confidentiality needs.

In view of such potential vulnerabilities, the expectations of public sector agencies have amplified with regards to the steps that owners and operators of critical infrastructure must undertake to safeguard their assets. For example, the Ontario Energy Board (OEB) recently implemented a cyber security risk management and reporting framework for utilities under its jurisdiction, while the IESO's mandate was expanded to provide cyber security information services to licensed transmitters and distributors.

Over the coming five-year horizon and beyond, the risks to critical infrastructure will outpace any individual organization's capacity to address them. Among other things, this means that government and industry partnerships will assume heightened importance.



#3. DECENTRALIZATION

"the transition from large, centralized production and networks to smaller, more distributed production and networks"

Smart Grid and Distributed Energy Resources

Over the past 20 years, the implementation of Smart Grid equipment and devices has fostered a more dynamic ecosystem of transactions, participants, and flows of energy, information, and communications. Whereas the 100-year-old model of electricity was premised on a one-way flow of power with no involvement by the end-user, the Smart Grid contemplated enabling the bidirectional movement of electrons and empowering customers as active participants in the system.

In light of the capabilities and opportunities made possible by the Smart Grid, it is widely acknowledged that the electricity sector is on a steady trajectory of transformation towards a much more decentralized paradigm.

As the Smart Grid transition has unfolded, a major area of focus that has emerged is the increased deployment of distributed energy resources (DERs) on local electricity networks. The IESO defines DERs as "electricity-producing resources or controllable loads that are connected to a distribution system or connected to a host facility within the local distribution system." DERs may include solar panels, electricity storage, electric vehicles (EVs), and controllable loads like heating, ventilation, and air conditioning systems and electric water heaters.

In recent years, Hydro Ottawa has witnessed the popularity of DERs rise substantially, with different customer segments pursuing DER solutions for different reasons. Many customers in the MUSH sector (municipalities, universities, schools, hospitals) have installed on-site generation and storage to help offset their electricity costs and benefit from back-up supply in the event of an outage. Several community housing, commercial, and government customers are interested in sourcing power from clean forms of generation in keeping with their corporate sustainability objectives.

Greater penetration of DERs on distribution networks is made possible by Smart Grid technology. In step with the growing digitization of economic activity, future phases of DER adoption are expected to be driven by advanced AI and IoT capabilities, which will enable enhanced modernization, decarbonization, and automation of energy systems.

Numerous signals suggest that consumer and stakeholder interest in DERs will continue to grow over the short- and long-term horizon. Modelling commissioned by the City of Ottawa has identified a need for thousands of megawatts of new capacity in locally-sited, renewable distributed resources in order to achieve Energy Evolution objectives. In addition, the IESO and OEB are collaborating on several initiatives aimed at piloting innovative business models for DER projects, leveraging the benefits of DERs for system planning and operations, and enabling DERs to unlock new revenue streams in Ontario's wholesale electricity markets.

DERs and Aging Infrastructure

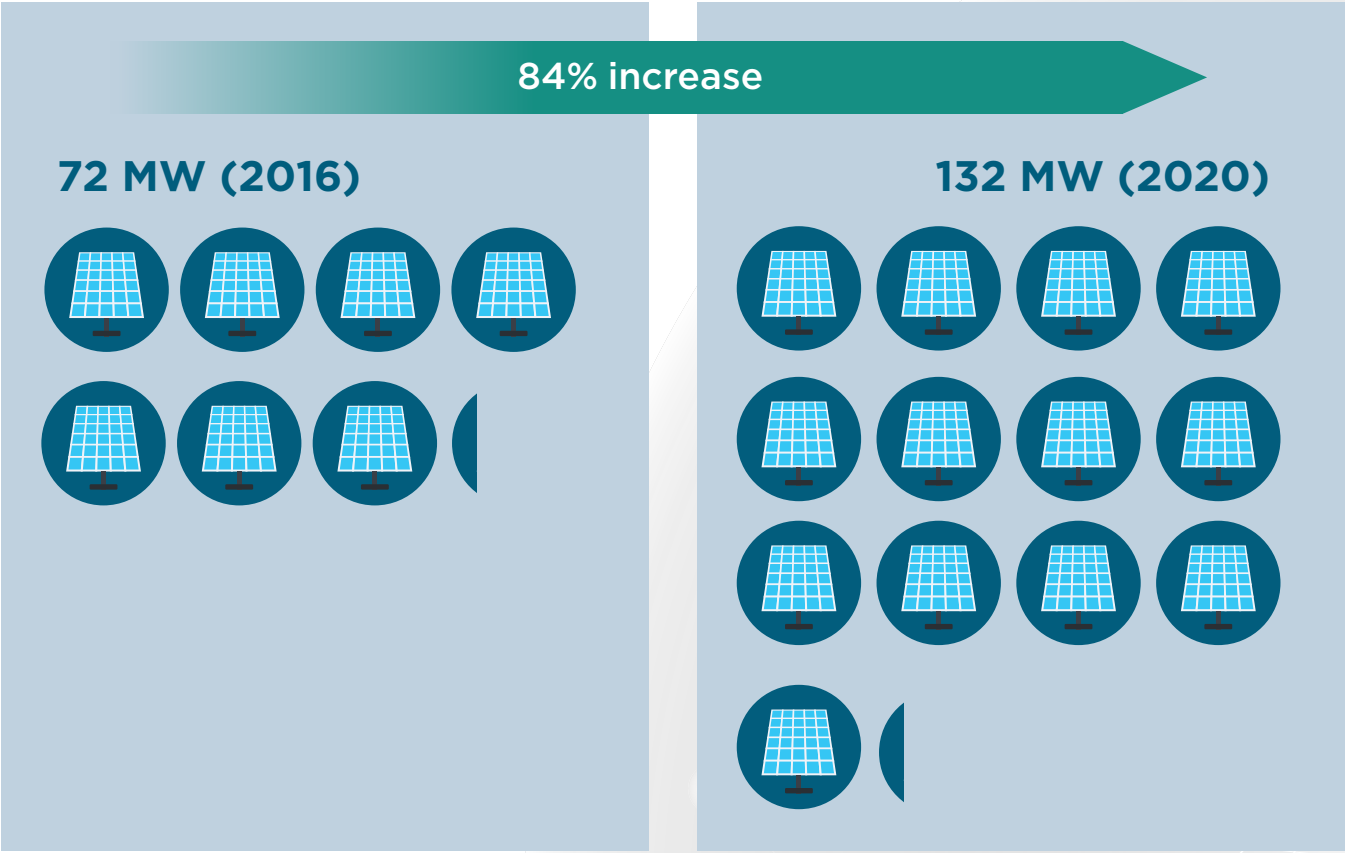
The transition to a more decentralized power system is also overlapping with a significant infrastructure renewal cycle for electric utilities. This presents opportunities for leveraging distributed energy solutions to help address the challenge of aging infrastructure.

Like many electric utilities in Canada, Hydro Ottawa is in the midst of an unprecedented period of infrastructure renewal. Large segments of our system were constructed in the 1960s through 1980s. With most assets having a lifespan of approximately 50 years, the need to replace or refurbish a considerable portion of them has spiked. As it did for 2016–2020, the company has secured OEB approval to execute a major program of investment over the course of the 2021–2025 period.

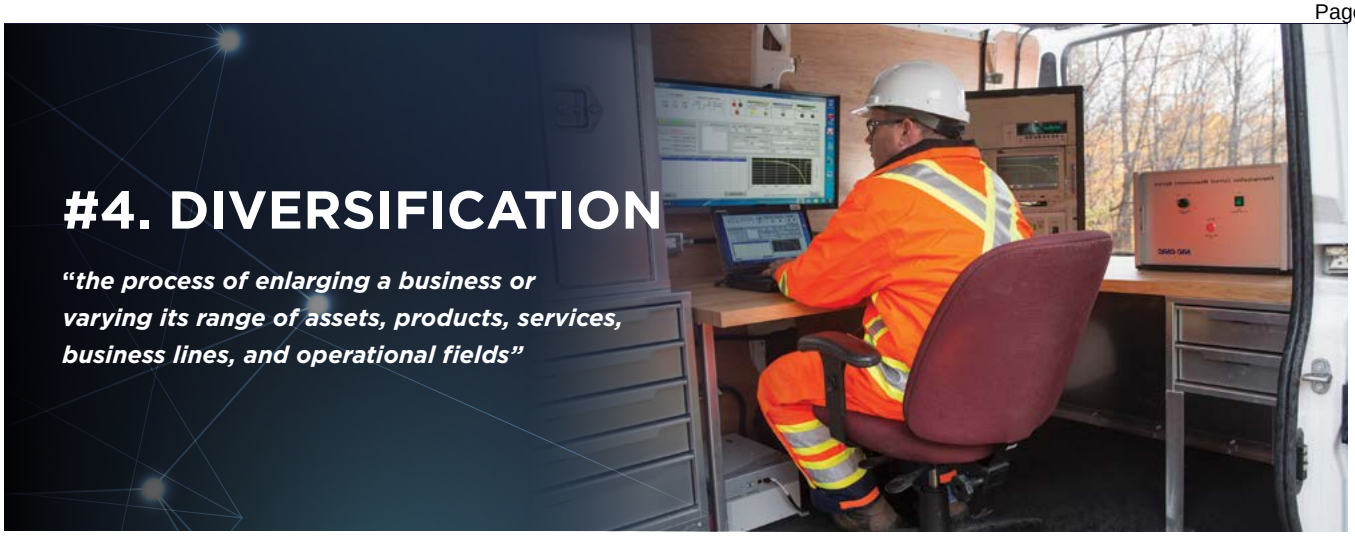
DERs offer utilities the possibility of deferring or reducing the need for certain capital investments, which in turn helps to control costs for consumers. For example, Hydro Ottawa has already begun deploying DERs as non-wire alternatives in Kanata North, where a mix of conservation, load transfer, and voltage reduction solutions has enabled the deferral of a new substation which the IESO had identified as a need. Similarly, the IESO's most recent round of regional planning for Greater Ottawa evaluated a range of DER options to meet local system needs and committed to further assessment of non-wire alternatives to help manage demand growth.

Decentralization thus represents a valuable expansion of the toolbox available for utilities to fulfill their essential responsibilities of maintaining and optimizing grid infrastructure.

Distributed Energy Connected to Hydro Ottawa's Grid



Distributed energy resources connected to our grid include solar, hydroelectric, cogeneration, biomass, and diesel-fired generation, as well as battery storage.



#4. DIVERSIFICATION

"the process of enlarging a business or varying its range of assets, products, services, business lines, and operational fields"

Evolution of the Utility Business Model

As noted above, the rising tides of decarbonization, digitization, and decentralization present intriguing challenges and opportunities for planners and operators of the electricity system. In a similar vein, these change drivers have raised questions around fundamental aspects of the utility revenue model.

In particular, the historical assumption of customer growth equating to electricity consumption growth no longer holds true. Innovative tools, technologies, and data sets have enhanced customer control over their energy use, while also introducing options around self-supply. Moreover, advances in efficiency and conservation have enabled increased use of devices and appliances to coincide with declines in overall consumption. Together, these trends have injected risk into utilities' revenue profile.

Conversely, however, the push to decarbonize, digitize, and decentralize presents a host of opportunities. Customer demand for leading-edge solutions and analytics is growing rapidly. With direct, long-standing, and trusted relationships with individual customers, utilities are uniquely positioned to meet the evolving needs for value-added services which extend beyond the mere provision of electrons.

In many ways, Ontario is becoming a laboratory for innovative diversification in the sector. In 2015, for example, restrictions in the *Ontario Energy Board Act* relating to permissible business activities for distributors and their affiliates were lifted. This sent a powerful signal in support of diversification, with several distributors having subsequently established new business lines in such areas as civil construction, data services, and sub-metering. In addition, as noted above, the OEB and IESO are collaborating on several initiatives to pilot new business and operational models for DERs.

To be sure, Hydro Ottawa has been a leader amongst our peers, with our successful journey of diversification stretching back well over a decade. That said, the acceleration and convergence of major change drivers in the sector mean that more players are becoming attuned to the diversification imperative, with the marketplace set to become significantly more competitive and crowded as a result.

Consolidation and Shared Services in Ontario's Distribution Sector

Approximately 60 local distributors provide electricity to the province's 5.3 million customers. For many years, public policy has sought to encourage and incentivize consolidation within the distribution community. What's more, numerous aspects of the sector's evolution and the changing utility business model seem to favour economies of scale in a distributor's operations and activities. It is therefore not altogether surprising that the sector has witnessed a steady succession of consolidations in recent years, along with an uptick in shared services agreements.

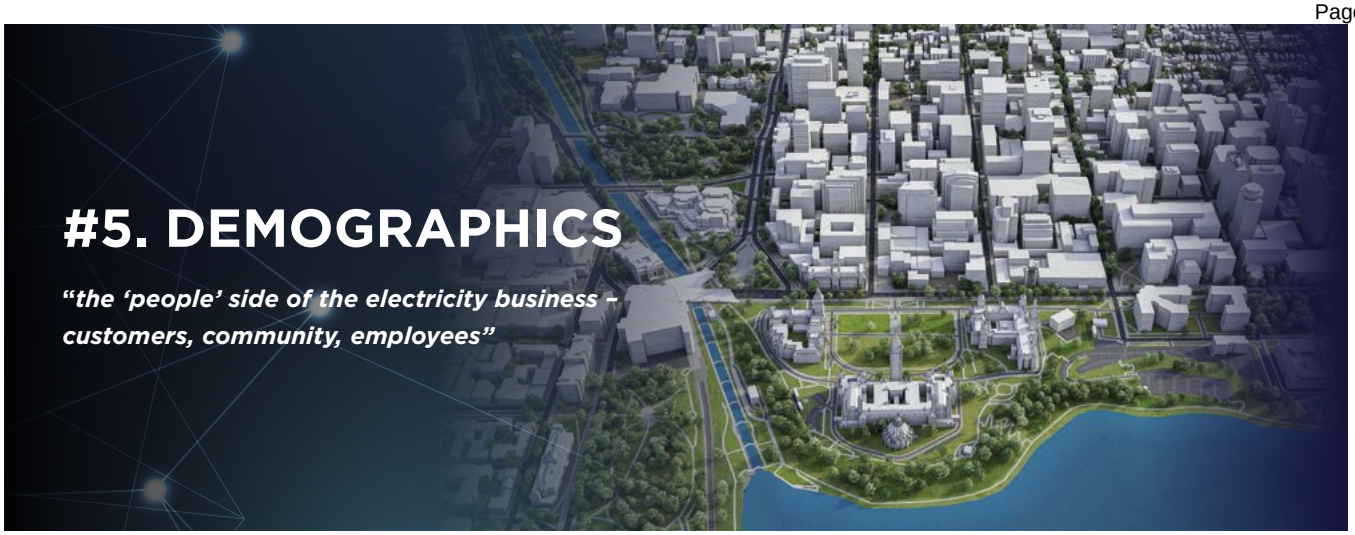
The footprint of distributors across Eastern Ontario means that Hydro Ottawa remains well-positioned to pursue consolidation opportunities. Similarly, the company's range of experience with shared services has underscored the value of targeted partnerships with peers, where appropriate. Going forward, these options will remain important parts of the company's diversification toolkit.

Redesign of Ontario's Electricity Market

Since 2016, the IESO has been exploring enhancements to the design and administration of Ontario's wholesale power markets. Several proposed reforms will be highly relevant for Hydro Ottawa, including the adoption of competitive auction mechanisms for procurement of new electricity supply, as well as expanded eligibility for new players, products, and services (including DERs) to participate in the market. Under the IESO's timelines, initial reforms are slated to take effect in Fall 2023, just beyond the mid-point of Hydro Ottawa's 2021–2025 Strategic Direction term.

For electricity distributors and generators, the changes emanating from these reforms may represent a double-edged sword. On the one hand, they represent a shift away from the model of awarding long-term power purchase agreements to generators for new supply, which has supported much of Hydro Ottawa's recent growth in renewable capacity. On the other hand, to the extent that market redesign serves as a platform for developing new product and service offerings, as well as exploring the establishment of localized electricity markets to stimulate expansion of renewable and distributed resources, the initiative could also open the door to business and revenue opportunities.





#5. DEMOGRAPHICS

"the 'people' side of the electricity business – customers, community, employees"

Evolving Customer Needs and Expectations

A focus of this Strategic Direction, as well as our prior five-year plan, is how the changing role of the customer is fueling transformation in the electricity sector. This trend shows no signs of abating. The expectations for customized service, control, and convenience continue to expand. They cover a broad range of interests, from controlling costs to enjoying more flexible service options to participating directly in the electricity marketplace.

Importantly, expectations often vary across different segments of the customer base. For example, throughout the COVID-19 pandemic, with more customers working and learning from home, the needs of residential customers necessitated changes to the way Hydro Ottawa performs maintenance on the grid; planned power outages had to be limited to critical situations only. Meanwhile, for many commercial customers, an issue of primary concern has been flexible payment plans, which have played a vital role in assisting businesses in managing the impacts and disruptions of public health restrictions.

Furthermore, some shifts in customer behaviour mirror broader shifts in population demographics and public attitudes. More and more of our customers are comfortable with digital services and interactions, as borne out by the growing number of registrations for online accounts and e-billing. Likewise, customer feedback signals rising support for Hydro Ottawa's investments in green energy and focus on sustainability, consistent with opinion polls finding increased support for action on climate change.

The shifting sands of customer needs and choices present exciting opportunities for enhancing customer value and service. To realize these opportunities, electricity providers will need to continuously improve the way they do business and the services they offer. Creating a more effortless and engaging customer experience will be essential, with "easy and fast" being the standard by which success will be measured.

A Mixed Outlook for Our Community

Looking ahead over the 2021–2025 horizon, the economic forecast for our community features both tailwinds and headwinds.

Grounds for optimism include expectations for the continuation of steady growth which the City of Ottawa has experienced in recent years. In renewing its 25-year plan to guide municipal development, the City has forecasted a 22 percent increase in population by 2026, relative to 2016 levels. What's more, according to London Economics, the Ottawa region enjoyed the strongest ranking of any metropolitan area in Ontario in terms of the resiliency of its electricity load profile as well as its sensitivity to the public health restrictions imposed to mitigate COVID-19.

However, as one illustration of the challenges that will linger even after the brunt of COVID-related impacts dissipate, the Conference Board of Canada is not expecting Ottawa's unemployment rate to revert to pre-pandemic levels until 2024. Similarly, there are several broader economic trends from which our community is not immune. A report from MNP found that over 50 percent of Canadians were $200 or less from not being able to meet all of their bills and debt obligations each month. In addition, there remain enduring concerns around the affordability of electricity in Ontario, with commodity costs having risen steadily over 15 years and relief programs occupying a growing share of the provincial budget.

Taken together, these factors underscore what will be a heightened need over the 2021–2025 term for Hydro Ottawa to be attuned and responsive to the pressures facing our community, and to proactively pursue initiatives aimed at helping our city to move forward.

Workforce and Workplace of the Future

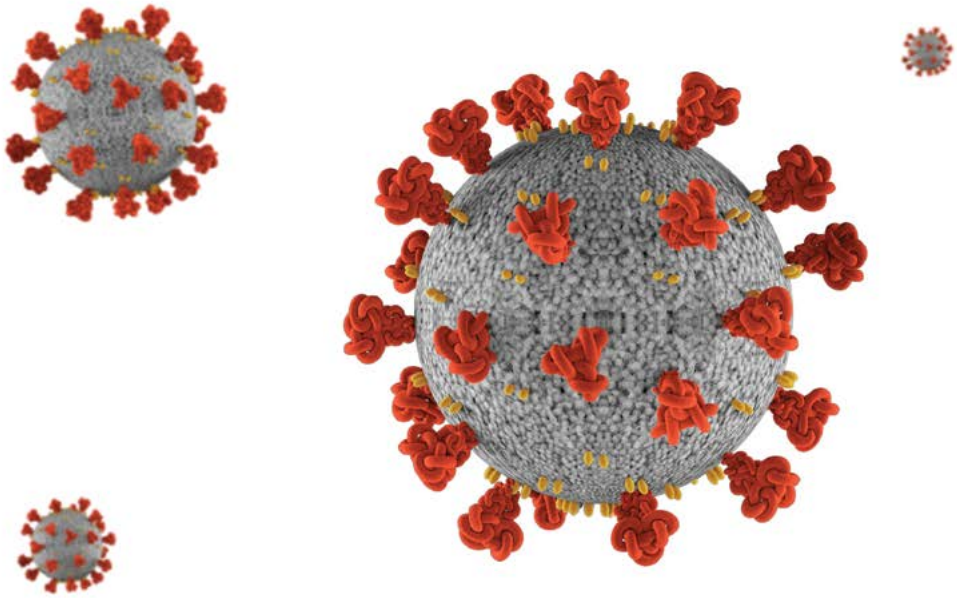
This Strategic Direction is being released against the backdrop of historic shifts in the labour market, many of which have been accelerated by COVID-19. These include the movement towards remote work environments; the digitization and automation of core business platforms and processes; increased utilization of "gig" or freelance workers; a greater focus on fostering cultures of collaboration and shared purpose; and a heightened emphasis on employee diversity, equity, inclusion, and empowerment. At the same time, the pandemic has prompted an exceptional uptick in employee resignations, giving rise to what is being called "The Great Resignation" and triggering a "war for talent" amongst employers who find themselves having to implement different approaches and incentives in order to fill vacant positions.

On their own, these shifts in the popular understanding of the nature of work and the workplace will have significant implications for how employers will be able to attract, retain, and nurture talent going forward. When layered on top of pre-existing workforce challenges, especially the utility industry's struggle with the number of skilled workers eligible for retirement, the complications are compounded further. The ability of Hydro Ottawa to proactively prepare for and mitigate these impacts will be a critical determinant of whether core business objectives and customer needs are met over the next five years and beyond.



3.2 ADDITIONAL CONSIDERATIONS

In addition to the "5 Ds", there are two other critical factors whose impact on our strategic context for the 2021–2025 period is unique and substantive.



COVID-19 Pandemic

At the time of the formulation of this Strategic Direction, the world continues to grapple with the effects of the COVID-19 pandemic. The lives of our community, customers, employees, and other stakeholders have been disrupted in an unprecedented manner, to say nothing of the severe mortality and economic impacts. The pandemic is expected to have an ongoing effect on how people live, work, and play – certainly in the near term, if not the long term. Hydro Ottawa will be affected by any such societal changes that occur.

Relationship with the City of Ottawa

Hydro Ottawa enjoys a special and multi-faceted relationship with our namesake city. The municipality is our shareholder, our customer, and our community. Hydro Ottawa and the City have forged an exemplary partnership over several decades that has helped both parties achieve their respective mandates and objectives.

Looking ahead to the 2021–2025 horizon, there will be numerous opportunities for leveraging and growing the relationship. Hydro Ottawa will be a committed ally in the City's push to achieve early momentum in advancing its objectives for decarbonizing local energy systems and reducing Ottawa's emissions profile. At a time when the City faces many competing pressures, including those arising from COVID-19 and its ongoing effects, the company can likewise lend support to the planning and delivery of major community-building projects, such as the next phase of Light Rail Transit, expansion of The Ottawa Hospital, and development of Lebreton Flats.

All told, this refreshed Strategic Direction term looks set to mark a new chapter in the valued collaboration with our municipal partners.


LANDFILL GAS
LANDFILL GAS
LANDFILL



4. Strategic Direction

4.1 OUR MISSION

To create long-term value for our shareholder, benefiting our customers and the communities we serve

Hydro Ottawa is both a community asset and an investment for our shareholder, the City of Ottawa. As a community asset, our purpose is to provide efficient and reliable services and a first-class customer experience, and to continue to be a strong strategic partner with the City, helping to deliver on its economic development and environmental agendas. As an investment, our purpose is to provide stable, reliable, and growing returns, and to increase shareholder value both in the short and long term.

4.2 OUR GUIDING PRINCIPLES

Hydro Ottawa is committed to creating long-term value in a manner that will withstand the test of public scrutiny and inspire confidence and trust. To that end, we strive to achieve excellent operating and financial results while abiding by professional standards of conduct. We are guided not only by legal obligations, but also by best governance and business practices, and standards established by independent agencies. These expectations provide the foundation for our commitment to all of our stakeholders, and are reflected in our organizational values, our Code of Business Conduct, and our operating policies and procedures.

These guiding principles have served Hydro Ottawa and our stakeholders well over the course of successive strategic planning cycles. They are more relevant than ever in light of rising public and private sector interest in ESG factors, and thus attest to Hydro Ottawa's leadership as a forward-thinking and purpose-driven corporation.

4.2.1 OUR ORGANIZATIONAL VALUES

At Hydro Ottawa, we are committed to an organizational environment that fosters and demonstrates ethical business conduct at all levels and reflects our shared values of teamwork, integrity, excellence, and service. Every employee must lead by example in this endeavour.

4.2.2 OUR COMMITMENTS TO OUR STAKEHOLDERS

Hydro Ottawa takes into account the interests of all our stakeholders including employees, customers, suppliers, our shareholder, and the communities and environment in which we operate.

Employees

The quality of our workforce is our strength and we will strive to hire and retain the best-qualified people available and maximize their opportunities for success. We are committed to maintaining a safe, secure, and healthy work environment enriched by diversity and characterized by open communication, trust, and fair treatment.

Customers

Our continued success depends on the quality of our customer interactions, and we are committed to delivering value across the entire customer experience. We are honest and fair in our relationships with our customers, and provide reliable, responsive, and innovative products and services in compliance with legislated rights and standards for access, safety, health, and environmental protection.

Suppliers and Contractors

We are honest and fair in our relationships with our suppliers and contractors. We purchase equipment, supplies, and services on the basis of merit, with a preference for local procurement. We pay suppliers and contractors in accordance with agreed terms, encourage them to adopt responsible business practices, and require them to adhere to our health, safety, and environment standards when working for Hydro Ottawa.

Community and the Environment

We are committed to being a responsible corporate citizen and will contribute to making the communities in which we operate better places to live and do business. We are sensitive to the community's needs, and dedicated to protecting and preserving the environment where we operate.

Shareholder and Other Suppliers of Finance

We are financially accountable to our shareholder and to the institutions that underwrite our operations, and communicate to them all matters material to our organization. We protect our shareholder's investment and manage risks effectively. We communicate to our shareholder all matters that are material to an understanding of our corporate governance.




PORTAGE
POWER | ÉNERGIE

4.3 OUR VISION AND STRATEGY

4.3.1 OUR VISION

Hydro Ottawa – a leading partner in a smart energy future

Leading…

For Hydro Ottawa, leading means consistently being among the top performers in the business, in every critical area of our operations, and being regarded as a credible and trusted voice in our industry, helping to shape policy, regulatory, and operational responses to the critical issues of the day.

Leading means not merely reacting effectively to the transforming utility landscape, but proactively seeking opportunities to accelerate the adoption of smart and sustainable energy solutions. We want our customers and our community to have the benefits this can provide, and we think local utilities have a critical role to play in making these solutions a reality.

To ensure we are leading, we will continue to recruit and fully leverage the talents of great people, listen to innovators and stakeholders in our community, partner with educational institutions, and work closely with other leading companies to help drive innovation.

Partner…

Utilities such as Hydro Ottawa will play a critical role in building a smart energy future, but we are not the only essential players. Indeed, customers are becoming the most important participants in the electricity market. The transition to a smart energy future will be driven by consumers' needs, preferences, and objectives.

At the same time, customers and communities can reach these goals faster and more fully when their local utility is proactive and innovative. The customer is at the centre of our business, and our aim is to be their trusted advisor and energy partner.

As a City of Ottawa-owned company, we are equally committed to the well-being of our community. We will continue to be a strong partner with our shareholder, helping to deliver on its energy, economic development, and environmental agendas.

Partnership means working together, in ways that may be familiar or new. It means re-examining our work methods and being flexible, entrepreneurial, and open to new possibilities.

…in a Smart Energy Future

There are many descriptions of what "smart energy" looks like. What we mean is an energy system that makes effective use of available technologies to maximize consumer, community, and environmental benefit. By definition, then, it is sustainable, customer-centric, reliable, cost-effective, secure, and constantly evolving. It is responsive to shifting needs and opportunities, and focused on tangible benefits.

This provides a standard for assessing progress towards our vision – how sustainable, customer-centric, reliable, cost-effective, secure, and responsive is the energy system we are helping to create? The goalposts are continuously moving as technology and consumer needs evolve, but these criteria help us to know if we are advancing in the right direction and at the right pace.

Smart energy is also a foundational component of a Smart City, and Hydro Ottawa will welcome opportunities to collaborate in the pursuit of that objective.

4.3.2 OUR STRATEGY

The essence of Hydro Ottawa's strategy is to put the customer at the centre of everything we do. Reorienting our business around the customer was the primary goal of our previous Strategic Directions, and customer centrality continues to drive our business strategy.

One of the key ways in which we have sought to maximize value across the customer experience is through a rigorous commitment to sustainability and the implementation of sustainable business practices. This approach has yielded numerous benefits from a customer perspective, including increased availability of digital services, expanded access to local sources of renewable energy, and a growing menu of advanced energy solutions and expertise.

In this Strategic Direction, we are putting even more emphasis on sustainability, including doing our part to address the generational challenge of climate change. This positions us to meet the needs of an evolving electricity marketplace and enhance our responsiveness to customer and stakeholder priorities.

Accordingly, our strategy for the 2021–2025 period involves:

- Achieving net zero operations by 2030;
- Becoming the partner of first choice for signature green energy and carbon reduction projects in our community;
- Accelerating digital transformation to enable sustainable business practices;
- Leveraging and promoting distributed energy resources;
- Continuing to grow and diversify our revenue sources;
- Growing our social license to operate;
- Ensuring organizational capacity, culture, and leadership to deliver in a post-pandemic environment; and
- Continuing to provide best-in-class customer service.

To ensure we have the scale, financial capacity, and culture of innovation necessary to deliver on this agenda, our strategy includes a continued focus on strategic business growth within our core areas of strength. Our growth agenda involves four basic components:

- **Electricity Distribution:** expanding our grid to accommodate new customers and continuing to evaluate opportunities to increase our service territory;
- **Renewable Generation:** increasing the supply of clean energy for customers and earnings for our shareholder by making smart investments in renewable generation;
- **Energy Services:** providing innovative and sustainable solutions to help consumers, businesses, public sector agencies, and communities meet their energy objectives through energy management, conservation, efficient streetlighting, energy generation, energy storage, EV charging, suite metering, district energy, demand response, and GHG reduction, monitoring, and reporting opportunities, among others; and
- **Utility Services:** leveraging our assets and expertise to help other utilities to enhance the value they provide, creating new revenue streams and economies of scale.

To keep us on course in achieving our strategy, this Strategic Direction is structured around four critical performance categories that have stood the test of time and driven our success to date – our Four Key Areas of Focus. They will guide our activities throughout the current plan as well, with Customer Value continuing to be the central driver of our business strategy and with greater emphasis on sustainability across our business practices.



4.4 DELIVERING ON OUR VISION – FOUR KEY AREAS OF FOCUS

CUSTOMER VALUE

We will deliver value across the entire customer experience

- by providing reliable, responsive, and innovative services at competitive rates

FINANCIAL STRENGTH

We will create sustainable growth in our business and our earnings

- by improving productivity and pursuing business growth opportunities that leverage our strengths – our core capabilities, our assets, and our people

CORPORATE CITIZENSHIP

We will contribute to the well-being of the community

- by acting at all times as a responsible and engaged corporate citizen

ORGANIZATIONAL EFFECTIVENESS

We will achieve performance excellence

- by cultivating a culture of innovation and continuous improvement

NET ZERO BY 2030
A FIRST FOR ANY MUNICIPAL UTILITY IN CANADA

A cornerstone of this Strategic Direction is a whole-of-company initiative to become the first municipally-owned utility in Canada to achieve net zero operations. Our goal is to reach this critical milestone by 2030.

This is an ambitious undertaking that cuts across all our Key Areas of Focus and represents a natural next step in our company's sustainability journey. For more than a decade, we have been working to reduce the environmental impact of our operations – for example, by greening our fleet, diverting a high percentage of our waste, and designing and building our new facilities to LEED Gold standards. We have also contributed to a cleaner, healthier environment in our community by developing local sources of renewable energy, expanding access to EVs, and supporting sustainable forms of public transit such as light rail and zero-emission buses. As a result, Electricity Canada designated Hydro Ottawa as a Sustainable Electricity Company™ in 2021.

But the generational challenge of climate change requires that we all move faster to reduce our emissions and Hydro Ottawa is committed to leading the way in our sector. Achieving net zero means reducing our emissions as much as possible, and counterbalancing the remainder with the removal and avoidance of an equivalent (or greater) amount of emissions from the atmosphere.

Our immediate focus will be on minimizing our own footprint to the lowest feasible level, moving as much of our vehicle fleet as possible to zero-emissions technology and decarbonizing energy use at our facilities. We will also work with our employees and contractors to reduce emissions beyond our direct control, such as emissions from commuting. Beyond these priority areas, we will examine potential investments in carbon avoidance and removal opportunities, which may include reforestation or other nature-based solutions.

Moreover, through our leadership in this space, we hope to act as a catalyst for other organizations and stakeholders in our community to take similar action. Where we can lend support in sharing our experience and expertise, we will certainly do so.

Hydro Ottawa is developing an action plan – informed by our customers, employees, and other stakeholders – to guide our way forward. Admittedly, it may be some time before we have the detailed roadmap to reach our destination. But our commitment is firm – net zero is going to happen. We will dig as deep as we need to in order to get there.

We draw inspiration from U.S. President John F. Kennedy's "moonshot" initiative. When he first announced plans to land astronauts on the moon and return them safely to Earth, there was no known capability to achieve this ambitious vision. But through ingenuity and resolve, JFK and his successors made their goal a reality – and so will we.



4.4.1 CUSTOMER VALUE

As a company that provides an essential service to the public, nothing is more critical to Hydro Ottawa's success than the ability to deliver value to our customers.

We know that "value" can mean different things across our diverse demographic of residential, small business, large commercial, and institutional customers. In addition, we are acutely aware that it is not just the needs of our customers that are evolving, but their place within the larger electricity system as well. For example, customers are no longer just passive consumers of electricity. Some are becoming "prosumers" – managers, generators, and sellers of their own energy, equipped with sophisticated tools and a growing mix of options.

This changing energy landscape, along with our goal of helping to lead a smart energy future, requires a shift in how we understand and interact with our customers. Utilities have traditionally viewed customers as the delivery point located at the end of a wire, but this lens is outdated and inadequate. Our understanding of our customers and how we can meet their energy needs has to be broader and deeper. Fortunately, Hydro Ottawa has been at the vanguard of our industry for more than a decade in evolving our thinking along these lines. As a result, we are well-suited to an environment in which customer profiles and preferences are becoming more complex.

With this in mind, we have adopted a whole-of-company customer experience strategy for the 2021–2025 period. By developing a customer-centric culture and investing in leading-edge services, technologies, and processes, we envision a customer experience defined by the four following outcomes:

- **Convenience** – Hydro Ottawa is an easy company to do business with
- **Choice** – customers have options to meet their needs and goals
- **Control** – customers are empowered to manage their energy use and costs effectively and sustainably
- **Communication** – Hydro Ottawa communicates with customers through their preferred channel in a way that is caring, knowledgeable, proactive, and efficient

Different segments of our customer base may have distinct interpretations of what these outcomes will look like. The challenge and opportunity for Hydro Ottawa is to be responsive to these varying needs, and to maintain customer satisfaction in tailored ways. We are confident that we have the right strategy to achieve this balance and to build on our strong record of service and satisfaction.



New Products and Services

During our previous strategic planning term, Hydro Ottawa expanded our menu of innovative product and service offerings for customers. Examples include a best-in-class mobile app, a voice assistant Smart Speaker skill (the first of its kind by a Canadian electric utility), a pilot program to study at-home EV charging patterns, and contact centre service on Saturdays.

In the coming years, Hydro Ottawa will continue raising the bar when it comes to products and services that add value to customers and simplify interactions with the company.

A focal point will be accelerating the digital transformation of our business, using the power of technology to offer enhanced service to customers anytime and anywhere. Among its other impacts, the COVID-19 pandemic elevated customer expectations for easy and fast online service. Meeting and exceeding these expectations is now table stakes for electricity providers.

Accordingly, we will explore opportunities for more service automation and integration of AI. Our aim is to provide an automated, digital solution to fulfill any transactional need that does not require support from a customer service agent (although agents will of course remain available to assist whenever needed). For example, deployment of AI-powered chatbots will provide a 24/7 capacity to assist customers with general inquiries and self-serve requests. Enhanced outage communications will likewise be a priority, with the goal of timely automated notices for both planned and unplanned outages.

Similarly, a signature program for the next five years involves establishing a 360-degree view of customer activity. A customer's engagement with Hydro Ottawa may take numerous forms – phoning the Contact Centre, using our mobile app, requesting a specific service, responding to a survey, or posting on social media. A holistic picture of the many touchpoints through which a customer connects with us will offer enriched intelligence and, in turn, enable a more personalized experience.

As we push to expand and enhance our digital service offerings, Hydro Ottawa will ensure that the privacy of customer data is effectively safeguarded. To this end, the company is set to implement a new framework for the protection, use, disclosure, and retention of customer data.

Sustainable Energy Solutions: Emissions Reduction, Distributed Energy Resources, and Conservation

More businesses and MUSH sector entities (municipalities, universities, schools, hospitals) are signalling interest in greening their operations and enjoying more control of their energy options. Accordingly, we are committed to becoming our customers' preferred partner for sustainability solutions.



Whether it is a community housing provider seeking to lower its energy costs, a mixed-use building exploring rooftop solar and on-bill credits for tenants, an institutional campus planning a district energy system, or a business owner who wants a storefront EV charger, Hydro Ottawa will be there to help these customers bring their aspirations to life.

We are well-positioned for such a role, having cultivated green energy and carbon reduction service offerings, skill sets, and expertise across our lines of business. Our energy services arm, Envari, is the City of Ottawa's preferred energy management partner, and numerous opportunities exist for similar arrangements with other commercial and MUSH sector clients. A major priority for the next five years will be strengthening Envari's position as the go-to provider of energy efficiency and sustainability solutions for customers.

Furthermore, within our distribution business, Hydro Ottawa is actively testing how decentralized grid technologies can meet both customer and system needs. Through the OEB Innovation Sandbox, we are collaborating with the City, clean energy stakeholders, and community housing groups on several pilot projects. These initiatives contemplate the use of virtual net metering and DERs to assist customers in generating their own renewable power, using electricity more efficiently, and reducing the emissions profile of heating systems in buildings. There is likewise potential for DERs to help meet system capacity requirements that will be identified through the next round of the IESO's regional planning process, which is slated to take place towards the end of the 2021–2025 period.

Similarly, although the provincial government has centralized the delivery of conservation and demand management (CDM) programs, Hydro Ottawa will continue offering CDM services to our customers. As part of the settlement of our 2021–2025 distribution rate application, we were successful in retaining in-house CDM resources. We intend to place this competitive advantage at the service of customers, supporting them in reducing demand and achieving energy savings.

A Reliable, Modernized Smart Grid

Innovative digital services and decentralized energy solutions present exciting possibilities for customers. At the same time, they will help us fulfill our customers' greatest expectation – the safe and reliable operation of the grid. Ultimately, we know that our value proposition as an electricity provider begins and ends with reliability.

During the 2016–2020 period, we completed the largest distribution capital investment program in our history, with aging infrastructure posing a heightened need for asset replacement, and with population growth requiring more capacity and new customer connections. These investments have proved their value several times over. Amongst our peers in Ontario, Hydro Ottawa has maintained the strongest overall reliability performance in recent years. We have also been able to recover more quickly from severe weather, as illustrated in 2018 when we restored power to 95 percent of customers within 72 hours of six tornadoes wreaking havoc across our city.

Challenges like aging infrastructure and system constraints will carry over into this new Strategic Direction term. Although investment will not match the historic highs of the last five years, it will nevertheless be significant, with $505 million in capital spending planned in order to address infrastructure, equipment, and workforce needs.

As in recent years, a key principle for our 2021–2025 program is that system modernization goes hand-in-hand with system investment. As we replace aging infrastructure, we are also transforming our system into an intelligent, automated, and resilient grid to meet the needs of the future.

Our plan therefore includes the implementation of an Advanced Distribution Management System, which will optimize the integration of DERs and enable "self-healing" capability – i.e. automated outage restoration. In addition, with first-generation smart meters having reached end-of-life, Hydro Ottawa will roll-out advanced metering infrastructure with enhanced data analytics capability, presenting opportunities for new insights and improved services to customers. Linking many of these Smart Grid initiatives together will be a 245-kilometre network of fibre optic infrastructure which was installed over the last few years and which will serve as the high-speed communications backbone for our system.

In addition, we will provide greater supply capacity for growing parts of our service territory. In 2022, Hydro Ottawa will energize the largest substation project in our history – the Cambrian Municipal Transformer Station. Cambrian will provide much-needed capacity to southern Ottawa, which is experiencing significant population and economic growth. The station has the added benefit of utilizing transformers with reverse power flow capability, which are designed to accommodate the injection of locally-sourced clean electrons onto the grid – representing a win-win for customers and the environment.

Grid investment will also enhance our resilience to climate change. As part of our most recent rate application to the OEB, we undertook a formal distribution system climate risk and vulnerability assessment. Over the course of 2021–2025, we will implement the action plan emerging from this study.

Through COVID-19 and Beyond

As a final point, it merits acknowledgement that this Strategic Direction is being released in the midst of a fluid public health landscape, with our community still navigating the impacts of COVID-19. Since day one of the pandemic, Hydro Ottawa has sought to do everything we can to support customers: offering flexible payment plans; advocating for provincial relief; limiting planned outages; and contributing to community assistance programs. While the impacts of COVID-19 have been severe, the light at the end of the tunnel is growing brighter as we finalize this Strategic Direction. Regardless of how long it takes, and mindful that a post-pandemic environment may present new circumstances and challenges, we are committed to supporting our customers with the utmost care and flexibility, and to upholding our pledge to put them at the centre of everything we do.



4.4.2 FINANCIAL STRENGTH

Over the course of our most recent strategic planning cycles, Hydro Ottawa has achieved strong financial results, having largely met or exceeded the targets set out in our five-year plans.

Like the vast majority of businesses, our revenues were adversely impacted by COVID-19. Nevertheless, the company was still able to achieve 108 percent of our dividend target and 97 percent of our net income target for the 2016–2020 period – an impressive result, given the circumstances.

Since 2004, Hydro Ottawa has delivered over $300 million in dividends to the company's shareholder, the City of Ottawa. These payments help fund municipal programs and services. And in recent years, the City has allocated the portion of our dividend payment exceeding our annual baseline commitment to energy efficiency and renewable projects. Under this new Strategic Direction, the cumulative dividend total will increase to nearly $415 million by 2025.

Our objective over the next five years is to continue this trend of solid financial performance, while creating sustainable growth in our business and our earnings. To achieve this, Hydro Ottawa will maintain a focus on strategic growth within our core areas of strength and continue our evolution into a more vertically-integrated corporation.

Notably, Hydro Ottawa will achieve a significant milestone during this Strategic Direction cycle, with annual revenues surpassing $300 million for the first time in the company's history.

Access to capital was a key priority in our previous strategy, in view of the $1.1 billion required investment in distribution and generation infrastructure. It will remain a necessary focus for the new five-year term. We will continue to diligently explore opportunities to reduce costs through prudent financing strategies, building on successes such as our $291 million Green Bond issued in 2019 – a first of its kind for a municipally-owned electricity provider in Canada.

Hydro Ottawa may again go out to the bond market during the 2021–2025 period. We understand that lenders will expect ESG measures to be a key component of that process. Accordingly, the company will continue to augment our ESG reporting over the course of this Strategic Direction timeframe.

Electricity Distribution

The Ontario Energy Board's approval of Hydro Ottawa's electricity distribution rates for 2021–2025 puts our regulated business on a stable financial footing throughout the period of this plan. This will allow Hydro Ottawa to make important investments in our distribution system to maintain reliable service, without compromising the company's financial strength.

At the same time, revenue growth under the current regulatory model will remain modest. In order to manage the challenges of aging infrastructure, grid expansion, technological evolution, and workforce modernization, we are maintaining our focus on cost containment and productivity improvement.

Our attention on this front will be amplified by a unique provision in our OEB-approved rate plan. Five performance metrics were established with corresponding annual targets. If Hydro Ottawa fails to achieve any of these targets in a given year, the company must refund a specific dollar amount to customers. This innovative regulatory mechanism is the first of its kind for any electricity distributor in Ontario, and will provide an extra level of accountability and incentive when it comes to linking performance with outcomes that are valued by customers.

Customer growth also has an impact on financial performance, since electricity distribution involves significant economies of scale. Our customer base grows by approximately one percent per year. Growth could also occur through consolidation with other local distribution companies. Hydro Ottawa will continue to examine opportunities to expand our service territory through mergers, acquisitions, or strategic alliances where there is a clear benefit to our customers and our shareholder.

In addition, we will continue to seek opportunities to monetize our existing assets, systems, and expertise. This may take the form of new services to customers; alternatively, it could involve expansion of our partnerships with other utilities.



Renewable Energy

As the largest municipally-owned producer of green energy in Ontario, Hydro Ottawa is a leader in renewable energy generation. Our leadership position was significantly strengthened over the past decade, with renewable generation capacity having increased by over 500 percent and assumed a larger share of our revenue profile.

The last few years, in particular, have marked the achievement of key milestones. In 2017, we completed the construction of a new 29 megawatt hydroelectric facility at Chaudière Falls on the Ottawa River. In 2020 and 2021, refurbishment concluded on two hydro plants located on the Québec side of the river, with a combined capacity of 40 megawatts.

The total capacity at Chaudière Falls is now 85 megawatts, representing two-thirds of the 128 megawatt fleet of clean power generation owned and operated by our subsidiary, Portage Power. All of the generating stations in our portfolio are now fully in service, producing cost-effective electricity and displacing carbon emissions for customers in Ontario and New York.

The vast majority of our Canadian-based generation is covered by long-term power purchase agreements, providing stable revenues and minimizing exposure to spot market volatility. Indeed, the completion of the Québec plant refurbishment projects will boost annual generation revenues by more than 35 percent from 2020 through 2025.

Looking ahead, Hydro Ottawa will continue to examine opportunities to expand our hydroelectric generation capacity (both in Canada and the United States), with a preference for opportunities that involve stable pricing under long-term contracts.

The same applies to other forms of renewable energy, whether large or distributed in scale. The company is keen to expand our solar assets as well as our two landfill gas-to-energy plants, which may serve as a springboard for ventures in the field of renewable natural gas. Moreover, we are broadening the scope of renewable technologies which we will consider for investment.



Opportunities may emerge in a variety of forms, including potential community net metering projects, or the IESO's competitive procurements that will address emerging supply needs in Ontario. In addition, in order to achieve the clean energy, electrification, and GHG-reduction goals laid out in its Energy Evolution plan, the City of Ottawa is forecasting a need for thousands of megawatts of new locally-sited renewable generation. These and other initiatives present exciting and viable opportunities for growth.

To be sure, alongside seeking ways to increase our generation holdings, Hydro Ottawa is mindful of the need to optimize the performance of the assets in which we have already made significant investments. A new generation maintenance program will be implemented to this effect, along with sustained efforts to monetize the environmental attributes of our plants in New York State. A renewable energy credit market is likewise under review in Ontario, and Hydro Ottawa will pursue related opportunities if and when the market develops.

The first of Hydro Ottawa's supply contracts with the IESO is set to expire in the late 2020s. As such, the 2021–2025 period will involve focused planning on the future of the affected units. This effort will assess potential options to pursue, such as alternative revenue streams, in the event that expired contracts are not renewed. It may also examine whether price signals in a decentralized, local electricity market could support the ongoing operation of these units, and whether such an approach could align with the IESO's plans for market reforms.

Energy and Utility Services

A third driver of financial strength will be the services we provide to a growing range of customers to help them meet their energy needs and objectives, and to other utilities to help them enhance the value they provide. These services can be grouped into two categories:

- *Energy Services*: providing innovative solutions to help consumers, businesses, governments, and communities meet their sustainable energy objectives through energy management, energy retrofits, conservation, efficient streetlighting,



energy generation, energy storage, EV charging, suite metering, district energy, demand response, and GHG reduction, monitoring, and reporting, among others; and

- *Utility Services*: leveraging our core systems and expertise to help other utilities to enhance the value they provide, creating new revenue streams and economies of scale.

Hydro Ottawa has taken several steps to position this business line for steady growth and expansion. In 2019, we carved out the energy and utility services business from our Energy Ottawa subsidiary, and re-structured it under a new subsidiary and brand, Envari. Similarly, where appropriate, the company has created new subsidiaries or entered into joint ventures to oversee the operations of specific business streams.

These realignments have strengthened the capacity of this line of business, as demonstrated by recent milestones. Through Envari, we successfully converted over 55,000 streetlights in Ottawa to efficient light emitting diode (LED) technology. The savings associated with this initiative – over $5 million on an annual basis – enabled the City to repay the costs of the project in less than six years. The City likewise retained Envari for two other critical projects: management of a $57 million upgrade of the cogeneration system at the municipality's wastewater and treatment plant, and the installation of EV charging infrastructure for zero-emission buses. In addition, through an innovative joint venture, Hydro Ottawa has helped design, build, and commence operations of the district energy system for Zibi, a sustainable mixed-use community in downtown Ottawa and neighbouring Gatineau, Québec.

These successes portend a promising future for our energy and utility services business. Reaching this future will mean sharpening our performance in an increasingly competitive market. In this regard, there are several strategic imperatives to address over the course of this Strategic Direction period – and beyond.

First, in the coming years, there are plans for multiple large-scale community-building projects in Ottawa: development of Lebreton Flats; further expansion of Light Rail Transit; The Ottawa Hospital's New Civic campus; and the numerous initiatives contemplated under the City's Energy Evolution program, to name a few. Each of these endeavours has distinct goals for minimizing environmental footprints, procuring clean energy supply, and maximizing energy efficiency. Hydro Ottawa's aim is to be the partner of first choice for such projects, leveraging our expertise to help bring initiatives of this nature to fruition.

Secondly, continued diversification of products and services, as well as our customer base, is essential. Rapid evolution in the energy marketplace demands that we proactively anticipate customer needs and craft solutions. As customer preferences evolve to encompass data management, building retrofits and automation, EV charging, distributed generation, energy storage, Energy-as-a-Service, and GHG reduction (among others), Hydro Ottawa will continue to expand our services and solutions. We anticipate that this diversification push will be bolstered by our own net zero transition and its enlargement of our sustainability expertise.

While the local market for sustainable energy is sophisticated and sizeable, it nevertheless has its limits. Expanding our services beyond Ottawa and Eastern Ontario is therefore a key element of our growth plan, with efforts focused on the commercial and MUSH sectors.

Finally, successful growth will hinge upon the ability to forge partnerships with other actors who bring complementary resources and competencies to the table. Where appropriate, we will replicate existing models which have proven their value, such as Zibi and service delivery agreements in which Hydro Ottawa provides our expertise to other utilities. Additionally, where there is suitable strategic alignment and cost-benefit assessment, we will consider equity investment in firms that can help us achieve our business objectives and expand earnings potential.





4.4.3 ORGANIZATIONAL EFFECTIVENESS

In our previous five-year strategy, we anticipated disruptions to our business and operations. To be sure, we experienced many such events and developments – historic floods, devastating tornadoes, a global pandemic, and public policy realignments, just to name a few. Time and again, Hydro Ottawa demonstrated our ability to overcome these challenges with professionalism and resilience.

Readiness and effectiveness will likewise be needed in order to execute on this new Strategic Direction's ambitious agenda for enhancing customer, shareholder, and community value, and for moving towards a net zero footprint. Achieving these objectives will require a constantly learning organization, with the right skill sets, organizational capacity, and culture to manoeuvre through the complexity and uncertainty ahead.

In this pursuit, we will cultivate a culture of innovation and continuous improvement, focusing on three outcomes: a safe and healthy work environment; an engaged, aligned, prepared, and diverse workforce; and efficient operations that are augmented by productivity measures and advanced technology.

Health and Safety

A fundamental component of Hydro Ottawa's commitment to operating effectively is the premium priority we place on protecting the health and safety of our employees and our community.

We have established an integrated occupational health, safety, and environment (OHSE) management system that has achieved and maintained certification to international standards since 2007. More recently, we transitioned our system to achieve certification to both ISO 14001 (environment) and 45001 (safety) standards, becoming one of the few utilities in Canada to secure dual certification. We provide safe work practices training for all employees consistent with industry best practices. Our company's safety performance has been solid, with the number of medical aid injuries, the number of lost work days, and the lost workday severity rate all trending well over the past few years.

Important initiatives for this new planning term include the development of action plans to further enhance safety performance and culture – both within our own workforce and with our contracted resources – and continuous improvement across the OHSE management system. Health and safety will continue to be a top priority for the company.

Workforce Capacity and Capability

A highly skilled, properly trained, knowledgeable, and diverse workforce is essential to Hydro Ottawa's continued success.

Like many other companies and utilities, we continue to face challenging workforce demographics that require a concerted response. More than 28 percent of Hydro Ottawa's workforce is expected to retire in the next 10 years. This represents a loss of approximately 4,100 years of experience, including 1,350 years of trades and technical experience. Fifty-six percent of frontline supervisors in trades and technical occupations are expected to retire by 2030.

The company's comprehensive Talent Management Strategy is aimed at anticipating and meeting talent needs through planning, talent attraction and acquisition, effective deployment of resources, performance management and development, and the articulation of a compelling employee-centered value proposition.

To ensure success, we have increased our focus on renewing our workforce by attracting and developing young workers. It is not simply a matter of recruiting replacements for retiring workers; we must also plan for and facilitate an effective transfer of knowledge and skills from our veteran workforce to the next generation, including the next generation of people leaders. An essential building block of this effort is our suite of apprenticeship and intern programs, including our partnership with Algonquin College in the delivery of our Powerline Technician Diploma Program, our in-house Power Cable Technician training and certification program, and our Engineer Intern Training and Development Program.


POSI+
POSI+
POSI+
POLICE

Another major challenge (and opportunity) for this Strategic Direction term will be adjusting to the realities of a post-COVID-19 landscape. The pandemic accelerated many shifts that were already underway in the workplace and heightened expectations for employment that offers flexibility, opportunity for growth, and purpose. In turn, Hydro Ottawa is assessing what the "future of work" and the "next normal" may look like in our unique context, where we can benefit from new labour market trends, and how we can gain an advantage in the "war for talent." Initial plans include pilot projects to explore new ways of working in hybrid settings.

We are also working to attract and develop new skill sets that will be needed as we work towards a smart energy future. This will ensure we are able to build and sustain relationships with our customers, innovate and transition to new technologies, develop new products, services, and work processes, meet changing operational and regulatory demands, and achieve our net zero commitment.

As our business is changing, the profile of our workforce is also changing. It is increasingly diverse in age, skills, background, belief, ethnicity, sexual orientation, and in many other ways. We aim to create a thriving and respectful workplace, and enable each employee to bring their whole self to work every day. In support of these goals and in step with our ESG practices, we have launched a new five-year Diversity, Equity, and Inclusion (DEI) Plan. Built on the successes and lessons learned from previous plans, it focuses on leadership accountability, education and awareness, addressing barriers to participation, and ensuring data-driven decision-making. As this plan underscores, Hydro Ottawa treats DEI as a business imperative that is essential to growth and innovation.

Furthermore, we will continue to engage our employees in enriching our organizational culture and embedding the attributes of safety, accountability, innovation, entrepreneurship, and customer focus.

Productivity and Technology

At the outset of the 2021–2025 period, Hydro Ottawa is confronting a myriad of overlapping pressures, such as replacing aging infrastructure, supporting customers in the midst of a pandemic, and enabling a transition to a decarbonized future – all while minimizing upward pressure on rates. In this context, we must continually find ways to work smarter and we are doing just that.

Improvements in workplace productivity have been anchored in a journey of digital transformation and automation. In recent years, we have phased-out legacy business systems and manual processes in favour of leading-edge digital platforms and solutions. Our approach has been animated by the principle of "Anytime, Anywhere, on Any Device." Employees are



equipped with self-serve, mobile-enabled technology that makes work more collaborative, dynamic, and convenient, whether in the field, in the office, or at home. This philosophy has likewise shaped our modernized approach to employee learning, with training taken out of the classroom and put into the hands of learners through digital means.

The organizational readiness and flexibility enabled by our Digital Strategy was put on display in March 2020, following the Government of Ontario's declaration of emergency in relation to COVID-19. In short, we pivoted our operations rapidly and seamlessly. Office-based employees transitioned to remote working, while field crews moved to modified schedules and environments, with both groups supported by the necessary digital tools. A cloud-based customer contact solution was also rolled out to ensure service continuity, while our control room employees were split into two teams and assigned to separate locations, each with full system office functionality.

Over the 2021–2025 period, we will accelerate our digital transformation and continue leveraging innovative technologies to enhance customer service, improve operational agility, increase automation, and empower employees to make faster, more informed decisions.

Against this "digital by default" backdrop, the security of our information and operational technology systems against cyber security threats remains a crucial imperative. The company works closely with industry partners and security agencies, and maintains a best-in-class program of cyber defenses and controls. Hydro Ottawa will continue to draw on both internal and external resources to ensure vigilance in the mitigation of cyber risks and protection of mission-critical systems.

In addition, we will maintain our practice of setting annual productivity improvement targets, with a focus on reducing waste, improving the efficiency of our capital work, reducing operating costs, and maximizing the effectiveness of our operations through organizational rightsizing and right-skilling.

Our new office buildings, completed in 2019, were specifically designed with employee productivity and innovation in mind. While COVID-19 required pivoting much of our operations to remote work environments, the anticipated return to work post-pandemic presents the opportunity to begin fully leveraging our new facilities' potential for enhanced workplace productivity.



Building a Smart Energy Future through Innovation



Energy Data Dashboard

Cloud-based solution allowing building owners to save money and reduce waste



Battery Loan Program

Complimentary loan of portable battery packs to customers affected by planned outages



Cold Climate Heat Pumps

Pilot project offering homeowners an energy efficient alternative to conventional heating



Net Zero Energy for Sustainable Living

Partnership in zero carbon district energy system for the Zibi community



EV Everywhere

Management of EV charging during peak demand periods using artificial intelligence



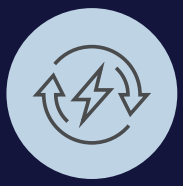
Voice-Activated Customer Assistance

First utility in Canada to develop a Smart Speaker skill to answer common customer questions



Virtual Reality Training

Giving trades employees exposure to tasks and procedures in a virtual environment



Building a Self-Healing Grid

Installation of sensors on the grid to provide real-time outage intelligence



4.4.4 CORPORATE CITIZENSHIP

As a community company that delivers an essential service to Ottawa residents – and whose predecessor companies have done so for more than 100 years – contributing to the well-being of the community has always been a part of Hydro Ottawa's core mandate. We know how much energy matters to the daily lives of our customers and our community, and the responsibility to provide it efficiently and reliably has shaped the way we see ourselves as a company.

Out of this mandate, a commitment to fulfill our ESG responsibilities as a company has naturally evolved. We will continue to deepen that commitment over the course of this plan, including through augmented reporting on our ESG performance.

This approach is not only true to our roots as a company, it enhances our corporate performance as well. As the growing movement around ESG in international markets and public policymaking has shown, good corporate citizenship can and does drive growth in value, as stakeholder trust creates new opportunities, reassures regulators, strengthens social license, increases customer loyalty, and attracts good business partners and talented employees.

To deliver on our commitment, we will continue to emphasize four aspects of good corporate citizenship: good governance; stakeholder engagement; environmental sustainability; and investing in our community.

Corporate Governance

Good corporate governance is the glue that holds together responsible business practices. By making governance a core focus over the past several years, Hydro Ottawa has established leading governance practices for a company of its size and mandate, and adheres to high standards of integrity, transparency, and disclosure. We will continue to ensure that this is the case, by regularly assessing emerging best practices (such as enhanced ESG reporting), and comparing ourselves to the best-governed private and public sector organizations.

Stakeholder Engagement

We also recognize that maintaining the trust and confidence of our stakeholders is essential to the company's performance and social license to operate. We are committed to taking into account the concerns and interests of all our stakeholders, including employees, customers, suppliers, our shareholder, and the communities and environment in which we operate. Our commitments to these stakeholders are entrenched in the guiding principles set out in this Strategic Direction. We will continue to operate with their interests in mind, and will actively encourage their participation in shaping the future of the company. Our emphasis will be on increasing our understanding of stakeholder requirements and perceptions, and implementing timely, accurate, and transparent disclosure mechanisms and communication.

This will include preserving the valuable engagement practices that have emerged amidst the constraints imposed by COVID-19. For example, customers and stakeholders have welcomed Hydro Ottawa's use of virtual open houses to provide information on planned work projects happening in specific neighbourhoods in the community.

HYDRO OTTAWA AND ESG – NEW TO THE NAME, NOT NEW TO THE GAME

Over the course of successive strategic planning cycles, Hydro Ottawa has executed projects, implemented practices, and conducted reporting in numerous areas that fall under the scope of ESG. Our Strategic Directions, as well as our integrated planning and performance management framework, are infused with ESG principles and objectives.

To date, this activity has not occurred under a formal ESG banner or program. It has occurred organically as part of our balanced scorecard approach to corporate performance and our long-standing commitments to sustainability and corporate citizenship.

Nevertheless, we have cultivated an exemplary record in ESG performance. In light of the growing prominence of ESG, going forward Hydro Ottawa will augment our ESG reporting and speak the language of ESG more fluently.

Environmental Sustainability

For more than a decade, our company has been on a steady trajectory of balancing our growth and operations with protection of the environment. Whether it is generating renewable energy, greening our fleet, reducing paper and water consumption, restoring public access to the Chaudière Falls site, or constructing facilities to LEED Gold standards, our track record in demonstrating continuous improvement in environmental performance is best-in-class. Our leadership in this space has been recognized by numerous third parties, including our recent designation as a Sustainable Electricity Company™ by Electricity Canada, and our inclusion in the annual roster of Canada's Greenest Employers for 10 years.

Hydro Ottawa's commitment to achieving net zero operations by 2030 represents a new, ambitious phase in our sustainability journey. In order to succeed, we will need to transform much of our business planning and operations, and benefit from the support of each and every employee. Over the course of this Strategic Direction term, we will hold ourselves accountable in delivering on this objective through regular progress and performance reporting.

Community Investment

Hydro Ottawa has a proud tradition of being a company that "gives where it lives." Our long-standing United Way workplace campaigns have raised more than $2 million in the past 10 years. In addition, we recently fulfilled a five-year pledge to raise $1 million in support of the Rose Ages Breast Health Centre at The Ottawa Hospital.

Our Community Partnership Investments, along with our employees' volunteer efforts, have contributed to many worthwhile local initiatives focused on at-risk youth, women's mental health, and combatting hunger and homelessness. These efforts will continue throughout the 2021–2025 period and will periodically evolve to achieve maximum impact and align with our role in the community.





5. Financial Outlook

5.1 FINANCIAL OUTLOOK

This financial outlook presents high-level projections for Hydro Ottawa's revenues, expenses, and major capital expenditures that support the company's business lines for the 2021–2025 period, and the underlying key assumptions and risks.

Hydro Ottawa's objective with respect to financial performance is to achieve sustainable growth in our business and our earnings. This creates value for Hydro Ottawa's sole shareholder, the City of Ottawa, including dividends and growth in the company's equity. It also enhances our ability to meet the energy needs of the communities and customers we serve. To achieve this key financial objective, Hydro Ottawa will continue to pursue excellence and strategic growth in our core business lines: providing efficient and reliable electricity distribution services; generating electricity from renewable resources; and offering a growing range of energy and utility services that help customers to meet their sustainable energy needs and objectives and other utilities to enhance the value they provide. We will continue to invest in our core distribution and generation assets, while improving productivity across all of our businesses and pursuing strategic growth opportunities that leverage our strengths.

Hydro Ottawa has achieved solid financial results since our 2016–2020 Strategic Direction was issued. We have surpassed most of the aggressive growth targets set out in that plan, notwithstanding the impacts of the COVID-19 pandemic. This continues a trend of consistent and sustained growth in net income and shareholder equity over time. Since the introduction of a dividend policy in 2004, Hydro Ottawa has delivered over $300 million to the City of Ottawa.

This five-year financial outlook projects continued growth in shareholder value over the 2021–2025 period, including $255 million in net income and dividends totalling $110 million. This represents a new record for the company in terms of dividend payments during the five-year term of a strategic direction and will bring total cumulative dividends (i.e. since 2004) to $415 million by 2025.

The financial projections set out herein reflect a continued focus on strategic business growth in our core areas of strength, as set out in the preceding sections of this Strategic Direction. They take into account current and future economic trends, the regulatory environment, and capital investments required to maintain and upgrade our electricity distribution and generation infrastructure.

5.1.1 REVENUE PROJECTIONS

Hydro Ottawa's revenues are projected to grow on average by 3.6 percent over the course of this Strategic Direction. With 2021 marking the completion of our major hydroelectric expansion and refurbishment projects, generation revenue is set to rise as production from our generation fleet is optimized over the 2021–2025 term. Revenue generated by our energy and utility services business line is likewise expected to increase steadily. As for electricity distribution revenues, they are projected to grow on account of capital investment in aging infrastructure and new planned customer connections. However, this growth will be moderate, as a result of such factors as an expected decline in consumption amongst small commercial customers during the early years of this five-year period (attributable to COVID-19 impacts).

Notably, Hydro Ottawa will achieve a significant milestone during this Strategic Direction cycle, with annual revenues surpassing $300 million for the first time in the company's history.

The largest component in Hydro Ottawa's revenue forecast is the cost of power recovered from customers through provincially established rates. Cost of power is a flow-through amount, which poses limited risk to Hydro Ottawa's financial performance.

Hydro Ottawa Limited filed a Custom Incentive Rate-setting application with the OEB in February 2020 for electricity distribution rates for the period January 1, 2021 through December 31, 2025. The application was informed by customer input, with the company having conducted an extensive customer engagement

process prior to filing and having integrated feedback on priorities into our final business and investment plans. Throughout 2020, Hydro Ottawa participated in an open, public, and transparent process administered by the OEB with intervenors representing different customer groups. The OEB rendered a decision approving a five-year rate plan for the company in November 2020.

For an average Hydro Ottawa residential customer, the average change in distribution rates over the course of 2021–2025 will be 2.39 percent. Our new Strategic Direction term marks the first in which distribution rates for residential customers will be fully fixed. Hydro Ottawa transitioned to a fixed distribution charge in 2020, as per OEB requirements.

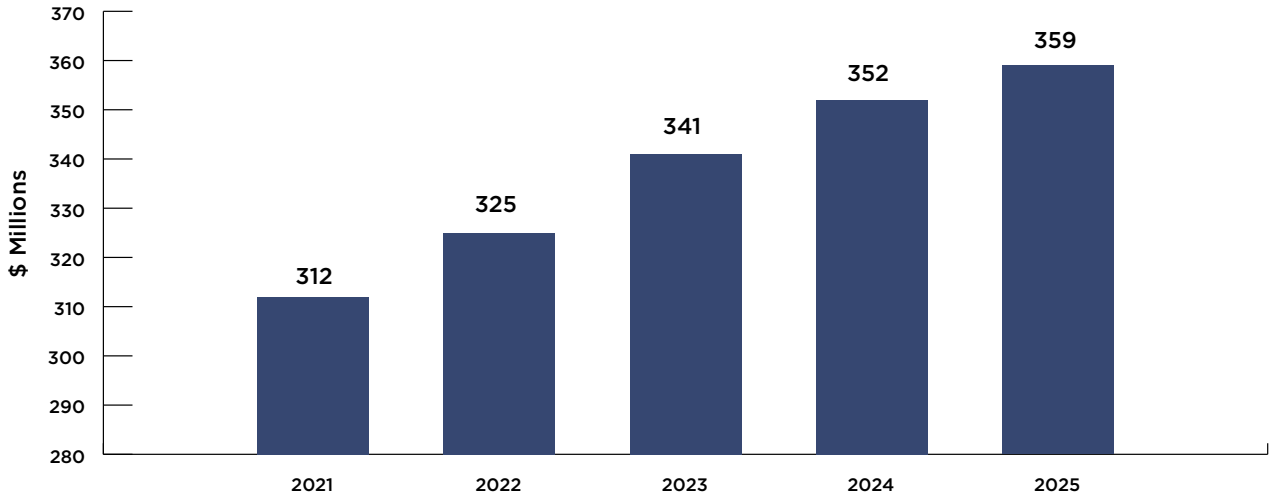
The distribution charge is the revenue retained by Hydro Ottawa and represents approximately 20 percent of the total bill. The remaining 80 percent includes commodity charges, provincially regulated charges, and harmonized sales tax. These revenues pass through Hydro Ottawa to electricity generators, Hydro One, IESO, the provincial government, and others.

Generation revenue has increased significantly in recent years, primarily on account of the completion of the new 29 megawatt hydroelectric facility at Chaudière Falls and the refurbishment projects at our hydroelectric plants in Québec. These investments represent a significant milestone in the company's expansion of our green power portfolio, which has increased by over 500 percent since 2012 and will continue to deliver stable revenue streams over the next 40 years. Generation revenue projections are based on pricing in accordance with secured Power Purchase Agreements and open market projections, along with historic water level data to guide production assumptions.

For our energy and utility services business, we anticipate continued expansion of business activity and moderate increases in annual revenue. Key projects which are on track for the 2021–2025 term include the $57 million planned upgrade to the City of Ottawa's wastewater collection and treatment plant, installation of EV charging infrastructure for the City's zero-emission bus project, and continued progress in the construction and operationalization of the district energy system for the Zibi community development.

The five-year revenue profile for Hydro Ottawa is as indicated in the chart below. Excluded from these projections are the cost of power flow-through.

Revenue



5.1.2 COST DRIVERS

FLOW THROUGH COST OF POWER

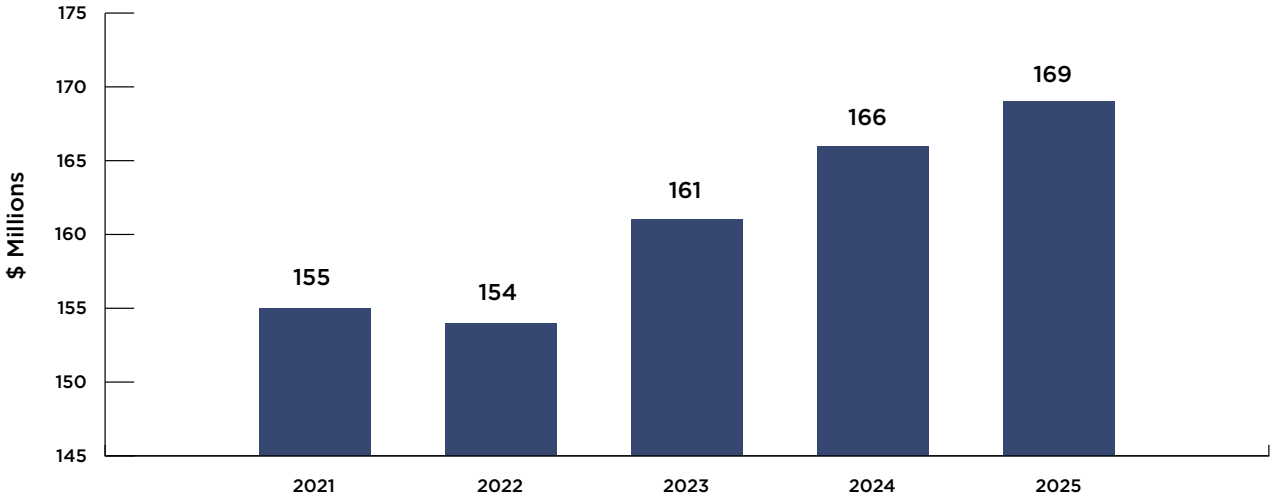
Similar to revenues, Hydro Ottawa's largest component of operating expense is the cost of power purchased from the provincial grid, which fluctuates based on the commodity price for electricity. This cost is designed by the OEB to be fully recoverable through the commodity rates charged to the customer. In the absence of regulatory change, there is limited risk to Hydro Ottawa's financial performance from the cost of power. Risk arises from Hydro Ottawa Limited's full responsibility for bad debts, as well as cash flow impacts from commodity rate increases, as the cost of power is the single largest monthly expenditure of the company.

OPERATING, MAINTENANCE, AND ADMINISTRATION COSTS

The most significant cost directly controllable by management is operating, maintenance, and administration (OM&A) expenses. This includes internal labour costs, direct material and program costs, and external service contracts. On a consolidated basis, annual OM&A is set to increase by 2.2 percent over the course of this Strategic Direction period, as shown in the graph below. For Hydro Ottawa Limited, its OEB-approved 2021–2025 electricity distribution rates prescribe OM&A increases using an escalator formula that is subject to annual adjustments.

Productivity improvements and cost containment are a must to offset the inflationary cost of labour, materials, and external service contracts integral to our business. Examples of such initiatives include digitization, process automation, cloud-based migration of business systems, operational reviews, material management, reduced overtime usage, cost-effective benefit plans, renegotiation of external service contracts, management of overdue customer accounts, and schedule optimization of crews and dispatch, amongst others.

Operating, Maintenance, and Administration Expenses

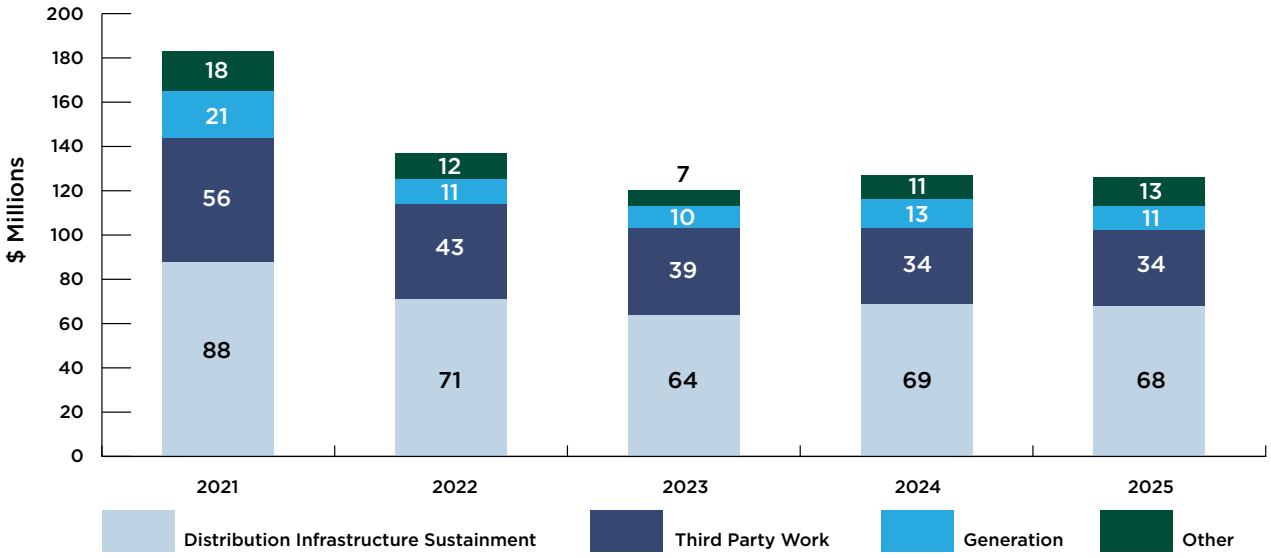


CAPITAL EXPENDITURES

Aging infrastructure remains a reality for Hydro Ottawa and other utilities, with implications for service reliability. The need to invest in electricity distribution infrastructure to maintain high-quality service represents a significant cost driver. Electricity distribution and generation reliability are contingent upon life-cycle investment programs. The regulated distribution business will incur the majority of capital expenditures, as we continue to invest to sustain the reliability of the distribution system through rehabilitation and upgrades, as well as expansion of substations to accommodate customer growth and provide sufficient capacity for emergency and peak load situations.

Hydro Ottawa invested $1.1 billion in capital infrastructure over the 2016–2020 period, representing the largest capital program in the company's history. While the 2021–2025 term will feature a diminished level of capital expenditures, the total planned spending envelope of $700 million is nevertheless significant. Hydro Ottawa's amortization expense and financing charges are reflective of this capital investment, and as a result are projected to increase over the period.

Gross Capital Expenditures



FINANCIAL PROJECTIONS

In summary, with Hydro Ottawa's Custom Incentive Rate-setting application approved for the 2021–2025 term, there is a secure level of funding available to maintain the reliability of Hydro Ottawa's electricity distribution operations. In addition, with our fleet of expanded and refurbished hydroelectric plants becoming fully operational, our generation portfolio is positioned to deliver stable revenue streams over the next 40 years. This, combined with strategic growth in energy and utility services, along with other emerging business lines, enables the company to project $255 million in net income over the next five years.

	FINANCIAL OUTLOOK				
Consolidated Statement of Income ($ millions)	**2021**	**2022**	**2023**	**2024**	**2025**
Revenues					
Power Recovery	851	948	1,007	1,053	1,108
Distribution Sales	199	208	219	227	230
Generation Revenue	64	71	72	73	74
Envari Revenue	26	30	35	37	40
Other Revenue	23	16	15	15	15
	1,163	**1,273**	**1,348**	**1,405**	**1,467**
Expenses					
Purchased Power	851	948	1,007	1,053	1,108
Operating, Maintenance & Administration	155	154	161	166	169
	1,006	**1,102**	**1,168**	**1,219**	**1,277**
EBITDA	**157**	**171**	**180**	**186**	**190**
Amortization, Interest, Taxes	109	122	129	133	136
Net Income from Current Operations	**48**	**49**	**51**	**53**	**54**

5.2 RISKS AND UNCERTAINTIES

As our track record over more than two decades demonstrates, Hydro Ottawa has the ability to manage and mitigate risk, to maintain flexibility, and to respond effectively to changes in our business environment.

Our Enterprise Risk Management (ERM) system establishes the framework to allow us to predict and respond to risks and opportunities impacting our Strategic Direction and business activities, and to do so in an effective, consistent, and integrated manner. Our five-year business planning cycle, with annual updates, also enables continuous review of assumptions and the state of the market in which we operate.

Key factors that could adversely impact the achievement of our projected financial results are outlined below.

COVID-19 Pandemic

Hydro Ottawa's 2021–2025 Strategic Direction is being published in the midst of ongoing COVID-19 challenges and impacts. The benefits of mass vaccination are evident in a considerably lower level of fatalities. Yet, there could be multiple waves of less lethal but highly contagious strains of the disease before it subsides.

If that should be the course that COVID-19 takes before subsiding, it is possible that socio-economic activity over the next year or more may be punctuated by occasional stop-start phases that include restrictions on capacity and/or social interaction. In duration and in scale, these stop-start phases may have less impact than in 2020 or 2021, but they may still affect the strength and sustainability of the post-pandemic recovery.

In the short to medium term, economic recovery might be uneven across industries. Certain sectors (e.g. agriculture, hospitality and food services, small-scale retail) may experience far more difficulty, not only because of the withdrawal of government support programs, but also because of inflation. Accelerating at its fastest since 2003, inflation is also likely to take a toll on families and small businesses. Supply chain disruptions may exacerbate the adverse effects of inflation.

The pandemic's impact on mental health and social cohesion are already manifest, and may have a sustained, adverse, community-wide effect. From an employer's perspective, that could result in an impact on workforce availability and productivity.

Although employment in general has rebounded to near pre-pandemic levels, there continues to be a mismatch in labour supply and demand, with regard to professional, scientific, and technical services, in particular. The impact of this mismatch might linger for a considerable period as the federal government clears backlogs in the immigration and naturalization process.

The socio-economic and demographic effects of the COVID-19 pandemic are likely to have an impact on the Corporation's businesses, at least in the short to medium term.

The electricity distribution business, for example, could see a decline in its revenue and face difficulties in recovering its costs from customers who are in distress. There can be no certitude that regulatory mechanisms will allow for a level of recovery of the resultant financial losses.

Physical distancing requirements may affect the duration and effectiveness of construction activity, which could have an adverse impact on the electricity distribution business, as well as on the Corporation's generation and energy and infrastructure management businesses.

Some of the long-term effects of the pandemic, such as the shortage of affordable talent, might affect the Corporation's capacity to achieve its strategic and growth-related initiatives.

The repercussions of COVID-19 will be felt across the business environment for a considerable period of time. Inevitably, there is – and will continue to be – some impact on Hydro Ottawa, as on the community we serve.

While we are confident in our assessment of the post-COVID-19 business environment as a whole, future events may differ significantly from what we expect. Some of our assumptions may prove unwarranted. Subsequent events could change the complexion of current trends and not all opportunities currently envisaged may turn out to be viable.

Economy

The state of the local, provincial, and national economy could have a significant impact on Hydro Ottawa's business performance, through factors such as interest rates, inflation, customer credit conditions, and weakening demand for electricity and/or value-added services.

Policy and Regulatory Environment

Hydro Ottawa's largest business operates in a regulated environment. Our business performance could be adversely affected by significant policy and regulatory changes, including but not limited to changes in rate regulation, policies relating to the production and procurement of renewable and clean energy, conservation and demand management, the consolidation of electrical utilities, restrictions on utility service provision, or changes to license requirements.

The current state of policy and regulatory guidance and support in Ontario introduces considerable uncertainty for rate-regulated electrical utilities, particularly with regard to anticipating and meeting the requirements of a DER environment led by customers. It is also not known whether and how future policy initiatives and regulatory frameworks would be compatible with the Market Renewal program initiated by the IESO, as the program begins to take effect in the mid-2020s.

Uncertainty surrounding federal, provincial, and municipal policies and regulations on climate change response could also adversely affect the growth of some of Hydro Ottawa's unregulated, market-facing businesses.

Potential Disruption of Utilities' Business Model

The convergence of DERs with IT could further disrupt the traditional business model of electrical utilities. As IT platforms develop to tie grid data, DER data, and customer-specific information together into a "virtual power plant," they may also become capable of networking multiple such self-contained virtual power plants into a single energy system. In time, they might be in a position to take over swaths of a local distribution company's service footprint. In addition, organizations capable of developing distribution-edge software platforms and translating them into sustainable value propositions to customers could progressively dislodge the distribution utility from the customer interface, reducing the opportunity for revenues from value-added services.

Diversification of Revenue: Implications for Credit Ratings

Over the last two decades, the consumption of electricity in Ontario, and elsewhere in North America, has remained relatively stable, reflecting underlying socio-economic trends, as well as the impact of conservation. The long-term impact to electrical utilities of the rapid shift from commercial and industrial electricity demand to residential, driven by the COVID-19 pandemic and widespread adoption of video-conferencing and working from home across multiple sectors of the economy, is difficult to assess at this stage.

Since 2008, Hydro Ottawa has been on a trajectory of diversifying its revenue and assets by expanding its presence in unregulated lines of business, including renewable energy generation and energy management services. This revenue diversification strategy has allowed Hydro Ottawa to get ahead of long-term trends within the industry, and contain rate increases for our customers, while steadily increasing shareholder value. Continued revenue diversification through the period of this Strategic Direction will also help the company offset the long-term impact of the COVID-19-driven shift in demand for electricity, from the commercial and industrial sector to the residential sector.

The need for electrical utilities to diversify their revenue and assets portfolio is gaining recognition in the financial community. In the short to medium term, however, there could be an adverse impact on Hydro Ottawa's credit ratings, which could increase the cost of borrowing.

Access to Capital

As is the case with many municipally-owned electrical utilities, the infusion of additional shareholder equity in order to achieve growth objectives may not always be a feasible option for Hydro Ottawa. As a result, there may be constraints on the Corporation's debt capacity, which could in turn affect its ability to achieve some of the growth objectives outlined in this Strategic Direction.

Market Prices for Electricity

Where revenue from electricity generation is linked to market prices, there could be revenue fluctuation due to a number of factors: the amount of excess generating capacity relative to load in that market; market structure; weather conditions which impact electrical load; growth in demand for electricity; absolute and relative prices for energy; and developments in conservation and demand management.

Exchange Rate Fluctuations

Hydro Ottawa uses the Canadian dollar as its functional currency. It already owns generation assets in the United States, and might expand its operations and assets in that market during the next five years. A significant depreciation of the value of the U.S. dollar relative to the Canadian dollar may adversely affect the value of the Corporation's U.S.-based assets and the related revenues. Conversely, a significant depreciation of the Canadian dollar relative to the U.S. dollar may affect the expected rate of return on the Corporation's U.S. investments as well as the capacity to finance those investments.

Climate Change

Climate change is affecting the rate of occurrence of extreme weather events and in some cases their severity as well. The impact of these events on North America's aging electricity grid will test utilities' capacity to respond to emergencies and restore power in a timely manner. Over the long term, grid renewal investments, such as those planned by Hydro Ottawa, should make the electricity system more robust. Regulatory and public support for such investments and the related management systems cannot be taken as a given, though expectations for utilities to be responsive, agile, and resilient during and after extreme weather events are likely to remain. Accordingly, there could be a mismatch between the climate change resilience expected of utilities and the resources available to achieve this level of resilience.

Hydrology

The amount of electricity generated at Hydro Ottawa's hydroelectric facilities depends upon available water flows and weather conditions, which vary naturally from season to season, and from year to year. Water flows may also be affected by natural disasters or through government controls and policies on water levels.

Dependence on Partners

The growth opportunities identified in this Strategic Direction may depend upon the presence of willing partners and/or partners that perform to long-term expectations. An absence of willing merger or acquisition partners, or utilities and others willing to partner on service delivery, could have an adverse impact on Hydro Ottawa's ability to deliver on its financial objectives, as could the underperformance of key business partners.

Workforce Demographics

Across the electricity sector, retirements are outpacing new entrants to the workforce, which could have an adverse impact on the ability of the Corporation to build a sustainable workforce and achieve its business objectives. Hydro Ottawa's investments in apprenticeships, internships, diversity and inclusion, knowledge management, succession planning, and retiree and older worker engagement programs are designed to manage risks relating to workforce demographics.

Technology Infrastructure

The Corporation's business performance is dependent upon complex technology systems, including customer information and billing systems, advanced metering, and operational technologies such as geographic information systems, system control, and outage management systems. The failure of one or more of these key systems, or a failure of the Corporation to plan effectively for future technology needs or transition effectively to new technology systems, could adversely impact the Corporation's business operations.

Many of these key systems also draw upon data and signals from several hundred thousand smart devices (chiefly smart meters), as well as the related systems and web interfaces. The processing of data in many cases entails a number of automated interfaces, as well as multiple internal and external dependencies, including Ontario's Smart Metering Entity. Risks arising from the reliability and performance of any single component of this integrated network, or of the system as a whole, could lead to a disruption of key business processes.

There is growing convergence of core operational systems with enterprise information systems, along with increasing automation, and extensive use of common technology in facilitating such integration and connectivity. The complexity of this technology infrastructure, together with its interconnected nature, has the potential to heighten existing risks as well as to create new ones.

Cyber Security

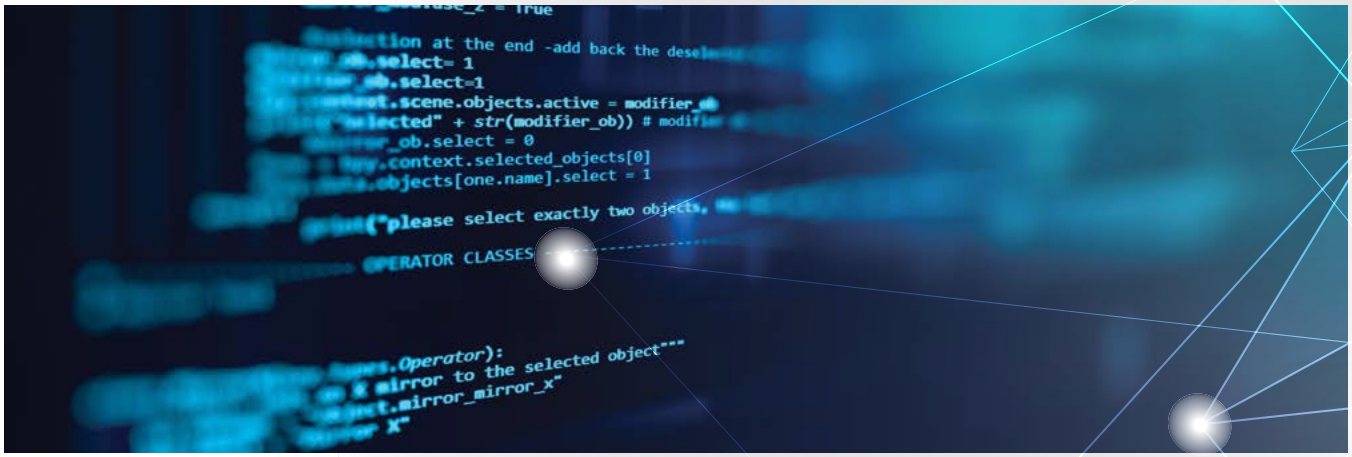
The Corporation's reliance on information systems and expanded data transmission and exchange networks, in conjunction with the growing extent of systems and data integration within the electricity sector, increases its exposure to information security threats, including cyber security risks. Hydro Ottawa's information systems and information assets could be put at risk by a security breach, data corruption, or system failure at a shared resource or common service provider. Cyber security risks could also be aggravated by the increased prevalence of working from home, potentially over an extended time period.

5.3 CONCLUSION

Subject to the risks and uncertainties discussed in this document, Hydro Ottawa will continue to provide efficient, reliable electricity distribution services to customers at a competitive cost, generate green power, and provide energy and utility services while maintaining sustainable earnings. The company will achieve this by continuing to invest in core distribution assets, improving productivity, and pursuing business growth opportunities that leverage corporate strengths.

Through the OEB's adjudication of Hydro Ottawa's 2021–2025 Custom Incentive Rate-setting application, the company has received approval for capital investment in electricity infrastructure for the next five years. Hydro Ottawa's customers will continue to benefit from reliable electricity distribution with stable, moderate, and predictable rate impacts. In our unregulated operations, we will experience a significant increase in renewable generation revenue, courtesy of our recently completed hydroelectric expansion and refurbishment projects, while our energy and utility services business remains on track for steady expansion.

In sum, Hydro Ottawa continues to enjoy a strong financial position. We are well-positioned to achieve continued growth and to yield higher dividends over the 2021–2025 period. All of this will transpire amidst a transformation of our business operations, as we follow through on our commitment to achieve net zero operations by 2030. We look forward to the opportunities ahead for creating greater value for our shareholder and community.



6. Governance and Reporting

Accountability for the effective operation of the Corporation and its subsidiaries rests with an 11-member Board of Directors, which provides direction to the Corporation on behalf of the shareholder, the City of Ottawa. The Board provides leadership for the company within a framework of effective controls that enables risks to be assessed and managed, and is responsible for overseeing the management of the business and affairs of the company and its subsidiaries.

In carrying out its oversight function, the Board of Directors is guided by a Shareholder Declaration issued by Ottawa City Council and revised from time to time.

In 2006, a separate Board of Directors was established to oversee the operations of Hydro Ottawa Limited, in accordance with the Affiliate Relationships Code for Electricity Distributors and Transmitters issued by the Ontario Energy Board. The powers and functions of that Board are set out in a Shareholder Declaration issued by the Hydro Ottawa Holding Inc. Board of Directors.

On a day-to-day basis, the Corporation is led by an Executive Management Team, comprising the Corporation's President and Chief Executive Officer and the senior executives of the subsidiaries and critical functional areas. This team aligns business activity and practices with the strategy of the Corporation, and drives performance by managing risks and opportunities. The Executive Management Team is accountable to the Corporation's Board of Directors through the President and Chief Executive Officer.

The Board will monitor progress against the Strategic Direction on a quarterly basis, including in relation to ESG performance, and make adjustments as required by changing circumstances. The Corporation will report on progress annually to the shareholder, at the time of the Annual General Meeting. A summary of the Corporation's financial results is provided to the shareholder on a quarterly basis through the City Manager.





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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-2

EVIDENCE REFERENCE:

[Ex.1]

QUESTION(S):

Please provide a copy of all materials provided to Hydro Ottawa's Board of Directors' in seeking approval of the Application and the underlying budgets.

RESPONSE(S):

Please see the response to interrogatory 1-CCC-13.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-3

EVIDENCE REFERENCE:

[Ex.1]

QUESTION(S):

Please provide a copy of all third-party benchmarking analyses, studies, reports, and/or similar documents, undertaken for, by, or that include Hydro Ottawa, since 2020, that are not already included in this Application, regarding any aspect that directly or indirectly relates to a material aspect of Hydro Ottawa's budget or aspect of its business.

RESPONSE(S):

Given the evidence reference above, Hydro Ottawa has interpreted this interrogatory as requesting third-party benchmarking analyses, studies, reports, and similar documents undertaken since 2020 that are relevant to the foundational planning and contextual elements set out in Exhibit 1 of Hydro Ottawa's application. At a high level, Exhibit 1 addresses:

- Corporate and strategic direction
- Business Planning
- Financial Information
- Organizational effectiveness
- Customer engagement and satisfaction
- Risk management and governance

In this context Table A below provides third-party studies and reports that have been completed in or after 2020. The reports listed in Table A were not used to develop the filed evidence but are related to the broader context addressed in Exhibit 1.

Given that these materials were not directly relied upon for this proceeding, Hydro Ottawa has only listed these studies and reports at this stage. More notably, as some of these studies contain sensitive information to the organization, Hydro Ottawa would request that only studies that are necessary to complete the record should be requested.

Table A - Third Party Studies

Third Party Benchmarking	Description
Security Program Assessment Report	This report provides a proactive assessment of Hydro Ottawa's Cybersecurity program and provides an industry view of the cyber threat landscape. The purpose of the assessment was to validate the current capabilities, identify areas for improvement, and provide best practice recommendations to improve the cybersecurity program's maturity.
Business Continuity Management Review	This report is a high-level assessment of the BCM Program structure and interfaces with the other plans/teams (e.g. EERP/ICC, CCP/CCT, CMP/CMT), including an assessment of staffing in the BCM group, and recommendations for improvement in any of the assessed areas.
Annual Electric Utility Customer Satisfaction Surveys - Residential and Small Commercial (2020, 2021, 2022, 2023)	Annual survey which provides insights into customer perceptions of Hydro Ottawa's services. Feedback allows Hydro Ottawa to identify areas of strength, opportunities for improvement, and benchmark its performance against its peers provincially and nationally. Note: 2023 is provided in interrogatory 1-ED-7(A)
Customer Satisfaction Survey - Large Commercial (2022)	Similar to above, Provides insights into large commercial customer perceptions of Hydro Ottawa's services.

Third Party Benchmarking	Description
National Electricity Customer Satisfaction Survey (2022)	Provides an understanding of customer satisfaction and offers insights into Hydro Ottawa's performance relative to other utilities in Ontario and across Canada. The survey is commissioned by Electricity Canada, and Hydro Ottawa has the option to participate.
Customer Capability Assessment (2024)	The purpose of the study is to evaluate the current state of Hydro Ottawa's customer-related capabilities and, by assessing industry-leading capabilities, identify key areas for improvement and potential opportunities to enhance, optimize, or automate processes and service delivery to meet future customer expectations.
Public Awareness of Electrical Safety Survey (Electricity Distributor Scorecard requirement - undertaken in March 2020, 2022 and 2024)	The PAESS survey is an LDC scorecard requirement of the Ontario Energy Board to measure public awareness of electrical safety every two years and submit these results as part of their annual scorecard. Respondents do not need to be a Hydro Ottawa customer to respond, just reside in Hydro Ottawa's service territory. The survey was conducted by Innovative Research Group and results were published on the OEB and Hydro Ottawa websites.
Website user research Phase I - initial user consultation (Feb 2025)	This survey included 10 one-on-one virtual in-depth interviews (7 residential and 3 commercial customers) lasting 1 hour each, to review the Hydro Ottawa Limited website. The purpose of these interviews was to better understand our website user needs and preferences when it comes to: desired features and functionalities; usability; accessibility; page layout; and navigation of our website as we look to refresh and update content and navigation to meet current customer needs (such as mobile experience versus desktop).

Third Party Benchmarking	Description
Kanata North Energy Study	Lead by the Ottawa Climate Action Fund (OCAF), supported by the Kanata North Business Association (KNBA), and co-funded by Hydro Ottawa, this study is an analysis of potential economic and energy growth in the Kanata North area, using existing demographics, known expansions and new growth, as well as local and global market trends. By better understanding potential growth, Hydro Ottawa, and the other entities, can better plan, forecast, and facilitate clean energy solutions.
Grid Modernization Strategy & Roadmap	A two-phase initiative to develop Hydro Ottawa's Grid Modernization Strategy. Phase 1 involved a Grid Modernization Maturity Assessment, which included baselining current system capabilities, mapping future requirements (short, mid, and long-term), and conducting a needs assessment to identify gaps. Phase 2 focused on Strategy and Roadmap Development, building upon the corporate mission, existing roadmaps, current initiatives, and a jurisdictional scan. (See response to interrogatory 2-SEC-39 part b))
Grid Modernization Key Performance Indicator (KPI) Development	This presentation outlines a new tool for measuring and tracking grid modernization progress through 8 Key Performance Indicators (KPIs). The project's objective is to provide a focused set of KPIs with calculation methodologies to monitor and evaluate grid modernization initiatives. (See response to interrogatory 2-SEC-39 part b))
Hydro Ottawa Resilience Rapid Assessment Preliminary Report	This presentation assesses the maturity of Hydro Ottawa's resilience processes and technologies, focusing on 7 key themes: Restoration Management, Customer-facing Systems, Internal Systems, Scalability and Storm Modes, Storm Roles, Training and Exercises and Energy Transitions. Additionally, it provides recommendations to improve resiliency.

1

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-4

EVIDENCE REFERENCE:

[Ex.1]

QUESTION(S):

Please provide summaries of all internal audit reports conducted since 2019, related to any aspect that directly or indirectly relates to Hydro Ottawa's business, their findings, recommendations, and the status of any actions that have or are to be taken.

RESPONSE(S):

In Table A below, Hydro Ottawa provides a summary of the key findings from the 17 internal audits that have been conducted since 2019, as well as the status of the related corrective actions.

1

Table A - Summary of Key Internal Audit Findings with Status of Actions

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
Oct 2020	IT General Controls-Major Distribution IT Applications	Functioning of the control environment	1. Prioritise creation of a high availability redundant site for the Outage Management System. 2. Develop a priority-based framework of the other disaster recovery vulnerabilities and gaps.	Implemented
Oct 2020	IT General Controls-Major Distribution IT Applications	Framework for the security of SCADA connections, field devices, and sensors	Define and implement a framework for the management and security of all Operational Technology devices.	Implemented
Oct 2020	IT General Controls-Major Distribution IT Applications	Contractual terms	1. Review and update existing support and maintenance agreements to include service levels and formal evaluation of vendor performance. 2. Prepare design documents for all OMS/GIS interfaces.	1 Implemented 2 Target completion date Q4 2025
Oct 2020	Revenue to Receivables	Disaster recovery preparedness for ERP	Strengthen current disaster recovery preparedness of ERP by conducting yearly testing and ensure that it aligns with Finance's Business Continuity Plans.	Target completion date Q3 2025
Mar 2021	Technology and Planning Projects	Technology planning and portfolio management function	Implement a business benefits realization phase to track the outcomes of all technology initiatives. Secure the services of an enterprise architect.	Implemented
Mar 2021	Technology and Planning Projects	Technology and project management practices	Revise the project management methodology by defining mandatory, scalable artifacts—including disaster recovery and interface requirements—and establishing a formal review process for their approval. Train the project managers on the updated methodology and align resources, staffing, and incentives to	Implemented

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
			support its implementation.	
Mar 2021	Technology and Planning Projects	Technology planning practices	Develop a comprehensive rolling four-year technology plan, synchronizing its planning cycle and prioritization criteria with the broader corporate strategy. Establish a formal governance process where divisional directors approve the annual list of technology initiatives derived from this plan.	Implemented
Oct 2021	Cybersecurity- Policy and Practices Framework	Cybersecurity posture	1. Document cybersecurity posture for each affiliate that aligns with the business needs and risks. 2. Establish a 3-year roadmap to cultivate cybersecurity talent.	1 Implemented 2 Target Completion date Q2 2025
Oct 2021	Cybersecurity- Policy and Practices Framework	Business Impact Assessments and divisional Business Continuity Plans	1. Continue to enhance and strengthen the Business continuity and Incident Response Plans 2. Assess the financial planning models for technology-related business risks.	1 Implemented 2 Target completion date Q3 2025
Oct 2021	Cybersecurity- Policy and Practices Framework	Cyber monitoring tools	An opportunity exists to enhance the tracking and monitoring of all enterprise technology assets, with rationalized cybersecurity monitoring tools.	Target completion date Q1 2026
Oct 2021	Cybersecurity- Policy and Practices Framework	Cybersecurity training	Strengthen the corporate security culture by enhancing leadership accountability and continuously refine role-based awareness programs for all staff. Formalize the security requirements and validation process for all third-party access to corporate systems	Implemented

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
			and data.	
Oct 2021	Cybersecurity- Policy and Practices Framework	Third party risk assessment	Refine the enterprise framework for third-party risk management, including the continuous assessment of vendor security controls and the governance process for risk-based decision-making.	Implemented
Mar 2022	Distribution Operations-Construction Activities	Productivity program	For the productivity program, establish new metrics and seasonal targets for labor allocation using Geotab data, and analyze the potential gains from shifting training and vacation hours out of peak construction months.	Implemented
Mar 2022	Distribution Operations-Construction Activities	Succession planning	Re-vitalize the succession program for the Supervisor of Distribution Operations by creating a formal development plan and assessing strategies to make the role more attractive to both internal and external talent.	Implemented
Mar 2022	Distribution Operations-Construction Activities	Workforce planning and resourcing	1. Enhance the accuracy of workforce planning by improving the resource and demand models to reflect variables like training, vacation, and customer requests, ensuring they are validated against actual data. Strengthen current scheduling operations by documenting the tool's assumptions for stakeholder validation and by defining a clear process to ensure material data is consistently updated. 2. Explore the implementation of a modern scheduling tool that offers full integration with the corporate ERP.	1. Target Implementation date Q4 2025 2. TBD with deferral of ERP Implementation

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
Nov 2021	Learning and Development	Internship program	Complete the 2021 initiative to review, update and enhance the internship program. Update the documentation to reflect all recent changes and improvements in the program. Review the apprenticeship programs from time to time in the light of changes in the business environment.	Target implementation date Q4 2025
Nov 2021	Learning and Development	Metrics and targets	Put in place a process for the periodic review of learning and development metrics and targets.	Implemented
Nov 2021	Learning and Development	Training expenditure	Develop a cost variance analysis process for the monitoring of training expenditure on employees.	Target implementation date Q4 2025
Nov 2021	System Operations	Resourcing	Establish a periodically refreshed emergency staffing plan for System Operations that identifies and trains skilled backup personnel from across the company and provides a detailed deployment schedule for a crisis. Implement a continuous job rotation and refresher training program to build institutional knowledge and maintain a ready pool of qualified staff.	Implemented
Nov 2021	System Operations	Emergency response	Strengthen the emergency response program through regular drills and exercises, maintenance of detailed training records, assignment of accountability for follow-up on major event actions, and formalizing procedures for the periodic testing of all backup devices.	Implemented
Nov 2021	System Operations	Control room framework	Examine the benefits and costs of developing a formal Control Room Management framework, complemented by potentially relevant ISO standards, such as ISO-11064.	Target implementation date Q1 2026

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
Oct 2022	Cloud Computing	Cloud computing applications	Formalize a comprehensive technology governance framework to standardize requirements for data management, security, resilience, and operational oversight for all SaaS solutions.	Target implementation date Q4 2025
Oct 2022	Cloud Computing	Contractual protections and oversight of SaaS vendors	Enhance the third-party risk management program for contract governance, vendor due diligence, and continuous monitoring. Concurrently, formalize the corporate data protection strategy to define requirements for the independent backup and recovery of critical information residing in third-party systems.	Target implementation date Q1 2026
Oct 2022	Cloud Computing	Internet connectivity	Review and enhance the redundancy and diversity of external network connections to improve service continuity.	Implemented
Oct 2022	Cloud Computing	SaaS applications	Standardize user access by integrating all capable SaaS applications with the central identity management platform. For systems where integration is not feasible, enforce documented protocols for user account lifecycle management.	Implemented
Mar 2023	Compliance Activity and Reporting	Letters of representation	Amend the Business Development Integration checklists to assess amendments to the letters of representation. Strengthen the current framework for letters of representation by refining content requirements, implementing a periodic review process to validate legal references, and improving traceability between all levels of certification.	Target implementation date: Q3 2025
Mar 2023	Compliance Activity and Reporting	Training expenditure	Formalize and strengthen the corporate compliance program by developing risk-based criteria for issue escalation while implementing a recurring training module for leaders that is fully integrated into onboarding and succession planning.	Target implementation date: Q4 2025

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
Oct 2022	Treasury and Financing	Treasury Management System	Explore the implementation of a Treasury Management System (TMS).	TBD with deferral of ERP Implementation
Mar 2024	Derecho Storm Response	Business Continuity Management	Review and adapt the Business Continuity Management (BCM) model to ensure it effectively addresses the current spectrum of hazards facing the organization. Subsequently, revise all BCM documentation including post-event processes to reflect current practices and formalize management's accountability for executing all required activities.	Target implementation date Q1 2026
Mar 2024	Derecho Storm Response	Business Continuity Management	Enhance the action monitoring framework with a single tracking mechanism and establish a streamlined reporting process with more frequent, validated updates for senior leadership. To ensure commitments are met, formally integrate all actions into divisional work plans, applying a project-based approach for more complex or long-term initiatives.	Target implementation date Q2 2025
Apr 2024	Labour Disruption	Business Continuity Management plans	Conduct an analysis to categorize business processes by criticality, identify the skills required to perform them, and compile a comprehensive skills inventory of all staff. Amend the Business Continuity plans to address staffing vulnerabilities identified and implement a formal cross-training and rotation program to build workforce resilience.	Target implementation date: Q1 2026
Apr 2024	Labour Disruption	Vetting new contractors	Finalize the draft procedure for any contractor who does not meet the defined ISNetworld qualification. For contractors hired during an emergency, the issuance of a Purchase Order should be	Target implementation date: Q3 2025

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
			contingent upon final confirmation from Environment and OHSE.	
Apr 2024	Labour Disruption	Vehicle key management	Investigate and implement enhanced security controls for fleet vehicle keys, including technology-based solutions, while concurrently developing a formal policy to govern key assignment and usage responsibilities.	Target implementation date: Q3 2026
Oct 2024	Corporate Credit Cards	Policy related	Revise the corporate credit card policy to clarify responsibilities, define submission deadlines and procedures for exceptions, and establish a formal enforcement framework that outlines clear consequences for non-compliance. Reaffirm the revised policy along with the related business expense, travel, and capitalization policies.	Target implementation date: Q3 2026
Oct 2024	Corporate Credit Cards	Training on usage of credit cards	Improve the credit card reconciliation process by consolidating all policies and job aids into a central resource with targeted refresher training, while concurrently enhancing the JDE system to resolve notification issues and automate reminders for all unprocessed, returned, and unclaimed transactions.	Target implementation date Q3 2026
Oct 2024	Corporate Credit Cards	Credit card program	Strengthen administrative controls over the corporate credit card program by implementing a periodic review of active cardholders, spending limits, and system logs, while concurrently updating application forms and enforcing role-based permissions for portal administrators.	Target implementation date Q3 2026
Oct 2024	Materials Management	Material forecasting	Enhance collaboration with the CEDO division to improve material forecasting and address JDE system limitations by incorporating targeted user training on work order management into the project	Target implementation date Q2 2026

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
			management methodology.	
Oct 2024	Materials Management	Disaster recovery plan	Conduct a business impact assessment for the Material Management function to guide the development of a comprehensive business continuity plan.	Target implementation date Q1 2026
Oct 2024	Materials Management	Key performance indicators	Enhance the material management program by developing key performance indicators for forecast accuracy, strengthening cycle count procedures through staff rotation, and investigating alternative solutions for the emergency kanban process.	Target implementation date Q1 2026
Oct 2024	Meter Data Services and Metering	Customer facing metering processes	Establish a comprehensive operational framework for customer-facing metering work that defines clear roles and processes, supported by regular collaborative meetings and enhanced Salesforce dashboards for data-driven insights. Concurrently, explore the use of outsourcing and temporary resources as a tactical solution to clear the existing backlog of customer requests.	Implemented
Oct 2024	Meter Data Services and Metering	Metering contractors	Strengthen service contractor oversight by implementing a formal onboarding process with standardized training and ISN integration, and establishing a periodic, criteria-based program to review their ongoing performance. Revise meter manufacturer contracts to include clauses for performance-based penalties and bonuses, along with a formal dispute resolution process.	Target implementation date Q1 2026

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
Oct 2024	Meter Data Services and Metering	Compliance	1. Establish a formal IESO performance management system with ownership for each performance measure and integrate them into internal KPI tracking. Continue the cross-training of all meter technicians on addressing wholesale metering issues. 2. Enhance IESO compliance, to ensure the timely and accountable resolution of all audit findings while proactively improving the quality of new installations. Evaluate the current meter resealing process and service provider capacity to ensure compliance with Measurement Canada expectations.	1 Implemented 2 Target implementation date Q4 2025
Oct 2024	Meter Data Services and Metering	Inventory management	1. Strengthen metering inventory controls by implementing a uniform, risk-based cycle counting process and ensuring stored meters are clearly labeled. Update the primary inventory management document and include specific business rules. 2. Investigate opportunities to improve operational efficiency by further leveraging JDE functionalities, exploring integration with CC&B for reporting, and migrating manual processes to collaborative cloud platforms where feasible.	1 Implemented 2 Target Implementation date Q1 2026
May 2025	Stations- Audit of Automation and Technology Introduction	Skills and work performed by Stations Technicians	Complete a comprehensive workforce review for the Stations group by finalizing the analysis for a new job profile, assessing current skill gaps, and re-evaluating the candidate testing process. Improve technician performance by implementing a structured development process for new hires.	Target implementation date Q2 2026
May 2025	Stations- Audit of Automation and Technology Introduction	Cybersecurity	Enhance the cyber resilience of the operational technology environment by optimizing the security architecture and its associated system and device management protocols.	Target implementation date Q4 2026

Final Report Issue Date	Audit Name	Title of Observation	Recommendations	Status
May 2025	Stations- Audit of Automation and Technology Introduction	Physical security	The physical security program can be enhanced by maturing the comprehensive access management framework and its supporting infrastructure.	Target implementation date Q2 2026
May 2025	Stations- Audit of Automation and Technology Introduction	Station inspection program	Enhance the end-to-end station inspection program by improving the coordination and tracking of schedules to meet required frequencies, and by establishing formal criteria to categorize and prioritize all identified issues for resolution.	Target implementation date Q3 2025
May 2025	Stations- Audit of Automation and Technology Introduction	Station assets	Implement a more rigorous transformer inventory management system for efficient use and establish a formal policy for reconciling the few missing assets over time. Concurrently, establish formal disposal contracts for station batteries, transformers, and oil, and create a process to record asset details to accurately forecast revenue from salvage.	Target implementation date Q2 2026
May 2025	Stations- Audit of Automation and Technology Introduction	Transformer shop	Consider outsourcing (internally or externally) the Services of the Transformer Shop.	Target implementation date Q4 2025

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-5

EVIDENCE REFERENCE:

[Ex.1-2-3, p.33] With respect to Figure 4:

QUESTION(S):

a. Please provide the information in tabular form.
b. Is the information included in this table a forecast, or represents actual submitted load summary forms and signed offer to connect for load through 2040 as of the time the figure was prepared?
c. Historically, what percentage of submitted load summary forms turn into signed offers to connect, both in terms of load and number of connections?

RESPONSE(S):

a) Please see Table A below.

1 **Table A: Tabular form of Figure 4**

Year	Connected	Signed Offer to Connect	Submitted Load Summary Form	Inquiries
2010	0			
2011	0			
2012	8			
2013	33			
2014	33			
2015	49			
2016	57			
2017	57			
2018	62			
2019	69			
2020	80			
2021	105			
2022	105			
2023	110	0	4	0
2024	110	13.1	5	0
2025	110	13.9	7	10.1
2026	110	47.9	24.9	47.4
2027	110	75.5	29.2	86.2
2028	110	113.2	61.3	91.7
2029	110	113.2	62.4	91.7
2030	110	113.2	71.3	128.2
2031	110	113.2	85.8	128.2
2032	110	113.2	115.8	128.2
2033	110	113.2	116.9	128.2
2034	110	121.5	127.1	130.4
2035	110	130.9	128.2	170.4
2036	110	130.9	128.2	170.4
2037	110	130.9	128.2	170.4

Year	Connected	Signed Offer to Connect	Submitted Load Summary Form	Inquiries
2038	110	132.6	165	170.4
2039	110	132.6	165	170.4
2040	110	132.6	176	176.4

b) The values in Table A represent actual submitted load summary forms and signed offers to connect for load through 2040 as of the time the figure was prepared.

c) Historically, Hydro Ottawa has not tracked the percentage of submitted load summary forms that turned into signed offers to connect, both in terms of load and number of connections and as such cannot provide that information. In past years, requests were received through multiple channels without centralized intake and tracking.

Hydro Ottawa has since modified the tracking system to accurately account for all incoming requests and track progress milestones, including the issuance and sign-off of the Offer to Connect. Based on the preliminary data of manually-tracked commercial and residential subdivision projects since 2022, Hydro Ottawa estimates an 89.1% conversion rate for service requests (where a load summary was submitted) that proceeded to an Offer to Connect.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-6

EVIDENCE REFERENCE:

[Ex.1-2-3, p.56]

QUESTION(S):

Please provide a copy of all budget guidance documents that were issued regarding the budgets that underlie the application, including any instructions regarding the demonstration of productivity savings.

RESPONSE(S):

Please see Attachment 1-2-3(A) - Corporate Memorandum - 2024-2030 Priorities and Budget Guidelines submitted on April 15, 2025. This was the only budget guidance document issued. There were no written instructions on the demonstration of productivity savings.

For all rate application material provided to the Hydro Ottawa Limited Board of Directors, refer to the response to interrogatory 1-CCC-13.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-7

EVIDENCE REFERENCE:

[Ex.1-2-3, p.60]

QUESTION(S):

Please revise Table 11 to show for each year, the Forecast Load at 2025 Rates, instead of 'Forecasted Load at Prior Years Rates'.

RESPONSE(S):

Hydro Ottawa has revised Table 11 from Schedule 1-2-3 - Business Plan as Table A to show for each year the Forecast Load at 2025 Rates instead of the Forecast Load at Prior Year Rates.

Table A - Revenue Sufficiency/Deficiency ($'000s)

	2026	2027	2028	2029	2030
Return on Rate Base	$ 91,549	$ 101,661	$ 113,928	$ 123,382	$ 130,196
Distribution Expenses (not including amortization)	$ 140,010	$ 147,263	$ 154,891	$ 162,914	$ 171,353
Amortization	$ 67,205	$ 75,392	$ 82,256	$ 88,364	$ 94,410
Payment in Lieu of Taxes	$ 6,638	$ 6,528	$ 12,204	$ 12,671	$ 15,432
Other Expenses	$ 4,590	$ 4,596	$ -	$ -	$ -
Service Revenue Requirement	**$ 309,993**	**$ 335,440**	**$ 363,279**	**$ 387,331**	**$ 411,392**
Less Revenue Offsets	$ 11,018	$ 10,697	$ 10,859	$ 11,123	$ 11,460
Revenue Requirement from Rates	**$ 298,975**	**$ 324,743**	**$ 352,420**	**$ 376,208**	**$ 399,932**
Forecasted Load at 2025 Approved Rates	$ 249,050	$ 250,697	$ 253,102	$ 255,502	$ 257,487
Yearly Revenue Deficiency	**$ (49,926)**	**$ (74,046)**	**$ (99,318)**	**$ (120,706)**	**$ (142,445)**
Cumulative Revenue Deficiency	**$ (49,926)**	**$ (123,971)**	**$ (223,290)**	**$ (343,995)**	**$ (486,441)**

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-8

EVIDENCE REFERENCE:

[Ex.1-2-5, p.5] With respect to inflation:

QUESTION(S):

a. What is the inflation factor that Hydro Ottawa has used for 2026 costs, and for capital costs between 2027 and 2030?
b. Please provide the inflation factor Hydro Ottawa used in its previous application for capital spending between 2021 and 2025.

RESPONSE(S):

a) The first part of the question mentions ‘costs’, whereas the second part of the question mentions ‘capital costs’. For the purposes of this answer, an assumption is made that ‘costs’ refers to OM&A and ‘capital costs’ refers to capital expenditures.

The inflation factor for 2026 OM&A costs is in the range of 2.0% to 3.75%, and as noted in Schedule 1-3-1 - Rate Setting Framework, 2.1% is also used for the purpose of rate modelling in years two to five (2027-2030).

For capital expenditures, annual inflation factors are in the range of 2.1% to 5% for 2026, and between 2.1% to 5% for 2027-2030, and depend on the nature of the spend. Capital costs relating to distribution assets assume a 5% annual inflation given heightened costs of core commodities used in the industry. Capital costs relating to non-distribution assets vary in the ranges previously mentioned, depending on the nature of the cost (e.g., labour, materials, etc.).

b) This is included in Section 1 of Schedule 1-2-5 - Impacts of Inflationary Pressure. With respect to capital expenditures, the approved plan did not include any amounts forecast for inflation, nor did it include any cost escalation adjustment mechanisms. Essentially the capital plan assumed that a modest level of inflation would continue and the impact of any inflation would be offset by productivity and efficiency savings. It should be noted that the previous rate application was filed in February 2020, with its figures being finalized much earlier. Therefore, it was reflective of a longstanding, stable inflationary environment, which quickly changed, as noted in the aforementioned schedule, with Statistics Canada indicating that the 2020-2024 inflation rate as measured by the Consumer Price Index was the highest in 40 years.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-9

EVIDENCE REFERENCE:

[Ex.1-3-1, p.4]

QUESTION(S):

Hydro Ottawa says, “The proposed increase in capital necessitates a corresponding increase in OM&A expenditures, as shown in Figure 3 below to hire and retain the necessary resources to support the execution of the capital program, and to fund enhanced testing and asset inspection programs to manage system health and reliability with constrained levels of renewal investment relative to the condition needs of the assets.” Is it Hydro Ottawa’s view that there are no reductions in OM&A spending as a result of undertaking capital work (i.e. less maintenance regarding on new assets, etc.)?

RESPONSE(S):

Please refer to the responses to parts (a) and (b) of interrogatory 2-Staff-56 for more information regarding OM&A spending as a result of undertaking capital work.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-10

EVIDENCE REFERENCE:

[Ex.1-3-1, p.7]

QUESTION(S):

Hydro Ottawa quotes from the Minister of Energy and Electrification 2024 Letter of Direction to the OEB. The quote includes the comment that the "The OEB will play a critical role in creating that environment, while balancing the need for continued affordability for customers." Please explain how Hydro Ottawa has specifically considered customer affordability as part of its application.

RESPONSE(S):

Hydro Ottawa acknowledges the Minister's direction and confirms that customer affordability was a foundational principle guiding the development of its entire 2026-2030 application. Hydro Ottawa's plan is the direct result of balancing the critical need for investment in a safe, reliable, and modern electricity grid with the financial pressures facing our customers. This balance was achieved through a combination of prudent investment, strategic pacing of capital investments, operational efficiency, and extensive customer engagement.

The specific ways Hydro Ottawa considered customer affordability are detailed throughout the application and summarized as follows:

- **Prudent and prioritized investment:** Hydro Ottawa's approach, as outlined in the Distribution System Plan (DSP) (Schedule 2-5-1), focused on replacing aging infrastructure, enabling growth and electrification, modernizing the grid and improving system resilience across the communities it serves. Projects were assessed though a risk and need-based framework to

ensure that spending aligns with customer and system priorities.

There are numerous examples which highlight how affordability was factored into the system planning process and how the scope of planned investments was effectively managed so as to minimize impacts on customer rates. The proposed approach for capacity upgrades balances the need for increased grid capacity with cost-effectiveness and customer affordability by employing a mix of wires and non-wires solutions. (See Section 2 of Schedule 2-5-8 - System Service Investments for details). Similarly, Hydro Ottawa's preliminary analysis for overhead asset renewal identified $199 million in investments to replace all assets in degraded condition over the 2026-2030 period. Instead, the utility has formulated an alternative approach involving $68 million in expenditures in order to balance asset degradation risk with long-term affordability most effectively. As for underground asset renewal, however, affordability considerations lean in favour of an approach which is more focused on short-term risk mitigation. (For more information, see Sections 3 and 4 of Schedule 2-5-7 - System Renewal Investments). The plans for further integration of electric vehicles (EVs) into Hydro Ottawa's fleet likewise reflect a posture of limiting cost impacts. For the next five-year rate term, purchases will be focused on a specific vehicle type—bucket trucks with plug-in hybrid booms—with an expectation informed by market signals that a sustained decline in the cost differential between EVs and their internal combustion engine counterparts will enable acquisition of a larger number of EVs at a later date within a similar budget envelope. (See Section 11 of Section 2-5-9 - General Plant Investments for additional details). Refer to Table B in response to interrogatory 2-SEC-41 for the overall reductions in investments.

- **Pacing of investments to smooth bill impacts:** Hydro Ottawa has sequenced its investments over time to mitigate rate volatility. This approach, outlined in the Business Plan Summary (Schedule 1-2-3) and the DSP (Schedule 2-5-1), is designed to allow Hydro Ottawa to address urgent needs while minimizing year-over-year rate increases.

  Key examples in this regard are the utility's proposed approaches to renewing its station and metering assets. With respect to the former, investments have been intentionally sequenced so as to ensure a levelized spending profile and to avoid large spikes in spending and the

associated rate impacts on customers. With respect to the latter, customer affordability was a core consideration in planning a rising level of investment in meter assets during the 2026-2030 rate term, as well as in spreading out the renewal of metering infrastructure over the course of two successive rate cycles. (For more information, please see Sections 2 and 5 of Schedule 2-5-7 - System Renewal Investments, respectively).

- **Customer engagement informed plan:** Hydro Ottawa undertook comprehensive customer engagement (Schedule 1-4-2, Attachment 1-4-2(A)) to understand affordability thresholds and customer preferences. Feedback from a broad cross-section of residential and business customers, including low-income respondents, indicated general support for the proposed plan when presented alongside rate impact estimates. Specifically, the evidence shows strong support for the plan even among the utility's most financially vulnerable customers. Of note:
    - 78% of Low-Income Energy Assistance Program (LEAP) qualified residential customers supported the draft plan.
    - 85% of customers with an income of less than $71,000 (not LEAP qualified) supported the draft plan. (Attachment 1-4-2 (A))

- **Focus on efficiency and cost control:** Hydro Ottawa continues to prioritize cost control through operational efficiencies and productivity improvements. OM&A and Capital forecasts reflect ongoing efforts to manage controllable costs and deliver value to customers. Hydro Ottawa's procurement policy manages external factors of rising costs by securing favorable prices and maximizing purchasing value. While Hydro Ottawa's compensation strategy aligns with its philosophy to attract and retain talent while responsibly managing costs.

Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement identifies numerous initiatives which will result in quantifiable benefits for customers during the 2026-2030 period. Among others, these include optimizing delivery of the utility's grid investment programs, pooling fleet vehicles to allow for more extensive and effective sharing of vehicles by employees, automating the preparation of bills for net metered customers, expanding the use of remote disconnection technology and implementing a new design standard for the placement of protection relays in substations.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-11

EVIDENCE REFERENCE:

[Ex.1-3-1, p.15]

QUESTION(S):

For each of Table 3 and 4, please provide all supporting calculations.

RESPONSE(S):

Please refer to interrogatory response 1-Staff-8.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-12

EVIDENCE REFERENCE:

[Ex.1-3-1, p.17-18]

QUESTION(S):

For each of the SR&ED tax credits and Accelerated CCA, please provide the revenue requirement difference for each year of the plan term, between the proposed capital contribution approach, as compared to the traditional approach of reducing PIL expenses. Please provide all supporting calculations.

RESPONSE(S):

Please refer to the interrogatory response 1-CCC-2.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-13

EVIDENCE REFERENCE:

[Ex.1-3-1, p.24-25] With respect to the proposed Growth Factor, please provide all analyses that Hydro Ottawa has undertaken regarding the specific relationship between:

QUESTION(S):

a. The change in total customers and OM&A costs
b. The change in system capacity and OM&A costs

RESPONSE(S):

a) Hydro Ottawa's proposed custom revenue OM&A factor (CROF) includes a growth factor of 3.23% to fund incremental OM&A costs associated with the rapid growth and electrification forecast. The proposed CROF is based on the OEB's standard approach to OM&A. It replicates the concepts of the PEG model, however adjusting for capacity growth for which the PEG model does not contemplate. The forecasted capital and operating costs are to support the expected increase in load that includes expanding grid capacity outlined in section 4 subsection V of Schedule 2-5-5 - Capital Expenditure Plan. These forecast costs are based on known increase in customer demand requests and from studies for regional planning purposes. The weighted factors on revenue requirements is based on the OEB's cost allocation model that separates costs related to demand and to customer.

The customer growth component is based on a forecasted Compound Annual Growth Rate (CAGR) of 1.005% in customer count for the 2026-2030 period. This represents an increase from 373,277 customers in 2025 to 392,422 customers by 2030.

The system capacity growth component is based on a CAGR of 5.054%, reflecting the significant expansion in system capacity from 2,128 MVA in 2025 to 2,723 MVA by 2030 (an increase of 594.9 MVA).

The 3.23% growth factor is calculated by weighting these two components according to the OEB's cost allocation model:

- System Capacity: 54.8% weighting × 5.054% CAGR = 2.77%
- Customer Count: 45.2% weighting × 1.005% CAGR = 0.46%
- Combined Weighted Growth Rate = 3.23%

This weighting reflects Hydro Ottawa's assessment that capacity growth drives a larger proportion of OM&A costs than customer growth alone, consistent with the forecast of capital investment and operating investment needs.

b) See response to part a) above.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-14

EVIDENCE REFERENCE:

[Ex.1-3-1, p.27-28] With respect to the proposed ESM:

QUESTION(S):

a. What year does Hydro Ottawa expect that an ESM amount would be cleared to customers?

b. Hydro Ottawa proposes that to maintain the deadband, it must maintain its Cohort III efficiency position in its adjusted PEG Model by the end of the rate term. The OEB is undertaking a review and update of its Total Cost Benchmarking (TCB) Model (EB-2025- 0102). What impact, if any, would a new TCB model have on its proposal?

RESPONSE(S):

a) Per current OEB guidance, Hydro Ottawa expects that any amount to be disposed of as part of the Earning Sharing Mechanism (ESM) would be disposed of in 2036.

b) Hydro Ottawa is not proposing that the review of the Total Cost Benchmarking Model as part of EB-2025-0102[1] would impact the proposed ESM.

[1] Ontario Energy Board, *Total Cost Benchmarking Update Invitation to Participate*, EB-2025-0102, (April 1, 2025).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-15

EVIDENCE REFERENCE:

[Ex.1-3-1, p.32-33] With respect to the proposed Non-Wires Solution (NWS) Variance Account:

QUESTION(S):

a. [Ex.1-3-1, p.33] Please explain why the proposed account does not appear to capture the revenue requirement impact avoided infrastructure costs that may be embedded in rates as a result of any incremental NWS solution whose costs would be recorded in the account.
b. Please confirm that this Variance Account reduces Hydro Ottawa's risk.

RESPONSE(S):

a) Please see Hydro Ottawa's response to interrogatory 1-Staff-18 for both parts a. and b.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-16

EVIDENCE REFERENCE:

[Ex.1-3-1, p.33] With respect to the Large Load Revenue Variance Account:

QUESTION(S):

a. Please explain how Hydro Ottawa defines “large load” for the purposes of the variance account.
b. What percentage of Hydro Ottawa’s revenue would be covered by this variance account?
c. Please confirm that the Large Load Variance Account reduces Hydro Ottawa’s risk.

RESPONSE(S):

a) Hydro Ottawa defines "large load" for the purposes of the Large Load Revenue Variance Account specifically as those large load requests outlined in Table 8 of Schedule 3-1-1 - Revenue Load and Customer Forecast. These large load requests are characterized by their unprecedented volume, scale, and are primarily driven by decarbonization and electrification initiatives but could include other factors not related to electrification.

b) The percentage of revenue requirement impacted by the Large Load Revenue Variance account has been calculated based on the updated service revenue requirement and distribution rates detailed in interrogatory response 1-Staff-1. Forecasted revenue for variance account is based on the incremental load multiplied by the proposed distribution variable rates. Please see Table A below for Large Load percentage of Revenue Requirement.

Table A - Large Load Revenue Percentage of Revenue Requirement

	2026	2027	2028	2029	2030
Service Revenue Requirement ($'000s)	$ 308,188	$ 331,196	$ 362,772	$ 387,206	$ 411,346
Forecast revenue for variance account	919	1,641	3,306	5,450	7,082
% Covered by Variance Account	0.30%	0.50%	0.91%	1.41%	1.72%

c) This Group 2 variance accounts ensure fairness and financial stability for both the customer and the distributor. The Large Load Variance account has been proposed to manage the risk between the predicted large load and actual billed demand.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-17

EVIDENCE REFERENCE:

[Ex.1-3-1, p.35] With respect to the Tariff Impact Deferral Account:

QUESTION(S):

a. Does Hydro Ottawa propose to record the impacts of costs only on tariffs directly paid for by Hydro Ottawa, or a third party on behalf of Hydro Ottawa, imposed by Government of Canada?
b. Please explain how Hydro Ottawa proposes the account operate, with illustrative example of various scenarios.
c. How does Hydro Ottawa propose to record the impact of tariffs where the costs are not explicitly identifiable? For example, if the tariff impacts intermediate goods or if purchased from a third-party are not identifiable as part of the final price.
d. Would the deferral account capture both capital and OM&A costs?
e. If the proposed deferral account had been in place since February 2025, what would have been the balance? Please provide all supporting calculations.
f. What amount of annual capital expenditures represents materials and equipment that are imported into Canada? Please provide a breakdown by country of origin.
g. Please confirm that the Tariff Impact Deferral Account reduces Hydro Ottawa's risk.

RESPONSE(S):

a. Hydro Ottawa proposes to record the impacts of costs related to global tariffs paid by Hydro Ottawa. This includes costs as a result of direct imports or payments to suppliers for goods and services impacted by tariffs as described in our response to interrogatory 9-Staff-216.

b. Specific capital and operating costs may be directly impacted by global tariffs. This account would capture the difference in revenue requirement related to the forecasted capital and operating costs as proposed in this application and the related actual costs incurred with tariffs applied. As an example, overhead transformers cost increased by 25% due to USA tariffs. These USA tariffs have caused the cost of overhead transformers to increase by 25%. This increase impacts several areas, including:

- Capital Investment Categories – All capital investment categories are affected, specifically USoA 1850 - Line Transformers. The increased costs for these capital-related portions are recorded in a deferral account. These amounts are then removed from the analysis of the capital variance account.

Sample journal entries are provided in Schedule 9-2-1 New Deferral and Variance Accounts, Section 2.2.

c. Hydro Ottawa is actively engaging with its suppliers to ensure that, wherever possible, costs related to global tariffs are itemized on the respective invoices. In the event that a supplier is unable to report the impact of global tariffs on its invoices, Hydro Ottawa may apply alternative methods to identify the impact of these costs, if any. For example, long term supplier contracts typically include a price adjustment clause, allowing for annual contract escalation in accordance with a published price index (e.g. the Consumer Price Index by Statistics Canada). Cost increases in excess of these contracted benchmarks may be attributable to global tariffs, and would require additional support from the vendor.

d. Yes. The request is for the deferral account to capture all additional expenses incurred as a result of the global tariffs. Therefore, the deferral account would include the revenue requirements impact of both OM&A and capital.

e. If a deferral account had been in place since February 2025, the balance in the deferral account would be $5,433.

f. Hydro Ottawa is unable to provide a breakdown of the portion of annual capital expenditures that represents materials and equipment imported into Canada. The types of materials and equipment being purchased involve complex global supply chains and visibility over the origin of raw materials or intermediate components used in manufacturing is difficult to source. In many cases, especially with capital-intensive goods such as heavy-duty equipment, production involves multiple stages of assembly and component sourcing across various international jurisdictions, some of which entail multiple cross-border movements before delivery to our facilities. As a result, our vendors are not able to track the granular level of detail required to ascertain the exact import content of the final goods we purchase. As a result, this level of detail is not available to Hydro Ottawa at this time and thus, we are unable to provide an estimate of the portion of our capital expenditures directly tied to imported materials.

g. Yes, the establishment of the Tariff Impact Deferral Account will reduce Hydro Ottawa's risk. The primary purpose of this account is to mitigate the financial uncertainty and volatility associated with unpredictable changes in global tariffs. However, it is important to note that the precise quantification of this risk reduction is not possible at this time. The value of the risk reduction is directly tied to the magnitude, scope, and duration of any new or escalated global tariffs, all of which are subject to external economic and political factors that cannot be forecasted with certainty. Therefore, the ultimate extent of that benefit will only become apparent as these future costs are incurred and recorded.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-18

EVIDENCE REFERENCE:

[Ex.1-3-2, p.5, Table 1]

QUESTION(S):

Hydro Ottawa has proposed a 2026-2030 Custom Performance Scorecard Measures, for each measure, please provide in a single table the results for each since 2018.

RESPONSE(S):

Table A below contains 2018-2024 results, where applicable, for each measure that is proposed for inclusion in the 2026-2030 Custom Performance Scorecard.

Table A - 2026-2030 Custom Performance Scorecard Measures (2018-2024 Results)

Performance Measure	Historical Actuals						
	2018	2019	2020	2021	2022	2023	2024
Contact Centre Satisfaction – Transactional Feedback	78%	87%	87%	88%	84%	85%	85%
Percentage of Online Billing Accounts	45.0%	50.3%	54.8%	59.5%	62.3%	65.3%	70.2%
Customer Participation in Non-Wires Solutions[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Injury Frequency Rate	2.31	0.63	0.84	1.17	0.74	1.00	1.09
Lost Workday Severity Rate	7.52	0.32	2.53	3.11	2.40	3.20	0.78
Percentage of Distribution Assets in Poor/Very Poor Condition[2]	17%	N/A	N/A	N/A	N/A	N/A	6%
Percentage of Distribution Assets Reaching End of Life[3]	18.7%	N/A	N/A	N/A	N/A	N/A	54%
Feeders Experiencing Multiple Sustained Interruptions	10	10	10	5	4	8	5
Worst Performing Feeders	5	5	8	6	7	6	1
Station Load Index (4 or 5)[4]	N/A	N/A	N/A	N/A	N/A	10	7
Incremental System Capacity[5]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Distributed Energy Resource Capacity[6]	114	127	152	163	165	167	169
Cyber Security Program Health[7]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Productive Time	72%	72%	69%	73%	69%	73%	71%
Labour Allocation	Unavailable[8]	33%	37%	29%	35%	35%	34%

[1] As noted in Section 2.1.3 of Schedule 1-3-2 - Proposed Annual Reporting - 2026-2030, historical data is not available for this measure, in light of the fact that the non-wires solutions programs planned for the upcoming rate term are new.
[2] The historical data reflect Hydro Ottawa's practice to report on asset condition and review the asset base as a whole prior to the beginning of a new five-year distribution rate term, so as to plan investment strategies accordingly.
[3] The historical data reflect Hydro Ottawa's practice to report on assets having reached end of life prior to the beginning of a new five-year distribution rate term, so as to plan investment strategies accordingly. In addition, historically the utility only captured end-of-life based on assets with known ages. As of 2024, the utility is considering the entire asset population.
[4] Historical data prior to 2023 is not available, as Station Load Index was not previously monitored before that time. This is a new measure which Hydro Ottawa is proposing to introduce for the 2026-2030 rate term.
[5] Hydro Ottawa monitors Incremental System Capacity over a five-year period. As stated in Section 1.1 of Schedule 2-5-1 - Distribution System Plan Overview, incremental system capacity added over the 2021-2025 rate term is expected to total 160 MVA.
[6] DER capacity is measured in megawatts (MW).
[7] Historical data is not available, as this is a new measure which Hydro Ottawa is proposing for the 2026-2030 rate term.
[8] Prior to 2019, Labour Allocation was calculated as % of Labour Time on Capital Activities / Total Productive Time.

Performance Measure	Historical Actuals						
	2018	2019	2020	2021	2022	2023	2024
OM&A per Customer (Appendix 5-A)	$259.05	$244.31	$248.81	$239.83	$279.37	$308.67	$308.74
OM&A per Customer (RRR)	$260.38	$254.69	$241.99	$240.64	$282.53	$313.07	$319.37
Scope 1 Greenhouse Gas Emissions[9]	N/A	N/A	N/A	2,359	2,505	1,914	1,746
Scope 2 Greenhouse Gas Emissions[9]	N/A	N/A	N/A	5,332	5,692	5,846	7,303
Annual Oil Spills & Costs of Remediation (Liters)	1,475	1,131	945	804	781	1,230	950
Annual Oil Spills & Costs of Remediation ($)	$1,760,000	$948,000	$1,440,000	$1,690,000	$1,970,000	$1,110,000	$1,860,000
Non-Hazardous Waste Diversion Rate	92%	86%	98%	94%	95%	94%	90%
Percentage of Green Suppliers	55%	53%	43%	46%	45%	40%	35%
Bad Debt as a Percentage of Total Electricity Revenue	0.13%	0.08%	0.25%	0.07%	0.18%	0.20%	0.22%

1

[9] Scope 1 and Scope 2 emissions are measured in tonnes of CO_2. Prior to 2021, Hydro Ottawa utilized different methodologies for tracking its GHG emissions. These methodologies were adjusted in different years to incorporate new variables and normalization practices. In 2021, the utility adopted its current methodology, which is consistent with international standards and best practices.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-19

EVIDENCE REFERENCE:

[Ex.1-3-3, p.17]

QUESTION(S):

Please provide the underlying data and working papers used to construct Figure 2.

RESPONSE(S):

The underlying data used to construct Figure 2 in Schedule 1-3-3 - Benchmarking is available in Attachment 1-SEC-21(B) - Supplemental Industry Benchmarking Analysis Supporting Data, provided as an attachment to the response to interrogatory 1-SEC-21. In particular, please see the tab titled “HOL vs. Industry Average”.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-20

EVIDENCE REFERENCE:

[Ex.1-3-3, Attachment A] With respect to Hydro Ottawa's adjustment to the PEG benchmarking results:

QUESTION(S):

a. Please provide a copy of Hydro Ottawa's forecast PEG model results without making any of the proposed changes. Please provide a summary table in the same format as Table 2.
b. Using the same adjustments that Hydro Ottawa has made to the forecast results, please provide the actual PEG benchmarking model for each year since 2018.
c. Please provide revised versions each of Tables 2 and 6, that shows that shows the impact of each specific adjustment separately.
d. Please confirm that the adjustments that Hydro Ottawa has made to the PEG model are changes that were not included in the underlying data used by PEG in developing the initial econometric model. For example, Hydro Ottawa did not include secondary lines and were not included in Hydro Ottawa's data used as part of the econometric analysis used to derive the underlying coefficients for the purposes of developing the PEG model.
e. Please add an additional column to Table 5 that shows, for each year the total cost, either incurred by Hydro Ottawa or the IESO, to deliver CDM savings.
f. [p.14] Hydro Ottawa states "Hydro Ottawa therefore proposes to remove Other Revenues from the PEG Model's OM&A. Hydro Ottawa is using Other Revenues as a proxy for the costs associated with these auxiliary services.":
   i. Please provide the specific amounts excluded from OM&A for year.
   ii. For each category of Other Revenue (see Appendix 2-H), please explain how those costs specifically act as proxy for costs related to "auxiliary services."

g. For any other adjustments to the PEG model that Hydro Ottawa investigated, please provide the results and explain why Hydro Ottawa choose not to incorporate them.

RESPONSE(S):

a) Please see Excel Attachment 1-SEC-20(A) - OEB Benchmarking Spreadsheet Forecast Model No Adjustment. The 2024 year was updated with actual results because the inputs were submitted through the annual Reporting and Record-keeping Requirements process and are known. The results are summarized in Table A below.

Table A - Copy of Hydro Ottawa's Forecasted Cost Efficiency Results (No Updates)

Model Results	Historical		Bridge	Test Years				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Actual Total Cost (1,000s)	$ 340,550	$ 353,148	$ 363,724	$ 403,279	$ 434,880	$ 463,693	$ 487,924	$ 515,358
Predicted Total Cost (1,000s)	$ 266,703	$ 286,668	$ 300,767	$ 317,744	$ 335,341	$ 353,071	$ 371,765	$ 390,898
Difference (1,000s)	$ 73,847	$ 66,480	$ 62,957	$ 85,535	$ 99,539	$ 110,622	$ 116,159	$ 124,460
% Difference (Cost Performance)	24.4%	20.9%	19.0%	23.8%	26.0%	27.3%	27.2%	27.6%
Three-year Average Performance	-	-	21.4%	21.2%	22.9%	25.7%	26.8%	27.4%
Stretch Factor								
Annual Result	4	4	4	4	5	5	5	5
Three-year Average	-	-	4	4	4	5	5	5

b) A summary of Hydro Ottawa's PEG historical model results, between 2018 and 2023, formatted in the style of Table 2 in Attachment 1-3-3(A) - PEG Benchmarking Analysis, including all of the

proposed changes (circuit kilometers, conservation and demand management, and other revenues), is summarized in Table B below.

Table B - Hydro Ottawa's Historical Cost Efficiency Results with Updates (Circuit Kilometers, CDM, and Other Revenues)

Model Results	Historical				
	2018	**2019**	**2020**	**2021**	**2022**
Actual Total Cost ('000s)	$ 221,757	$ 239,141	$ 237,992	$ 246,147	$ 282,641
Predicted Total Cost ('000s)	$ 231,089	$ 240,340	$ 241,563	$ 249,668	$ 276,404
Difference ('000s)	$ (9,333)	$ (1,199)	$ (3,571)	$ (3,521)	$ 6,236
% Difference (Cost Performance)	-4.1%	-0.5%	-1.5%	-1.4%	2.2%
Three-year Average Performance	-5.17%	-3.47%	-2.0%	-1.1%	-0.2%
Stretch Factor					
Annual Result	3	3	3	3	3
Three-year Average	3	3	3	3	3

c) A summary of Hydro Ottawa's PEG forecast and historical cost efficiency results, formatted in the style of Table 2 and Table 6 in Attachment 1-3-3(A) - PEG Benchmarking Analysis, detailing the impact of each Hydro Ottawa update to the PEG model, is shown below in Tables C and D.

Table C - Hydro Ottawa's Forecasted Cost Efficiency Results by Proposed Update and Cost Performance Impact

Step	Model Results	Historical		Bridge	Test Years				
		2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
PEG Model With no Updates	Actual Total Cost ('000s)	$ 340,550	$ 353,148	$ 363,724	$ 403,279	$ 434,880	$ 463,693	$ 487,924	$ 515,358
	Predicted Total Cost ('000s)	$ 266,703	$ 286,668	$ 300,767	$ 317,744	$ 335,341	$ 353,071	$ 371,765	$ 390,898
	Difference ('000s)	$ 73,847	$ 66,480	$ 62,957	$ 85,535	$ 99,539	$ 110,622	$ 116,159	$ 124,460
	% Difference (Cost Performance)	24.4%	20.9%	19.0%	23.8%	26.0%	27.3%	27.2%	27.6%
	Three-year Average Performance	-	-	21.4%	21.2%	22.9%	25.7%	26.8%	27.4%
	Stretch Factor								
	Annual Result	**4**	**4**	**4**	**4**	**5**	**5**	**5**	**5**
	Three-year Average	**-**	**-**	**4**	**4**	**4**	**5**	**5**	**5**
Step 1: Updated for Historical Circuit Kilometers	Actual Total Cost ('000s)	$ 340,550	$ 353,596	$ 363,627	$ 403,185	$ 434,788	$ 463,603	$ 487,837	$ 515,274
	Predicted Total Cost ('000s)	$ 314,024	$ 329,919	$ 340,953	$ 355,869	$ 371,802	$ 387,936	$ 405,170	$ 422,913
	Difference ('000s)	$ 26,526	$ 23,678	$ 22,674	$ 47,315	$ 62,986	$ 75,667	$ 82,666	$ 92,360
	% Difference (Cost Performance)	8.1%	6.9%	6.4%	12.5%	15.6%	17.8%	18.6%	19.8%
	Three-year Average Performance	-	-	7.2%	8.6%	11.5%	15.3%	17.3%	18.7%
	Stretch Factor								
	Annual Result	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**4**
	Three-year Average	**-**	**-**	**3**	**3**	**4**	**4**	**4**	**4**
	Step Cost Performance Impact	**-16.3%**	**-13.9%**	**-12.6%**	**-11.4%**	**-10.3%**	**-9.4%**	**-8.6%**	**-7.9%**
Step 2: Updated	Actual Total Cost ('000s)	$ 340,550	$ 353,596	$ 363,627	$ 403,185	$ 434,788	$ 463,603	$ 487,837	$ 515,274
	Predicted Total Cost ('000s)	$ 320,211	$ 339,137	$ 350,740	$ 367,541	$ 385,000	$ 402,457	$ 419,182	$ 436,310

Step	Model Results	Historical		Bridge	Test Years				
		2023	2024	2025	2026	2027	2028	2029	2030
for CDM	Difference (‘000s)	$ 20,339	$ 14,459	$ 12,887	$ 35,643	$ 49,787	$ 61,147	$ 68,654	$ 78,964
	% Difference (Cost Performance)	6.2%	4.2%	3.6%	9.3%	12.2%	14.1%	15.2%	16.6%
	Three-year Average Performance	-	-	4.6%	5.7%	8.3%	11.9%	13.8%	15.3%
	Stretch Factor								
	Annual Result	**3**	**3**	**3**	**3**	**4**	**4**	**4**	**4**
	Three-year Average	**-**	**-**	**3**	**3**	**3**	**4**	**4**	**4**
	Step Cost Performance Impact	**-2.0%**	**-2.8%**	**-2.8%**	**-3.2%**	**-3.5%**	**-3.7%**	**-3.4%**	**-3.1%**
Step 3: Updated for Other Revenue	Actual Total Cost (‘000s)	$ 332,046	$ 344,819	$ 354,942	$ 392,167	$ 424,091	$ 452,744	$ 476,713	$ 503,814
	Predicted Total Cost (‘000s)	$ 320,211	$ 339,137	$ 350,740	$ 367,541	$ 385,000	$ 402,457	$ 419,182	$ 436,310
	Difference (‘000s)	$ 11,834	$ 5,682	$ 4,201	$ 24,625	$ 39,090	$ 50,287	$ 57,531	$ 67,504
	% Difference (Cost Performance)	3.6%	1.7%	1.2%	6.5%	9.7%	11.8%	12.9%	14.4%
	Three-year Average Performance	-	-	2.2%	3.1%	5.8%	9.3%	11.4%	13.0%
	Stretch Factor								
	Annual Result	**3**	**3**	**3**	**3**	**3**	**4**	**4**	**4**
	Three-year Average	**-**	**-**	**3**	**3**	**3**	**3**	**4**	**4**
	Step Cost Performance Impact	**-2.5%**	**-2.5%**	**-2.4%**	**-2.8%**	**-2.5%**	**-2.4%**	**-2.3%**	**-2.2%**

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Table D - Hydro Ottawa's Restated Historical Stretch Factors by Proposed Update and Cost Performance Impact

Year	Original Data from PEG Model		Step 1: Updated for Historical Circuit Kilometers			Step 2: Updated for CDM			Step 3: Updated for Other Revenues		
	% Difference (Cost Performance)	Stretch Factor (Annual Result)	% Difference (Cost Performance)	Stretch Factor (Annual Result)	Cost Performance Impact	% Difference (Cost Performance)	Stretch Factor (Annual Result)	Cost Performance Impact	% Difference (Cost Performance)	Stretch Factor (Annual Result)	Cost Performance Impact
2013	8.5%	3	(5.4)%	3	(13.9)%	(5.6)%	3	(0.2)%	(5.6)%	3	-
2014	12.7%	4	(1.4)%	3	(14.1)%	(1.8)%	3	(0.4)%	(1.8)%	3	-
2015	15.2%	4	0.9%	3	(14.3)%	0.3%	3	(0.6)%	(4.7)%	3	(5.0)%
2016	15.7%	4	1.1%	3	(14.6)%	0.3%	3	(0.8)%	(5.6)%	3	(5.9)%
2017	16.5%	4	1.6%	3	(14.9)%	0.5%	3	(1.1)%	(5.8)%	3	(6.3)%
2018	18.2%	4	3.1%	3	(15.1)%	1.7%	3	(1.4)%	(4.1)%	3	(5.8)%
2019	20.4%	4	5.0%	3	(15.4)%	3.6%	3	(1.4)%	(0.5)%	3	(4.1)%
2020	19.8%	4	4.2%	3	(15.6)%	2.3%	3	(1.9)%	(1.5)%	3	(3.8)%
2021	19.5%	4	3.6%	3	(15.9)%	1.8%	3	(1.8)%	(1.4)%	3	(3.2)%
2022	23.1%	4	7.0%	3	(16.1)%	5.2%	3	(1.8)%	2.2%	3	(3.0)%
2023	24.4%	4	8.1%	3	(16.3)%	6.2%	3	(2.0)%	3.6%	3	(2.5)%

d) Hydro Ottawa confirms that its updates to the PEG model are not included in the underlying data, between 2002 and 2012, used by PEG to develop the model's parameters.

Provincial CDM programs were not widely adopted between 2002 and 2012, and therefore their effects on deliveries and capacity were minimal during PEG's regression period. As a result, CDM likely imposed minimal costs on distributors at that time. As evidenced by Hydro Ottawa's own experience in its Attachment 1-Staff-11(A) - CDM Supporting Data in response to interrogatory 1-Staff-11, CDM volumes were low in 2011 and began to increase substantially throughout the 2010s and have remained at those levels. This growth or the presence of CDM programs is not modelled in the PEG Model's parameters, nor did PEG implement a variable to model CDM's effect on distributors' costs.

In addition, Hydro Ottawa did not report secondary circuit kilometers between 2002 and 2012 for reasons discussed in Attachment 1-3-3(A) - PEG Benchmarking Analysis. Accordingly, secondary circuit kilometers for Hydro Ottawa are not modelled in the PEG regression parameters. We note that other LDCs have, in some cases, incorporated missing historical data into PEG model updates where such data became available.

Other Revenues are not included in the PEG model or its regression period used to determine the model's parameters. However, their associated OM&A costs accrued for performing these auxiliary services would have likely been included in the PEG's model's regression period.

Since the PEG model parameters do not reflect these omitted variables, the model's cost predictions may be systematically lower or higher than they would be if these factors were included. Adjustments made by Hydro Ottawa, such as incorporating CDM savings or recognizing unreported assets, are intended to align the model's outputs more closely with the current operating environment and asset base, thereby improving the relevance and accuracy of the benchmarking results.

e) Hydro Ottawa is unable to quantify the total CDM costs accrued to its network by year. To complete this task would be difficult because CDM's costs arise indirectly from lost demand and lower per-household consumption. Please refer to Attachment 1-Staff-11(A) - CDM Supporting Data for more information.

CDM was designed and executed to deliver provincial grid benefits. Although distributors were refunded for direct costs of managing programs and partially kept whole on lost revenues (via the Lost Revenue Adjustment Mechanism), the PEG model does not account for distortions in customer growth, consumption, or demand caused by CDM initiatives. For example, Hydro Ottawa's new connections in greenfield areas, but flat demand due to CDM-driven urban load reductions limits variable cost recovery. The PEG model's reliance on historical data assumes stable demand patterns, which CDM disrupts, as discussed in Interrogatory 1-Staff-11.

f) Please refer to Hydro Ottawa's response to interrogatory 1-Staff-22.

g) Hydro Ottawa did not explore updates to the PEG model beyond what it proposed in Attachment 1-3-3(A) - PEG Benchmarking Analysis. However, as discussed in the Benchmarking evidence, there are certain other costs Hydro Ottawa believes should be excluded. Specifically, OEB regulatory fees and Hydro One transmission-related costs. In Hydro Ottawa's view, these costs, driven by regulatory oversight and approved transmitter expenses are prudently incurred and outside Hydro Ottawa's control. Including them in the PEG model could unfairly penalize efficiency scores, potentially reduce customer service levels or require Hydro Ottawa to offset other justified costs. This position aligns with OEB's cost causation principles, which emphasize allocating only controllable costs to LDC performance metrics (e.g. OEB's 2019 Rate Handbook). The utility updated the PEG model with no adjustments as a base scenario when preparing its rate application evidence. The results of that model are provided in part (a) above.

It should be noted that Hydro Ottawa explored iterations of the PEG model as the proposed adjustments were incorporated. Specifically, two additional other revenue scenarios: (i) where only Other Revenue USoA 4210, Rent from Property, offsets actual OM&A, and (ii) where only

Other Revenue USoAs 4082 to 4210 offset actual OM&A. The results of the two scenarios are provided in Tables E and F below, respectively. Ultimately, Hydro Ottawa elected to use all Other Revenue USoAs to offset its OM&A, which was submitted in its revised PEG model.

The final updates to the PEG model submitted in Exhibit 1, Tab 3, Schedule 3, Attachment A, were supported by empirical evidence, practices by PEG and the OEB as discussed in part (a) of the response to interrogatory 1-Staff-14, and findings made by the OEB-commissioned review of its total cost benchmarking.[1]

Table E - Copy of Hydro Ottawa's Forecasted Cost Efficiency Results, Other Revenue, USoA 4210 Rent From Electricity Property Removed from OM&A

Model Results	Historical		Bridge	Test Years				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Actual Total Cost (1,000s)	$ 335,970	$ 348,877	$ 358,726	$ 398,178	$ 429,691	$ 458,413	$ 482,550	$ 509,887
Predicted Total Cost (1,000s)	$ 320,211	$ 339,138	$ 350,740	$ 367,541	$ 385,000	$ 402,457	$ 419,182	$ 436,310
Difference (1,000s)	$ 15,759	$ 9,738	$ 7,986	$ 30,637	$ 44,691	$ 55,956	$ 63,368	$ 73,577
% Difference (Cost Performance)	4.8%	2.8%	2.3%	8.0%	11.0%	13.0%	14.1%	15.6%
Three-year Average Performance	-	-	3.3%	4.4%	7.1%	10.7%	12.7%	14.2%
Stretch Factor								
Annual Result	3	3	3	3	4	4	4	4
Three-year Average	-	-	3	3	3	4	4	4

[1] University of Toronto, *Review of Total Cost Benchmarking Methodology for Electricity Distributors* (November 12, 2024)

Table F - Copy of Hydro Ottawa's Forecasted Cost Efficiency Results, Other Revenue, USoA 4082 to 4210 Removed from OM&A

Model Results	Historical		Bridge	Test Years				
	2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Actual Total Cost (1,000s)	$ 334,491	$ 347,387	$ 357,192	$ 391,102	$ 422,367	$ 450,854	$ 474,754	$ 501,848
Predicted Total Cost (1,000s)	$ 320,211	$ 339,138	$ 350,740	$ 367,541	$ 385,000	$ 402,457	$ 419,182	$ 436,310
Difference (1,000s)	$ 14,280	$ 8,248	$ 6,451	$ 23,561	$ 37,366	$ 48,398	$ 55,572	$ 65,539
% Difference (Cost Performance)	4.4%	2.4%	1.8%	6.2%	9.3%	11.4%	12.4%	14.0%
Three-year Average Performance	-	-	2.9%	3.5%	5.8%	8.9%	11.0%	12.6%
Stretch Factor								
Annual Result	3	3	3	3	3	4	4	4
Three-year Average	-	-	3	3	3	3	4	4

Lastly, as discussed in response to interrogatory 1-Staff-15, Hydro Ottawa conducted a post-submission scenario incorporating future capacity needs to address emerging demands. Hydro Ottawa also noted in Attachment 1-3-3(A) - PEG Benchmarking Analysis that limitations in the PEG model include not accounting for infrastructure investments driven by customer growth and electrification.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-21

EVIDENCE REFERENCE:

[Ex.1-3-3, Attachment C, D]

QUESTION(S):

Please provide all the underlying data and working papers used to calculate the various tables and figures in Attachment C and D.

RESPONSE(S):

The underlying data and working papers used to calculate the various tables and figures in Attachment C are available as Attachment 1-SEC-21(A) - Electricity Utility Scorecard Benchmarking Analysis Supporting Data.

The underlying data and working papers used to calculate the various tables and figures in Attachment D are available as Attachment 1-SEC-21(B) - Supplemental Industry Benchmarking Analysis Supporting Data.

Hydro Ottawa notes that during the preparation of the underlying data and working papers for Attachment 1-SEC-21(B), an error was identified in the calculation of the industry averages for long-term debt for the years 2020 and 2021. These figures can be found in the tab titled "Long Term Cost of Debt."

Both the originally submitted and updated values are provided below for reference.

Table A - Original Submission

	2019	2020	2021	2022	2023	5 Yr Avg.
Industry Average	4.74%	4.16%	3.34%	3.58%	6.13%	4.44%
Hydro Ottawa Limited	3.11%	2.95%	2.96%	3.13%	3.41%	3.11%

Table B - Updated Values for 2020 and 2021

	2019	2020	2021	2022	2023	5 Yr Avg.
Industry Average	4.74%	4.35%	3.39%	3.58%	6.13%	4.44%
Hydro Ottawa Limited	3.11%	2.95%	2.96%	3.13%	3.41%	3.11%

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-22

EVIDENCE REFERENCE:

[Ex.1-3-3, Attachment E] With respect to the Gartner, Enterprise IT Spending & Staffing Benchmark, Final Report:

QUESTION(S):

a. [p.13] Please list the companies included in the Peer Group and ITKMD Utilities.
b. [p.17] How many companies' that are included in the Peer Group and ITKMD Utilities are:
   i. distribution only utilities
   ii. transmission only utilities
   iii. generation only utilities
   iv. distribution and transmission only utilities
   v. other
c. [p.13,17] Please confirm that Hydro Ottawa's revenue includes revenue related to pass- through costs (i.e. commodity, transmission, etc.) in addition to distribution revenue.
d. [p.17] Please revise the table to show IT Spend as a % of Distribution Revenue only.

RESPONSE(S):

a) The custom peer group organizations used for comparative purposes are a subset of Gartner's IT Key Metrics Data (ITKMD). Due to client confidentiality agreements, Gartner cannot release the names of the companies included in the ITKMD – Utilities Industry or custom peer groups.

b) There were 140 organizations included in the 2023 IT Key Metrics data set; it would be a considerable effort to analyze the nature of operations for each. More importantly, the materiality

of the response would be limited as the benchmark analysis emphasizes comparing Hydro Ottawa results with the custom peer group of 9 organizations.

For the 9 organizations in the custom peer group, the distribution is as follows:

i. distribution only utilities = 3
ii. transmission only utilities = 0
iii. generation only utilities = 1
iv. distribution and transmission only utilities = 0
v. generation, transmission and distribution = 4
vi. generation and transmission = 1
vii. other = 0

c) Confirmed.

d) The minimum number of organizations required in a peer group to be statistically relevant is 7. Including distribution only organizations would mean being well below the minimum. Therefore providing IT Spend as a % of Distribution Revenue only would not be meaningful.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-23

EVIDENCE REFERENCE:

[Ex.1-3-3, Attachment F] With respect to the Mercer, Market Compensation Review:

QUESTION(S):

a. [p.4] Please provide a list of all companies included in each of the Mercer Benchmarking Database and the MEARIE Survey Data.
b. [p.5] Is the Hydro Ottawa data actual compensation paid at each position?
c. [p.8-11] For each listed HOL Job/Position, please provide the number of FTEs in that role in 2024, and specify if the Job/Position is management, non-management union, non-management/non-union.
d. [p.8-11] Please provide a list of all elements of compensation that are included in the benchmarking study that differ from that which makes up the compensation costs included in Appendix 2-K.

RESPONSE(S):

a) Please reference Attachment 1-SEC-23(A) - Mercer Participant List and Attachment 1-SEC-23(B) - Mearie Participant List.

b) Yes, the average salary for each position has been used to compare to the market median job rate.

c) Please see Table A below.

Table A - FTEs and Category of Jobs in Compensation Review

Role	2024 FTE	Category
Billing Service Associate	10.73	Union
Collection Agent	5.29	Union
Communications Officer	1.00	Union
Customer Contact Agent	2.15	Union
Director, Distribution Operations	2.00	Management
Distribution Engineer	2.82	Non-Union
GIS/CAD Technician	10.47	Union
IT Service Desk Technician	4.00	Union
IT Systems Support	3.00	Union
Management Accountant	3.54	Non-Union
Manager, Distribution Operations	3.98	Management
Network Administrator	5.00	Union
Power Line Technician	86.98	Union
Senior Procurement Agent	2.24	Union
Supervisor, Billing	1.00	Management
Supervisor, Distribution Operations	11.00	Management
System Designer	18.70	Union
System Operator	19.17	Union
Vehicle and Utility Equipment Technician	4.77	Union
Warehouse Attendant	6.04	Union
Total	**203.87**	

d) The only significant element included in Appendix-2K that was not included in the benchmarking study is overtime. Some minor allowances and premiums (e.g. On Call Allowance, Computer Acquisition Program, shift differentials etc.) were also included in the 2K but not the benchmarking study.

2024 CA MBD Mercer Benchmark Database Participant List (excluding Mining & Retail)		
3M Canada Company	FMC Canada	OOCL (Canada) Inc.
9 Story Media Group, Inc.	Fairstone Financial, Inc.	ORLEN Upstream Canada, Ltd.
ABB, Inc.	Family Capital	ORTHOsoft, ULC (Zimmer CAS)
ABC Benefits Corporation	Farmers Edge, Inc.	OTT HydroMet
ABC Canada Technology Group	Federated Co-operatives - CEC	Obsidian Energy, Ltd.
ADAMA Canada, Ltd.	Federated Co-operatives, Ltd. - Co-op Refinery Complex	Oceaneering Canada, Ltd.
ADGA Group Consultants, Inc.	Fednav Limited	Okta Software Canada, Inc.
AECOM Canada	Fengate Capital Management, Ltd.	Olam Americas, LLC
AEM Corporation	Ferring Pharmaceuticals Inc.	Olympus Canada, Inc.
AG Growth International, Inc.	Festo Canada	Ontario Infrastructure and Lands Corporation
AGF Management Limited	Fidelity Investments Canada, ULC	Ontario Medical Association
AMBICO Limited	Finning Canada, Inc.	Ontario One Call
ANDRITZ Hydro Canada	First Canadian Title Company Limited	Ontario Public Service
ARAUCO	First Nations Health Authority	Ontario Teachers' Pension Plan
ARC Resources, Ltd.	First West Credit Union	Opawica Explorations, Inc.
ASCOM North America	Fisher & Paykel Healthcare Limited	OpenText
ASSA ABLOY - HID Canada	Fit4Less	Orbia Advance Corporation S.A.B. De C.V. - Canada
ASSA ABLOY of Canada, Ltd.	Fleet Complete	Oregon Tool
AT&T (Canada), Inc.	Flint Hills Resources, LTD.	Organon Canada
ATB Financial	Flipp Corporation	Orica Canada, Inc.
ATCO, Ltd.	Flowserve Canada Corp.	Oshkosh Corporation (Canada)
AbbVie, Inc. (Canada)	Fluor Canada, Ltd.	Osler, Hoskin & Harcourt, LLP
Abbott Nutrition Canada	Foresters Financial	Ovintiv, Inc.
Accenture, Inc. Canada	Fort Edmonton Management Company	Owens Corning Canada Holdings, ULC
Access Information Management of Canada, ULC	Fortinet Technologies (Canada), ULC	PCI Pharma Services
Accor Canada, Inc.	Fortis, Inc. - FortisAlberta, Inc.	PENN Entertainment, Inc.
Acrisure Re	Fortis, Inc. - FortisBC, Inc.	PETRONAS Canada
Acushnet Canada, Inc.	Forty Creek Distillery, Ltd.	POWER Engineers, Inc.
Advantage Oil & Gas, Ltd.	Foundever Canada Corporation	PPG Canada, Inc.
Aecon Group, Inc.	Fragomen (Canada) Co	Pacific Canbriam Energy Limited
Aerotek ULC (Allegis Group)	Franklin Templeton Investments Corporation	Pacific Smoke International
Affirm Canada Holdings Ltd	Freeman Canada	Palo Alto Networks, Inc.
Agropur Cooperative	Fresenius Medical Care Canada	Paramount Resources, Ltd.
Air Canada	Fresh Canada	Parex Resources, Inc.
Air Liquide Canada, Inc.	FundSERV, Inc.	Pariveda Solutions, Inc.
Air Products & Chemicals	GE Canada Healthcare	Parkland Corporation
Airbnb Canada Inc.	GE Vernova	Parsons Corporation - Parsons Canada, Ltd.
Airbus Canada Limited Partnership	GEA Canada	Pathways Alliance
Akamai Technologies	GEA Farm Technologies Canada, Inc.	PayPal Canada Co.
Akzo Nobel Coatings, Ltd.	GEA Refrigeration Canada, Inc.	Payments Canada
Akzo Nobel Wood Coatings, Ltd.	GEODIS Canada	Pearson Canada, Inc.
Alberta Boilers Safety Association	GF Piping Systems Canada, Ltd.	Pelmorex Media, Inc.
Alberta School Employee Benefit Plan	GIESECKE & DEVRIENT ePayments Canada	Pembina Pipeline Corporation
Alcon Canada Inc.	GN Store Nord Canada	Penske Truck Leasing Canada, Inc.
Alfa Laval	GXO Logistics, Inc.	PepsiCo Beverages Canada
Algonquin Power & Utilities Corp.	Galderma Canada, Inc.	PepsiCo Canada, ULC
Alithya	Galderma Prod Canada, Inc.	Perpetual Energy, Inc.
All Nippon Airways Co., Ltd.	Ganotec, Inc.	Petcurean Pet Nutrition USA, Inc.
All Weather Windows, Ltd.	Gates Canada, Inc.	Peter Kiewit Sons, ULC
Allnex Canada, Inc.	Gear Energy	Pethealth A Fairfax Company
Allstate Insurance Company of Canada	Gen Digital Inc.	PetroChina Canada, Ltd.
Alludo	Generac Power Systems	Peyto Exploration & Development Corp.
Alstom Transport Canada, Inc.	General Dynamics Land Systems - Canada Corporation	Pfizer Canada, Inc.

AltaGas, Ltd.	General Dynamics Mission Systems - Canada	Pharmasave Drugs (National), Ltd.
AltaLink Management, Ltd.	General Mills Canada Corporation	Pharmasave East
Altus Group	General Motors Financial of Canada, Ltd.	Pharmasave West
Amcor Packaging Canada, Inc.	Gerdau Ameristeel Corporation	Philips Electronics, Ltd. - Healthcare
Amdocs Canadian Managed Services Inc	Ghd Holdings (Canada), Inc.	Philips Electronics, Ltd. - Personal Health
Americold Logistics	Gibson Energy, Inc.	Pine Cliff Energy, Ltd.
Amgen Canada, Inc.	Giesecke+Devrient Currency Technology America, Inc.	Plains Midstream Canada, ULC
Amica Senior Lifestyles	Gilead Sciences Canada	Plateforme Workleap, Inc.
Amplifon Canada	Gilead Sciences Canada - Gilead Alberta	PointClickCare
Amway Canada Corporation	Ginsberg Gluzman Fage & Levitz, LLP	Porter Airlines
Anachemia Canada Co.	Givaudan Canada	Post Consumer Brands Canada, Inc.
Analog Devices Canada, Ltd.	Glanbia Performance Nutrition Canada, Inc.	PrairieSky Royalty
Anaplan Software Canada, Inc.	GlaxoSmithKline Canada, Inc.	Precision Castparts Corp. Canada
Andersen Corporation - Andersen Windows, Inc.	Globant Canada	Precision Drilling Corporation
Ansell Canada, Inc.	Golden Boy Foods, Ltd.	Prevost Car, Inc.
Ansys Canada, Ltd.	GoodLife Fitness Centres	Primary Engineering & Construction
Anuvu Operations LLC	Government of Alberta	ProServeIT Corporation
Apex Tool Canada, Ltd.	Government of Alberta - Agriculture Financial Services Corporation	Procore Technologies Canada, Inc.
Apex Utilities	Government of Alberta - Alberta Electric System Operator	Procter & Gamble, Inc. - Canada
Apotex, Inc.	Government of Alberta - Alberta Energy Regulator	Prospera Credit Union
Aptos, Inc.	Government of Alberta - Alberta Enterprise Corporation	Publicis Sapient (Canada), Inc.
Aquatera Utilities, Inc.	Government of Alberta - Alberta Gaming, Liquor and Cannabis Commission	Puratos Canada, Inc.
Arch Insurance Canada, Ltd.	Government of Alberta - Alberta Health Services	Pure Metal Canada
Arch Reinsurance Company - Canadian Branch	Government of Alberta - Alberta Indigenous Opportunities Corporation	PwC Management Services, LP
Archer-Daniels-Midland Company (ADM) (Canada)	Government of Alberta - Alberta Innovates	QuadReal Property Group, LP
Arctic Wolf Networks Canada, Inc.	Government of Alberta - Alberta Innovates - C-FER Technologies	Quaker Houghton Canada, Inc.
Arcutis Biotherapeutics, Inc	Government of Alberta - Alberta Innovates - InnoTech Alberta	Qualico Developments
Ariston Canada	Government of Alberta - Alberta Motor Vehicle Industry Council	Queen's University
Arjo Canada, Inc.	Government of Alberta - Alberta Pensions Services Corporation	Queensland Sugar Limited
Arla Foods, Inc.	Government of Alberta - Alberta Public Service	Quorum Business Solutions (Canada), Inc.
Arrow Electronics, Inc. (Canada)	Government of Alberta - Alberta Securities Commission	R.V. Anderson Associates Limited
Arterra Wines Canada, Inc.	Government of Alberta - Alberta Teachers' Retirement Fund Board	RGA International Corporation
Arup Canada, Inc.	Government of Alberta - Alberta Utilities Commission	RHI Canada, Inc.
Aspire Bakeries B.C., ULC	Government of Alberta - Athabasca University	ROCKWOOL, Inc. - Canada
Associated Brands, Inc.	Government of Alberta - Bow Valley College	RSM Canada
Associated Materials Canada Limited	Government of Alberta - Covenant Health	RTX Corporation
Association of Professional Engineers and Geoscientists of BC	Government of Alberta - Credit Union Deposit Guarantee Corporation	RWDI AIR, Inc.
Astellas Pharma Canada, Inc.	Government of Alberta - Health Quality Council of Alberta	RXO, Inc.
Astenjohnson, inc.	Government of Alberta - Invest Alberta Corporation	Radial, Inc.
AstraZeneca Canada, Inc.	Government of Alberta - Keyano College	Radiology Consultants Associated
Asurion Insurance Services	Government of Alberta - LAPP Corporation	Read Jones Christoffersen, Ltd.
Athabasca Oil Corporation	Government of Alberta - Lethbridge College	Real Estate Council Of Ontario
AutoCruitment, LLC	Government of Alberta - MacEwan University	Reckitt Benckiser Canada
AutoStore Holdings, Ltd.	Government of Alberta - Market Surveillance Administrator	Red Bull Canada, Ltd.
Autoliv, Inc. - Autoliv Canada, Inc.	Government of Alberta - Medicine Hat College	Regal Beloit Canada, ULC
Avalara Inc.	Government of Alberta - Mount Royal University	Regional Municipality of Niagara
Avient - Canada	Government of Alberta - Natural Resources Conservation Board	Reimer World Corporation
Aviso Wealth, Inc.	Government of Alberta - NorQuest College	Resideo Technologies, Inc.
Axalta Coating Systems Canada	Government of Alberta - Northern Alberta Institute of Technology	Rheem Canada, Ltd.
BA Robinson	Government of Alberta - Northern Lakes College	Rich Products of Canada
BADGER INFRASTRUCTURE SOLUTIONS	Government of Alberta - Northwestern Polytechnic	Richardson International Limited
BASF Canada, Inc.	Government of Alberta - Olds College	Richter, LLP
BBA, Inc.	Government of Alberta - PSPP Corporation	Ricoh Canada, Inc.
BC Hydro & Power Authority	Government of Alberta - Portage College	Rife Resources, Ltd.
BDO Canada, LLP	Government of Alberta - Red Deer Polytechnic	Rimex Supply, Ltd.

BGC Engineering, Inc.	Government of Alberta - SFPP Corporation	RioCan Real Estate Investment Trust
BGIS Global Integrated Solutions Canada, LLP	Government of Alberta - Southern Alberta Institute of Technology	Riverside Natural Foods Ltd. (Home of MadeGood)
BISSELL Canada Corporation	Government of Alberta - Special Areas Board	Rivian Automotive Canada, Inc.
BMC Software Canada, Inc.	Government of Alberta - Travel Alberta	Robert Half Canada, Inc.
BMW Group Financial Services Canada	Government of Alberta - University of Alberta	Roche Diabetes Care Canada
BNP Paribas	Government of Alberta - University of Calgary	Roche Diagnostics Canada
BP Canada Energy Group, ULC	Government of Alberta - University of Lethbridge	Rock Central, LLC
BSH Canada Home Appliances Non-Exec	Government of Alberta - Workers' Compensation Board - Alberta	Rockpoint Gas Storage
BWXT Canada, Ltd.	Government of Nova Scotia	Rockwell Automation Canada Control Systems
BWXT Medical, Ltd.	Graham Management Service, LP	Rogers Communications, Inc.
BWXT Nuclear Energy Canada, Inc.	GrainCorp Canada, Inc.	Rolls-Royce Canada, Ltd.
BWXT Precision Mfg, Inc.	Grainger Canada Holdings	Roquette Canada Ltd.
Baker Hughes	Gran Tierra Energy, Inc.	Ross Video Limited
Balcan Innovations, Inc.	Grant Thornton, LLP	Rothmans, Benson & Hedges, Inc.
Ball Corporation - Ball Aerosol Packaging	Graphic Packaging Canada	Rowan Williams Davies & Irwin, Inc.
Ball Corporation - Beverage Packaging North & Central America	Great Canadian Gaming Corporation	Royal Bank of Canada
Bank of Montreal	Great Canadian Railtour Company, Ltd.	Royal Canin Canada, Inc.
Barry Callebaut Canada, Inc.	Great Western Malting Co.	S&C Electric Canada, Ltd.
Baytex Energy Corp.	Greater Toronto Airports Authority	SAS Institute (Canada), Inc.
Bechtel Corporation (Canada)	Green Impact Partners	SBA Network Services Canada
Becton Dickinson Canada, Inc.	Grundfos Canada, Inc.	SC Johnson & Son, Ltd.
Beiersdorf Canada, Inc.	H-E Parts International, LLC	SCM Insurance Services
Belden Canada, Inc.	HAPAG-LLOYD (CANADA) INC	SCS Consulting Group, Ltd.
Belimo Aircontrols (CAN), Inc.	HDR, Inc. (Canada)	SIEMENS MOBILITY LIMITED
Bell Canada	HH Angus & Associates, Ltd.	SKF Canada Limited
Bell Textron Canada Limited	HSS Enterprises	SNDL, Inc.
BenchSci	HWN Energy, Ltd.	SOTI, Inc.
Benevity, Inc.	Hach	SPS Commerce Canada, Ltd.
BentallGreenOak (Canada)	Haleon Canada	SPX Technologies, Inc. - Canada
Bentley Canada, Inc.	Halifax Regional Municipality	STELIA North America
BeyondTrust Corporation	Halliburton Group Canada	STEMCELL Technologies Canada, Inc.
BioSyent, Inc.	Hammond Power Solutions	STEP Energy Services, Ltd.
Biogen Canada, Inc.	Hanon Systems Canada, Inc.	Safe Roads Engineering
Biomérieux Canada Inc.	Hanon Systems Canada, Inc. - Fluid Pressure & Controls (FP&C)	Safran Landing Systems Canada, Inc.
Birchcliff Energy, Ltd.	Harlequin Enterprises, Ltd.	Sage-Link, Ltd.
Bird Construction Company	Hasbro Canada	Sagen MI Canada, Inc.
Black & Veatch Canada Company	HashiCorp Sales & Marketing (Canada) ULC	Saint-Gobain Canada, Inc.
Blackberry Limited	Hatch, Ltd.	Salesforce Canada Corporation
Blackline Safety Corp.	Hatfield Consultants, Ltd.	Samuel, Son & Co., Limited
Blake, Cassels & Graydon, LLP	Haventree Bank	Sandoz Canada, Inc.
BluEarth Renewables, Inc.	Haworth	Sandvik Canada, Inc.
Blue Mountain Resorts, LP	Healthcare Insurance Reciprocal of Canada	Sanjel Energy Services Inc.
BlueShore Financial Credit Union	Healthcare of Ontario Pension Plan	Sanofi Pasteur Limited
BlueTriton Brands (Canada)	Heartland Generation	Saputo, Inc.
Boehringer Ingelheim Canada, Ltd.	Heaven Hill Distilleries, Inc.	SaskEnergy, Inc.
Bombardier Recreational Products, Inc. (BRP, Inc.)	Heidelberg Materials	SaskPower
Bombardier, Inc.	Hellmann Worldwide Logistics	SaskTel
Booking.com Canada	Hempel (Canada), Inc.	Saskatchewan Blue Cross
Bosch Rexroth Canada Corp.	Henkel Canada Corp	Saskatchewan Government Insurance
Boston Scientific Canada Limited	Henry Schein Canada, Inc.	Saskatchewan Indian Gaming Authority
Boyd Group Services, Inc.	Heritage Resource Limited Partnership	Saturn Oil & Gas, Inc.
Bradken Canada Manufactured Products, Ltd.	Hershey Canada, Inc.	Savanna Drilling
Brambles	Hexion Canada Inc.	Savanna Well Servicing
Brightly Software Canada, Inc.	High Liner Foods, Inc.	Savvas Learning Company
British Columbia Automobile Association	Highspot, Inc.	Sazerac of Canada, Inc.

Brookfield Residential Properties, ULC	Hillenbrand, Inc. Canada	Scarborough Transit Connect GP
Burns & McDonnell	Hilti Canada	Schaeffler Aerospace Canada, Inc.
Business Development Bank of Canada	Hiram Walker & Sons, Ltd.	Schaeffler Canada, Inc.
CAA Club Group	Hitachi Construction Truck Manufacturing	Schenker of Canada Limited
CAE, Inc.	Hitachi Energy Canada	Schindler Elevator Corporation (Canada)
CB&I	Hitachi Rail STS Canada	Schlumberger Canada, Ltd.
CBC/Radio-Canada	Hitachi Systems Security, Inc.	Schneider Electric Canada, Inc.
CBRE Limited	Hockey Canada	Scotiabank
CDN Controls Ltd.	Hoffmann-La Roche, Limited	Scotts Canada, Ltd.
CEDA International Corporation	Hollister	Seaspan Ship Management, Ltd.
CES Energy Solutions Corp.	Hologic	Seastar Chemicals, Inc.
CEVA Freight Canada Corp.	Home Trust Company	Secure Energy Services, Inc.
CEVA Logistics Canada ULC	Honda of Canada Manufacturing	Sensia, Ltd. (CA)
CF Chemicals, Ltd.	Honeywell Limited	Serco Canada
CGC, Inc.	Hood Packaging	ServiceNow Canada, Inc.
CGI, Inc.	HubSpot Canada, Inc.	Servier Canada, Inc.
CHC Helicopters Canada	Hunting Energy Services (Canada), Ltd.	Shaw Industries Group
CIBC Mellon	Huntsman Canada	Shell Canada Limited
CIMA+	Husky Injection Molding Systems, Ltd.	Shell Canada Limited - Downstream
CKQ KONE	Hydro-Quebec	Shell Canada Limited - Projects & Technology
CMA CGM CANADA	Hypertherm	Shiseido (Canada), Inc.
CNH Industrial Canada, Ltd.	IBM Canada Limited	Shockwave Medical Canada, Inc.
CNOOC Petroleum North America, ULC	ICF Consulting Canada, Inc.	Shopify, Inc.
COSL Canada	IMAX Corporation	Shutterfly, Inc.
CRH	IPC Canada, Ltd.	Sidel Canada, Inc.
CRH Canada Group, Inc.	IQVIA RDS Canada, ULC	Siemens Canada Limited
CSA Group	Imperial Oil, Ltd.	Siemens Canada Limited - Process Instruments Business Unit
CSL Behring Canada, Inc.	Imperial Tobacco Canada Limited	Siemens Canada Limited - RuggedCom
CST Consultants, Inc.	Imperva, Inc.	Siemens Canada Limited - Siemens Healthcare Diagnostics
CSV Midstream Solutions	InPlay Oil Corp.	Siemens Electronic Design Automation, ULC
Cadillac Fairview Corporation Limited	Index Exchange, Inc.	Siemens Energy Canada Limited
Calgary Airport Authority	Infoblox Canada, Ltd.	Siemens Energy Canada Limited - Dist Gen (PRW)
Calgary Stampede Foundation	Inmar, Inc.	Siemens Energy Canada Limited - PGI Business Unit
Calian Group, Ltd.	Innomotics Inc.	Siemens Energy Transformers Canada
Calix, Inc.	Innovation Credit Union Limited	Siemens Financial, Ltd.
Cambium, Inc.	Insight Canada, Inc.	Siemens Gamesa Renewable Energy Limited
Cameco Corporation	Intact Financial Corporation	Siemens Industry Software, ULC
Campbell Company of Canada	Integra Canada	Sigma-Aldrich Canada, Ltd.
Canada Bread Company, Ltd.	Intelcom Courrier Canada, Inc.	Signify Canada, Ltd.
Canada Mortgage And Housing Corporation	Intelliware Development, Inc.	Silicon Laboratories Canada, ULC
Canada Post Corporation - Purolator	Inter Pipeline, Ltd.	Simpson Strong-Tie Canada, Ltd.
Canada Workday, ULC	Interdigital Administrative Solutions, Inc.	SinaLite
Canadian Association of Petroleum Producers (CAPP)	Interface Flooring Systems Canada, Inc.	Sinopec Daylight Energy, Ltd.
Canadian Bank Note Company, Limited	Interior Savings Credit Union	SiriusXM Canada, Inc.
Canadian Hospital Specialties Ltd.	International Air Transport Association (IATA)	Skyline Group of Companies
Canadian Imperial Bank of Commerce	International Committee of the Red Cross Canada	Slalom, LLC
Canadian Medical Association	International Financial Data Services (IFDS) Canada	Sleeman Breweries, Ltd.
Canadian Natural Resources – Oil Sands	International Paper Company Canada	Smith and Andersen Consulting Engineering
Canadian Natural Resources, Ltd.	Invesco Canada	Smucker Foods of Canada Corp.
Canadian Nuclear Laboratories	Invitae Corporation	Snap, Inc.
Canadian Pacific Kansas City Limited	Ipsen Biopharmaceuticals Canada, Inc.	Social Research and Demonstration Corporation (SRDC)
Canadian Premier Life Insurance Company (Securian Canada)	Irving Oil, Ltd.	Societe Des Alcools Du Quebec (SAQ)
Canadian Western Bank	J.D. Irving, Ltd. - Cavendish	Sollio Agriculture
Canfitpro, Inc	J.D. Irving, Ltd. - Construction and Equipment Division	Sollio Cooperative Group
Canlan Ice Sports Corp.	J.D. Irving, Ltd. - Corporate Services	Southwire Canada Company

Canlin Energy Corporation	J.D. Irving, Ltd. - Irving Consumer Products	Spartan Controls, Ltd.
Canopy Growth Corporation	J.D. Irving, Ltd. - Irving Group of Companies	Spartan Delta Corp.
Canuck Place Children's Hospice	J.D. Irving, Ltd. - Irving Personal Care	Spin Master
Capital Power Corporation	J.D. Irving, Ltd. - Irving Shipbuilding, Inc.	Spirax Sarco Canada Limited
Cardinal Health Canada	J.D. Irving, Ltd. - Midland Transport, Ltd.	Sproule Associates Limited
Cargill Limited	J.D. Irving, Ltd. - Moncton Wildcats	Square Canada Inc
Carmeuse Group - Carmeuse Lime & Stone Canada	J.D. Irving, Ltd. - Protrans	Stampede Drilling
Carrier Canada Corporation	J.D. Irving, Ltd. - Pulp & Paper Division	StandardAero Limited
Cascade Canada, Ltd.	J.D. Irving, Ltd. - Sawmills & Woodlands	Stantec, Inc.
Cascades, Inc.	J.D. Irving, Ltd. - Transportation and Logistics	Starkey Canada
Catapult Environmental Inc.	J.D. Irving, Ltd. - Universal Properties	Steel Reef Infrastructure Corp.
Caterpillar Financial Services Limited	J.D. Irving, Ltd. - Woodlands	Stericycle, Inc. - Canada
Celanese Canada, ULC	J.S. Held, ULC	Stikeman Elliott, LLP - S&E Services Limited Partnership
Cenovus Energy, Inc.	JTI-Macdonald Corp.	Strathcona Resources, Ltd.
CentralSquare Technologies, LLC	Jacobs Canada, Inc.	Straumann Canada Limited
Centuri Group, Inc. - Canada	Jaguar Land Rover Canada, ULC	Sublatus Environmental
Cerence Operating Company	Jamieson Laboratories, Ltd.	Sulzer Chemtech Canada, Inc.
Ceridian Dayforce Corp.	Janssen, Inc.	Sulzer Pumps (Canada), Inc.
Certn	John Deere Canada, ULC	Sulzer Rotating Equipment Services (Canada), Ltd.
ChampionX Canada, ULC	Johns Manville Canada, Inc.	Sun Life Financial, Inc.
Charles River Laboratories Canada	Johnson & Johnson (Canada), Inc.	Sunbelt Rentals of Canada, Inc.
Charlotte Tilbury Limited	Johnson & Johnson, Inc. - Medical Products	Suncor Energy, Inc.
Chartered Professional Accountants of Canada	Jones Lang LaSalle Canada	Suncor Energy, Inc. - Exploration & Production
ChemTreat	Journey Energy, Inc.	Suncor Energy, Inc. - Oil Sands
Chervon Canada, Inc.	Joy Global (Canada) Ltd	Suncor Energy, Inc. - Refining and Marketing
Chevron Canada Limited	Just Eat Takeaway.com - SkipTheDishes	Sunwing Vacations
Chevron Canada Resources	KAR Auction Services, Inc.	Surbana Jurong - Canada
Chisholm Fleming & Associates	KONE, Inc. (Canada)	Surerus Murphy Joint Venture
Church & Dwight Canada Corp.	KPMG, LLP	Surge Energy, Inc.
Cigna Life Insurance Company of Canada	KUBRA Data Transfer, Ltd.	Sustainable Development Technology Canada
Cimpress	Kardium	Swiss Reinsurance Company Canada
Circle Internet Financial, LLC	Kautex Corporation	Symcor, Inc.
Cirque du Soleil, Inc.	Kelt Exploration, Ltd.	Syncreon Canada, Inc.
City Of Ottawa	Kennametal, Inc.	Syneos Health Inc
City of Medicine Hat	Kenvue	Syngenta Canada, Inc.
Clean Harbors Canada, Inc.	Kepler Group	Sysco Canada, Inc.
ClearBakk Water Solutions	Kerry (Canada), Inc.	TAQA North, Ltd.
Clover Leaf Seafoods Corp.	Keurig Dr Pepper Canada	TELUS Corporation
Club Auto Roadside Services, Ltd. (Xperigo)	Keyera Corp.	TK Elevator Canada
Coast Capital Savings Federal Credit Union	Keystone Field Engineering, Inc.	TSYS Managed Services Canada, Inc. (TSYS)
Coastal Community Credit Union	Kimberly-Clark, Inc.	TTEC Canada Solutions, Inc.
Coca-Cola Canada Bottling Limited	Kingston Midstream Limited	TTM Technologies Toronto, Inc.
Coca-Cola, Ltd.	Kiwentinohk Energy Corp.	Takeda Canada, Inc.
Cognizant	Klohn Crippen Berger, Ltd.	Tatham Engineering Limited
Coinstar Automated Retail Canada, Inc.	Knight Therapeutics, Inc.	TaylorMade Golf Company Canada
Colas Canada, Inc.	Koerber Supply Chain, Inc.	Technical Standards and Safety Authority
Colgate-Palmolive Canada, Inc.	Konecranes Canada, Inc.	TechnipFMC Canada, Ltd.
Colgate-Palmolive Canada, Inc. - Hill's Pet Nutrition Canada	Konica Minolta Business Solutions (Canada)	Teekay Shipping (Canada) Ltd.
Colliers Project Leaders, Inc.	Kraft Heinz Canada, ULC	Teine Energy, Ltd.
Coloplast Canada Corporation	Kruger Energy, LP	Telix Pharmaceuticals (Canada), Inc.
Comcast Corporation	Kruger Packaging, LP	Tenaris Global Services (Canada), Inc.
Compagnie WestRock du Canada Corp.	Kruger Products, LP	Teranet, Inc.
Compass Group Canada	Kruger Pulp & Paper	Tesla, Inc. (Canada)
CompuCom Canada Co.	Kruger, Inc.	Tetra Pak Canada
Computer Modelling Group, Ltd.	Kuehne + Nagel International AG - Canada	Textron Aviation, Inc.

Conagra Brands Canada, Inc.	Kyowa Kirin	Textron Canada
Conavi Medical, Inc.	L'Oreal Canada	Textron Specialized Vehicles
Concordia University	LANXESS - North America	Textron Systems Canada, Inc.
Concordia University of Edmonton	LEGO Canada, Inc.	The Boston Consulting Group of Canada, Ltd.
Conestoga Meat Packers, Ltd.	LEO Pharma, Inc.	The CSL Group, Inc.
Conexus Credit Union	LGC Group	The Canada Life Assurance Company
Conifer Energy, Inc.	Labatt Breweries of Canada	The Canadian Medical Protective Association
Connacher Oil And Gas Limited	Labtician Ophthalmics, Inc.	The Church of Jesus Christ of Latter-day Saints (Canada)
ConocoPhillips Canada	Lactalis Canada, Inc.	The City of Calgary
Continental Canada	Land Title & Survey Authority	The Clorox Company of Canada, Ltd.
Continental Casualty Company	Laval Corporate Training Centre Inc.	The Co-operators Group Limited
ConvaTec Canada, Ltd.	Law Society of Ontario	The Commonwell Mutual Insurance Group
Convertus Canada LTD	Ledcor Industries, Inc.	The Emmes Company
Cook Medical	Lennox Industries (Canada), Ltd.	The Mastercard Foundation
CoolIT Systems Inc	Lesaffre Corporation	The Minto Group
Corby Spirit and Wine, Ltd.	Libbey, Inc.	The Orphan Well Association
Corex Resources, Ltd.	Liberty Mutual Canada	The Sherwin-Williams Company (Canada) - Corporate Division
Cornerstone Building Brands Canada Inc.	Liburdi Turbine Services, Ltd.	The Sherwin-Williams Company (Canada) - Global Supply Chain (GSC)
Cornerstone OnDemand, Inc.	LifeLabs, LP	The Sherwin-Williams Company (Canada) - Performance Coatings Group
Corning Canada	LifeScan Canada	The Sherwin-Williams Company (Canada) - Performance Coatings Group, Automotive
Corporation Développement Knowlton, Inc. (KDC/ONE)	Linamar Corporation	The Sherwin-Williams Company (Canada) - Performance Coatings Group, General Industrial
Cosmetica Laboratories	Linde Canada, Inc.	The Sherwin-Williams Company (Canada) - Performance Coatings Group, Industrial Wood Finishing
Coty Canada	Lineage Logistics ORS, Ltd.	The Sherwin-Williams Company (Canada) - Performance Coatings Group, Protective & Marine
Covanta - Durham York	Linvatec Canada, ULC	The Trade Desk Canada, Inc.
Cowi North America, Ltd.	Lion Electric	The War Amputations of Canada
Cox Automotive	Littelfuse (Canada)	The Wawanesa Mutual Insurance Company
Credit Union Central Alberta, Ltd.	Livingston International, Inc.	Thermon Canada, Inc.
Crew Energy, Inc.	Livingston Transportation, Inc.	Thomson Reuters Canada Limited
CrowdStrike, Inc.	London Health Sciences Centre	Thyssenkrupp Industrial Solutions (Canada), Inc.
Crown Lift Trucks Canada	Long View Systems	Tokio Marine Canada
Cummins Canada, ULC	Lonza Canada, Inc.	Toronto Hydro Corporation
Cushman & Wakefield	Loram Maintenance of Way	Toronto International Film Festival
Cygnet Energy Ltd.	Louis Dreyfus Company Canada, ULC	Toronto Metropolitan University
Cytel Canada Health, Inc.	Lufthansa Technik	Torxen Energy, Ltd.
DFI Corporation	Lumanity	Torys LLP
DHL Corporate	Lundbeck Canada, Inc.	Tourmaline Oil Corp.
DHL Express (Canada)	Lycopodium Minerals Canada, Ltd.	Toyota Boshoku Canada, Inc.
DHL Express Canada (Corporate)	Lynx Energy, ULC	Trans Mountain Corporation
DHL Global Forwarding (Canada), Inc.	LyondellBasell Industries - Canada	Trans-Northern Pipelines, Inc.
DHL Supply Chain Canada (Corporate)	MAXIMUS Canada, Inc.	TransAlta Corp.
DNA Genotek, Inc.	MEG Energy Corp.	Transcontinental, Inc.
DRISCOLL'S	MEGlobal Canada, ULC	Travelers Insurance Company of Canada
DSI Canada Civil, Ltd.	MHI RJ Aviation, ULC	Treasury Board Of Canada Secretariat
DSM Nutritional Products Canada, Inc.	MNP, LLP	TriSummit Utilities, Inc.
DURR Aktiengesellschaft	MTE Consultants, Inc.	Trican Well Service, Ltd.
Daimler Truck Financial Services Canada Corporation	Mackenzie Financial Corporation	Tricon Residential
Daimler Trucks North America	Maersk Line Branch Canada	Trillium Health Partners
Danaher - Beckman Coulter - Diagnostics	Magna International, Inc. - Polycon Industries	Trimac Management Services LP
Danaher - Beckman Coulter - Life Sciences	Mancal Energy, Inc.	Trimble, Inc.
Danaher - Cepheid	Manitoba Hydro	Trojan
Danaher - Cytiva	Manulife Financial Corp.	TuGo
Danaher - Integrated DNA Technologies	Maple Leaf Foods, Inc.	Tundra Oil & Gas, Ltd.
Danaher - Leica Biosystems, Inc.	Maple Leaf Sports & Entertainment, Ltd.	UPM Fibres
Danaher - Leica Microsystems	Mark Anthony Group, Inc.	UPM Raflatac Canada, Inc.
Danaher - Mammotome	Mars Canada, Inc.	Uber - Canada

Danaher - Pall	Mars Food - Canada	Ultium Cam Partners
Danaher - Radiometer	Mars Petcare - Canada	Unilever Canada, Inc.
Danaher - Sciex	Mars Wrigley Confectionery US, LLC - Canada	Unisys Canada, Inc.
Danaher Corporation	Masonite International Corporation	United Parcel Service Canada, Ltd.
Danaher Corporation (Canada)	MasterCard Incorporated	United Way of Calgary and Area
Danfoss, Inc.	Masterbrand Cabinets Canada	Univar Canada, Ltd.
Danone, Inc.	Mastronardi Produce, Ltd.	University Health Network
Dart Container, Inc.	Mattamy Homes Limited	University Pension Plan
Data Communications Management Corp.	Mattel Canada, Inc.	University of Toronto
Day & Ross, Inc.	Mattr Corp	Upfield Canada, Inc.
De Havilland Aircraft of Canada	McCain Foods Limited	Upper Grand District School Board
DeLaval, Inc.	McCormick and Company	User Testing
Deckers Outdoor Corporation Canada	McKesson Canada Corporation	VIA HFR VIA TGF
Delegat Canada Limited	McMillan LLP	VIA Rail Canada, Inc.
Dell Canada, Inc.	Medavie Blue Cross	VMWare Canada, Inc.
Deloitte, LLP	Medela Canada, Inc.	VWR International, Ltd.
Det Norske Veritas (Canada), Ltd.	Medicom	Valiant Machine & Tool Inc.
Dexterra Group	Medison Canada	Valmet, Ltd.
Diageo Canada, Inc.	Medline Canada Corporation	Valmont WC Engineering Group, Ltd.
Dialpad, Inc.	Medtronic Canada, ULC	Vancouver City Savings Credit Union (Vancity Credit Union)
Diamond Gas Management Canada, Ltd.	Mercedes-Benz Financial Services Canada Corporation	Vanderlande Canada
Diligent Canada, Inc.	Meridian Credit Union Limited	Vantage Data Centres Canada, ULC
Domtar Corporation	Meridian Onecap Credit Corp	Varian Medical Systems, Inc.
DoorDash, Inc.	Merrick and Company	Veoneer Canada, Inc.
Dow Chemical Canada, ULC	Mersen Canada DN, Ltd.	Veralto Corp.
Dresser-Rand Canada, ULC	Methanex Corporation	Veren Energy
Driven Brands, Inc.	Methode Canada	Vermilion Energy, Inc.
DuPont Canada, Inc.	Metso Outotec Canada	VersaBank
Dynacare	Mettler-Toledo, Inc.	Vertex Pharmaceuticals (Canada), Inc.
Dyno Nobel Canada, Inc.	MiTek Canada, Inc.	Vesta Energy Corp.
Dyson Canada	Michael Garron Hospital	Vestas - Canadian Wind Technology, Inc.
EDF Renewables Canada, Inc.	Michelin North America, Inc. - Canada	Vestis
EFI Canada, Inc.	Microsoft Corporation	Vialto Canada
EMD, Inc.	Millennium EMS Solutions, Ltd.	Videojet
ENMAX Corporation	MillerKnoll Canada	Viega, LLC
EPCOR Utilities, Inc.	Molnlycke Health Care, Inc.	Ville de Montreal
ESAB Group Canada, Inc.	Molson Coors Canada, Inc.	Visa Canada Corporation
Eastman Chemical Canada	Mondelez Canada, Inc.	Viterra Canada Inc.
Eaton Industries (Canada) Company	Mondofix	Voyant Beauty, Inc.
Ecolab Canada	Moog, Inc. (Canada)	WESCO Distribution Canada, LP
Edgewell Personal Care Canada, ULC	Motion, LP	WK Kellogg
Edward Jones	Motioneering, Inc.	WK Kellogg Canada Corp.
Egis Canada Ltd.	Motorola Solutions Canada, Inc.	WSP Canada, Inc.
Eisai Limited	Motrex, LLC	WZR Development, ULC
Elanco Canada Limited	Mouvement des caisses Desjardins (Desjardins Group)	Waddell Engineering, Ltd.
Electrolux	Multi-Health Systems	Wartsila Canada, Inc.
Eli Lilly Canada, Inc.	Murphy Oil Company, Ltd.	Waste Management, Inc. (Canada)
Ellucian Company L.P.	NAV CANADA	Weatherford Canada, Ltd.
Ember Resources, Inc.	NCS Multistage, Inc.	Wella Canada, Inc.
Emburse, Inc.	NORTERA	Wenco International Mining Systems
Emera, Inc.	NOVA Chemicals Corporation	Werner Enterprises Canada Corporation
Emerson Electric Canada Corporate	NTE Energy Canada	West Fraser Timber Co., Ltd.
Empire Communities	NVIDIA Corp. - Canada	West Lake Energy Corp.
Enbridge, Inc.	Nanometrics, Inc.	WestJet Airlines, Ltd.
Encore - Canada	National Bank of Canada	Western Energy Services Corp.

Endo Pharma	National Express, LLC	Western Energy Services Corp. - Aero Rental Services
Enercare Home and Commercial Services, Inc.	Nestle Canada	Western Energy Services Corp. - Eagle Well Servicing
Enercare, Inc.	Nestle Canada, Inc. - Nespresso	Western Energy Services Corp. - Horizon Drilling
Enerflex, Ltd.	Nestle Canada, Inc. - Nutrition Health Science	Westinghouse Electric Canada, Inc.
Enerflex, Ltd. - Engineered Systems & After Market	Nestle Canada, Inc. - Purina PetCare	Westland Insurance Group
Energie Valero, Inc.	NetApp Canada, Ltd.	Whistler Blackcomb
Energizer Canada, Inc.	Newfold Digital Inc.	Whitecap Resources, Inc.
Energy Safety Canada	Newman Hattersley, Ltd.	Whitefox Technologies Canada Ltd.
Enerplus Corporation	Nexus Water Group (Canada)	Windsor Tooling International Inc.
Englobe Corp.	Nokian Tyres Canada	Windsor-Detroit Bridge Authority
Ensign Drilling, Inc. - Corporate	Nordic Consulting Partners	Winpak Portion Packaging, Ltd.
Enterprise Holding, Inc.	Nordock Inc.	Wittington Investments Limited
Entuitive	Norsk Hydro Canada	Wolf Infrastructure Management, Inc.
Envirem Organics Ltd.	Nortal, LLC	Woodbridge Foam Corporation
Envision Pharma Canada	North West Redwater Partnership	Woodfibre LNG Limited
Envista Holdings Corporation (Canada)	NorthRiver Midstream, Inc.	WorkSafeBC
Epicor Software Canada, Ltd.	Northbridge Financial Corporation	Workplace Safety & Insurance Board
Equinix Canada, Ltd.	Norton Rose Fulbright Canada	World Wide Technology Canada, ULC
Equinor Canada, Ltd.	Nova Bus, Inc.	Worldwide Clinical Trials Canada
Equitable Group	Novartis Pharmaceuticals Canada, Inc.	WorleyParsons Canada Services, Ltd.
Ericsson Canada, Inc.	Novelis, Inc.	Wyndham Hotels & Resorts, Inc.
Ernst & Young, LLP	Novo Nordisk Canada, Inc.	Xerox Canada, Inc.
Esko	NovoCure Canada, Inc.	Xplore, Inc.
Essity Canada, Inc.	Novozymes Biologicals, Ltd.	Yara Canada Inc.
Evonik Canada, Inc.	Novozymes Canada Limited	Yelp, Inc
Exact Sciences	NuVista Energy, Ltd.	Yorkville University
Exchanger Industries Limited	Nulli Secundus, Inc.	ZF Automotive Canada Limited
Exel Canada, Ltd.	Numeris	Zebra Technologies Corp.
Experian	Nutrien, Ltd.	Zillow Group, Inc.
Exterran Water Solutions	Nvent Thermal Canada, Ltd.	Zurich Canadian Holdings Limited
Exxonmobil Canada, Ltd.	O'Kane Consultants inc.	e-Zinc, Inc.
F5, Inc.	ODL North America, Inc.	i3 Energy Canada
FGF Brands Inc	OMERS	ivari Canada, ULC
FM Global	ONxpress Transportation Partners	

Mearie Participant List
Alectra Utilities Inc.
Bluewater Power Distribution Corporation
Burlington Hydro Inc.
E.L.K. Energy Inc.
Elexicon Energy
Entegrus Inc.
EPCOR Electricity Distribution Ontario Inc.
ERTH Power Corporation
Essex Powerlines Corporation
Festival Hydro Inc.
Fort Frances Power Corporation
GrandBridge Energy Inc.
Greater Sudbury Hydro Inc.
Grimsby Power Incorporated
Hydro Ottawa Limited
InnPower Corporation
Kitchener-Wilmot Hydro Inc.
Lakefront Utility Services Inc.
Lakeland Power Distribution Ltd.
London Hydro
Milton Hydro Distribution Inc.
Niagara Peninsula Energy Inc.
North Bay Hydro Distribution Limited
Northern Ontario Wires Inc.
Orangeville Hydro Limited
Oshawa PUC Networks Inc.
Ottawa River Power Corporation
Peterborough Utilities Group
PUC Services Inc.
Sioux Lookout Hydro
Synergy North
Utilities Kingston
Wasaga Distribution Inc.
Waterloo North Hydro

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-24

EVIDENCE REFERENCE:

[Ex.1-3-4, p.1]

QUESTION(S):

With respect to Table 1, please provide a revised table that provides a breakdown by specific initiative, and shows each year between 2021 and 2030 separately.

RESPONSE(S):

To accommodate this request, Table 1 is broken out to 4 new tables (Tables B - E). Each table provides a breakdown for a single row in the referenced Table 1 from Schedule 1-3-4 Facilitating Continuous Improvement.

The tables below are updated based on the following revisions:

- 3.1.1 Distribution Capital Program Delivery Optimization, as noted in the response to interrogatory 1-SEC 26;
- 3.1.5 Major Projects Consulting Procurement and 3.1.6 Vendor and Supplier Engagement as minted in the response to interrogatory 1-SEC 25; and
- 3.2.2 Online Billing Enhancements as noted in the response to interrogatory 1-SEC 27.

The updates compared to the original evidence are presented in Table A below.

Table A - Summary of Updated Productivity Benefits of 2021-2025 and 2026-2020 Initiatives ($'000 000s)

	Original Evidence		Revised	
	2021-2025	2026-2030	2021-2025	2026-2030
Capital Expense	$ 23.2	$ 35.1	$22.8	$33.9
Capital Depreciation	$ 1.1	$ 3.0	$0.8	$2.5
OM&A	$ 14.5	$ 27.2	$14.7	$27.3
Services to Third Parties	$ 0.9	$ 1.9	$0.9	$1.9

Tables B through E below provide a breakdown by specific initiative and show each year between 2021 and 2030 separately. They are organized into the following categories: Capital Expense, Capital Depreciation, OM&A and Services to Third Parties.

1

Table B - Capital Expense ($'000 000s)

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.1 Distribution Capital Program Delivery Optimization (Regular Time)	*Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity*	*$2.5*	*$2.4*	*$1.9*	*$3.0*	*$2.9*	*$12.6*	*$2.6*	*$4.3*	*$4.7*	*$3.7*	*$4.0*	*$19.3*
3.1.1 Distribution Capital Program Delivery Optimization (Overtime)	*Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity*	*$0.9*	*$0.9*	*$0.8*	*$0.7*	*$0.6*	*$3.9*	*$0.7*	*$0.8*	*$0.8*	*$0.8*	*$0.8*	*$4.0*
3.1.2 Fleet Pooling	*Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*$1.0*	*n/a*	*$2.9*	*n/a*	*n/a*	*$3.9*
3.1.4 Service Layout Process Improvements	*Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.*	*$0.0*	*$0.0*	*$0.0*	*$0.2*	*$0.3*	*$0.5*	*$0.3*	*$0.3*	*$0.3*	*$0.3*	*$0.3*	*$1.5*

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.5 Major Projects Consulting Procurement	Consolidated civil and electrical engineering services under a single consultant to streamline project coordination and reduce costs.	*n/a*	*n/a*	*$0.3*	*$0.5*	*n/a*	*$0.8*	*n/a*	*$0.5*	*$0.5*	*$0.5*	*n/a*	*$1.5*
3.1.6 Vendor and Supplier Engagement	Fostered strong relationships with vendors and suppliers, resulting in favourable pricing for critical equipment relative to industry averages	*$0.5*	*$0.5*	*$0.5*	*$0.5*	*$0.5*	*$2.6*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	*$0.1*	*$0.2*	*$0.2*	*$0.2*	*$0.2*	*$0.8*	*$0.2*	*$0.2*	*$0.2*	*$0.3*	*$0.3*	*$1.2*
3.2.7 Blue Beam for Plant Inspectors	Digitalized project documentation and plant inspections, reducing paper use and improving workflow efficiency.	$0.2	$0.2	$0.2	$0.2	$0.2	*$1.1*	$0.2	$0.3	$0.3	$0.3	$0.3	*$1.3*
3.2.10 Damage to Plant Process Automation	Implemented a Google Form-based system for faster and more efficient reporting of infrastructure damage.	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*	*$0.0*

Initiative	*Description*	*Productivity Benefits*											
		2021	*2022*	*2023*	*2024*	*2025*	*2021-2025*	*2026*	*2027*	*2028*	*2029*	*2030*	*2026-2030*
3.3.1 Protection Relays Design Standard	Optimized the placement of protection relays in substations, reducing wiring costs and eliminating the need for separate relay buildings.	$0.0	$0.0	$0.5	$0.0	$0.0	*$0.5*	$0.0	$0.4	$0.4	$0.0	$0.3	*$1.1*
Total Capital Expense:		$ 4.3	$ 4.1	$ 4.4	$ 5.3	$ 4.8	*$22.8*	$ 5.1	$ 6.8	$ 10.1	$ 5.9	$ 6.0	*$33.9*

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Table C - Capital Depreciation ($'000 000s)

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.1 Distribution Capital Program Delivery Optimization (Regular Time)	Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity	$0.1	$0.1	$0.1	$0.1	$0.1	$0.4	$0.1	$0.1	$0.2	$0.1	$0.1	$0.6
3.1.1 Distribution Capital Program Delivery Optimization (Overtime)	Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1
3.1.2 Fleet Pooling	Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees	n/a	n/a	n/a	n/a	n/a	n/a	$0.1	$0.1	$0.3	$0.3	$0.3	$1.2
3.1.4 Service Layout Process Improvements	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.	n/a	n/a	n/a	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.5 Major Projects Consulting Procurement	Consolidated civil and electrical engineering services under a single consultant to streamline project coordination and reduce costs.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$0.0	$0.0	$0.1	$0.1	$0.1	$0.3
3.1.6 Vendor and Supplier Engagement	Fostered strong relationships with vendors and suppliers, resulting in favourable pricing for critical equipment relative to industry averages	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	0.0	0.0	0.0	0.0	0.0	0.0
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*
3.2.7 Blue Beam for Plant Inspectors	Digitalized project documentation and plant inspections, reducing paper use and improving workflow efficiency.	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*
3.2.10 Damage to Plant Process Automation	Implemented a Google Form-based system for faster and more efficient reporting of infrastructure damage.	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.3.1 Protection Relays Design Standard	Optimized the placement of protection relays in substations, reducing wiring costs and eliminating the need for separate relay buildings.	$0.0	$0.0	$0.0	$0.0	$0.0	*$0.0*	$0.0	$0.0	$0.0	$0.0	$0.1	*$0.2*
Total Capital Depreciation		$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ 0.2	*$0.8*	$ 0.3	$ 0.4	$ 0.6	$ 0.6	$ 0.6	*$2.5*

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Table D - OM&A ($'000 000s)

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.2 Fleet Pooling	Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees	n/a	n/a	n/a	n/a	n/a	n/a	$0.1	$0.1	$0.2	$0.2	$0.2	$0.9
3.1.3 Cable Locates Efficiency	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.	$0.0	$0.3	$0.7	$0.5	$0.8	$2.4	$0.7	$0.7	$0.7	$0.8	$0.8	$3.7
3.2.1 Net Metering Automation	Streamlined net metering billing processes, saving significant labor hours per month.	n/a	n/a	n/a	n/a	n/a	n/a	$0.2	$0.6	$1.4	$1.9	$2.6	$6.8
3.2.2 Online Billing Enhancements	Expanded online billing, reducing mailing and printing costs (with ancillary savings related to Account Overdue Notices)	$0.2	$0.8	$1.0	$1.5	$2.9	$6.4	$0.5	$0.8	$1.1	$1.4	$1.7	$5.5
3.2.3 Remote Disconnection Technology	Expanded use of remote disconnect meters, reducing labor costs for service terminations and reconnections..	$0.3	$0.4	$0.5	$0.8	$0.9	$2.9	$0.9	$0.9	$1.0	$1.0	$1.1	$4.9
3.2.5 Disconnection Notification Automation	Replacement of manual delivery of disconnection notices with automated notifications	$0.3	$0.4	$0.4	$0.4	$0.4	$1.8	$0.4	$0.4	$0.4	$0.5	$0.5	$2.2

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.2.6 Satellite Imaging for Vegetation Management	Used satellite data to identify high-risk vegetation areas and optimize trimming schedules.	n/a	n/a	n/a	n/a	n/a	*n/a*	$0.2	$0.4	$0.4	$0.4	$0.4	*$1.6*
3.2.8 Move-In Move-Out Automation	Automated customer move-in/move-out requests to reduce manual processing and errors.	$0.0	$0.0	$0.1	$0.2	$0.2	*$0.5*	$0.2	$0.2	$0.2	$0.2	$0.2	*$0.9*
3.2.9 Salesforce Field Service for Reliability Operations	Centralized work requests and scheduling, reducing reliance on manual communication and increasing productivity.	$0.0	$0.0	$0.0	$0.0	$0.1	*$0.1*	$0.1	$0.1	$0.2	$0.2	$0.2	*$0.8*
3.2.11 Customer Information System Reduced Fees	Reduced managed service costs	$0.3	$0.2	$0.0	$0.0	$0.0	*$0.5*	n/a	n/a	n/a	n/a	n/a	*n/a*
OM&A Total:		$ 1.1	$ 2.1	$ 2.7	$ 3.4	$ 5.3	*$14.7*	$ 3.4	$ 4.2	$ 5.5	$ 6.5	$ 7.6	*$27.3*

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Table E - Services to Third Parties ($'000 000s)

Initiative	Description	Productivity Benefits											
		2021	2022	2023	2024	2025	2021-2025	2026	2027	2028	2029	2030	2026-2030
3.1.4 Service Layout Process Improvements	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.	$0.0	$0.0	$0.0	$0.1	$0.2	$0.3	$0.2	$0.2	$0.2	$0.2	$0.2	$1.0
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	$0.1	$0.1	$0.1	$0.1	$0.1	*$0.6*	$0.1	$0.1	$0.2	$0.2	$0.2	*$0.8*
Total Services to Third Parties		**$ 0.1**	**$ 0.1**	**$ 0.1**	**$ 0.2**	**$ 0.3**	***$0.9***	**$ 0.3**	**$ 0.3**	**$ 0.4**	**$ 0.4**	**$ 0.4**	***$1.9***

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-25

EVIDENCE REFERENCE:

[Ex.1-3-4, p.9, Table 2] With respect to Labour and supply chain optimization initiatives:

QUESTION(S):

a. Please revise Table 2 to show the benefits for each year between 2021 and 2030.
b. For each initiative listed in Table 2, please provide a detailed description of the methodology and supporting calculations used to calculate the specific productivity benefit.
c. Please explain what is captured in Capital Expenses versus Capital Depreciation category.

RESPONSE(S):

a) To accommodate this request, Table 2 is broken out to 2 new tables (Tables A and B). Each table provides a breakdown by year for 2021-2025 and 2026-2030. After submitting the 2026-2030 Rate Application, it was noticed that the depreciation productivity benefits for 3.1.5 Major Projects Consulting Procurement and 3.1.6 Vendor and Supplier Engagement depreciation were overstated. Hydro Ottawa has recalculated the productivity savings below. The Tables below also reflect a revision to 3.1.1 as shown in Table J of the response to interrogatory 1-SEC 26.

Table A - Labour and Supply Chain Optimization Initiatives (Quantifiable)[1] ($'000s) 2021-2025

Initiative	Description			Productivity Benefits					
				2021	2022	2023	2024	2025	2021-2025
3.1.1 Distribution Capital Program Delivery Optimization	Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity	Regular Time	*Capital Expense*	*$2,467*	*$2,366*	*$1,899*	*$2,972*	*$2,916*	*$12,620*
			Capital Depreciation	$82	$79	$63	$99	$97	$421
		Overtime	*Capital Expense*	*$935*	*$868*	*$753*	*$687*	*$639*	*$3,883*
			Capital Depreciation	$31	$29	$25	$23	$21	$129
3.1.2 Fleet Pooling	Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees		*Capital Expense*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
			Capital Depreciation	n/a	n/a	n/a	n/a	n/a	n/a
			OM&A	n/a	n/a	n/a	n/a	n/a	n/a
3.1.3 Cable Locates Efficiency	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.		OM&A	$0	$341	$702	$536	$847	$2,425
3.1.4 Service Layout Process Improvements	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.		*Capital Expense*	*$0*	*$0*	*$0*	*$193*	*$279*	*$472*
			Capital Depreciation	n/a	n/a	n/a	$6	$9	$16
			Third Party Services	$0	$0	$0	$129	$186	$315
3.1.5 Major Projects Consulting Procurement	Consolidated civil and electrical engineering services under a single consultant to streamline project coordination and reduce costs.		*Capital Expense*	*n/a*	*n/a*	*$290*	*$480*	*n/a*	*$770*
			Capital Depreciation	$0	$0	$10	$26	$26	$61

[1] Totals may not sum due to rounding.

Initiative	Description		Productivity Benefits					
			2021	2022	2023	2024	2025	2021-2025
3.1.6 Vendor and Supplier Engagement	Fostered strong relationships with vendors and suppliers, resulting in favourable pricing for critical equipment relative to industry averages	*Capital Expense*	*$524*	*$524*	*$524*	*$524*	*$524*	*$2,618*
		Capital Depreciation	$17	$17	$17	$17	$17	$87
Total Capital Expense			**$3,925**	**$3,759**	**$3,466**	**$4,856**	**$4,357**	**$20,362**
Total Capital Depreciation			**$131**	**$125**	**$116**	**$172**	**$171**	**$714**
Total OM&A			**$0**	**$341**	**$702**	**$536**	**$847**	**$2,425**
Total Third Party Services			**$0**	**$0**	**$0**	**$129**	**$186**	**$315**

Table B - Labour and Supply Chain Optimization Initiatives (Quantifiable)[2] ($'000s) 2026-2030

Initiative	Description			Productivity Benefits					
				2026	2027	2028	2029	2030	2026-2030
3.1.1 Distribution Capital Program Delivery Optimization	Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity	Regular Time	*Capital Expense*	*$2,638*	*$4,334*	*$4,662*	*$3,670*	*$4,016*	*$19,321*
			Capital Depreciation	$88	$144	$155	$122	$134	$644
		Overtime	*Capital Expense*	*$711*	*$814*	*$847*	*$840*	*$811*	*$4,023*
			Capital Depreciation	$24	$27	$28	$28	$27	$134
3.1.2 Fleet Pooling	Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees		*Capital Expense*	*$1,037*	*n/a*	*$2,864*	*n/a*	*n/a*	*$3,901*
			Capital Depreciation	$104	$104	$316	$316	$316	$1,155
			OM&A	$122	$130	$182	$204	$232	$870
3.1.3 Cable Locates Efficiency	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.		OM&A	$662	$698	$737	$777	$820	$3,694

[2] Totals may not sum due to rounding.

Initiative	Description		Productivity Benefits					
			2026	2027	2028	2029	2030	2026-2030
3.1.4 Service Layout Process Improvements	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.	*Capital Expense*	*$288*	*$297*	*$307*	*$316*	*$326*	*$1,534*
		Capital Depreciation	$10	$10	$10	$11	$11	$51
		Third Party Services	$192	$198	$205	$211	$217	$1,023
3.1.5 Major Projects Consulting Procurement	Consolidated civil and electrical engineering services under a single consultant to streamline project coordination and reduce costs.	*Capital Expense*	*n/a*	*$500*	*$500*	*$500*	*n/a*	*$1,500*
		Capital Depreciation	$26	$42	$59	$76	$76	$278
3.1.6 Vendor and Supplier Engagement	Fostered strong relationships with vendors and suppliers, resulting in favourable pricing for critical equipment relative to industry averages	*Capital Expense*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
		Capital Depreciation	$0	$0	$0	$0	$0	$07
Total Capital Expense			**$4,674**	**$5,946**	**$9,180**	**$5,326**	**$5,152**	**$30,278**
Total Capital Depreciation			**$251**	**$328**	**$569**	**$552**	**$563**	**$2,2796**
Total OM&A			**$784**	**$828**	**$919**	**$981**	**$1,052**	**$4,564**
Total Third Party Services			**$192**	**$198**	**$205**	**$211**	**$217**	**$1,023**

b) For each initiative listed in Table 2 of Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement, please see Table C below with a description of the methodology used to calculate the specific productivity benefit.

For detailed calculations, please refer to Excel Attachment 1-SEC-25(A) - Supporting Calculations - Labour and Supply Chain Optimization Productivity Initiatives.

c) Please see Table C below for an explanation of what is captured in Capital Expenses versus Capital Depreciation.

Table C - Labour and Supply Chain Optimization Initiatives Methodology and Calculation

Initiative	Description			Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
3.1.1 Distribution Capital Program Delivery Optimization	Implemented operational changes, including team realignment, dedicated construction technicians, and seasonal shift adjustments, to enhance collaboration, efficiency, and productivity	Regular Time	*Capital Expense*	The pole renewal program offers a highly repetitive and predictable workflow. This yields a robust dataset, establishing it as a strong model for efficiency gains. This is calculated by taking total internal labor hours divided by total pole units per year. The average of hours per pole between 2019-2020 and 2021-2024 reveal a 23.6% decrease in the average annual labor hours per pole. This efficiency gain has been extrapolated across all distribution capital programs (with the exception of station-related programs) by multiplying the average annual percentage against labor spend, effectively capturing the time saved due to this initiative.	Estimated total expense
			Capital Depreciation		Annual expense based on estimated useful life of 30 years
		Overtime	*Capital Expense*		Estimated total expense
			Capital Depreciation		Annual expense based on estimated useful life of 30 years
3.1.2 Fleet Pooling	Fleet pooling pilot program, allowing for more effective and extensive sharing of corporate vehicles by field crews, supervisors and administrative employees		*Capital Expense*	Cost avoidance of 17 light duty estimated at a total of $1M purchased in 2026 and 4 heavy duty estimated at $2.9M in 2028.	Estimated total expense
			Capital Depreciation		Annual expense based on estimated useful life of 10 years for Light Duty and 13.5 years for Heavy Duty

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
(3.1.2 Fleet Pooling Cont'd)		OM&A	OMA savings based on projected avoided additional fuel and maintenance costs. OMA savings less the subscription cost for the fleet pooling module.	n/a
3.1.3 Cable Locates Efficiency	Implemented automated clearing processes and Alternate Locate Agreements to reduce field visits	OM&A	Clearing house savings were calculated as the difference between the cost per office clear and the cost per field clear multiplied by the increased number of office clears since the clearing house took over in 2022. ALA savings were calculated as the number of tickets cleared by ALAs multiplied by the annual rate per field clears.	n/a
3.1.4 Service Layout Process Improvements	Used Salesforce analytics and targeted training to improve service layout efficiency and reduce backlogs.	*Capital Expense*	Cost savings calculated as the reduced number of overtime hours required by service layout agents multiplied by the annual internal labour rate for overtime. The total number of overtime hours is split between Capital and Third Party Services based on the relative proportion of all work done by service layout agents on an annual basis.	Estimated total expense
		Capital Depreciation		Annual expense based on estimated useful life of 30 years
		Third Party Services		n/a

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
3.1.5 Major Projects Consulting Procurement	Consolidated civil and electrical engineering services under a single consultant to streamline project coordination and reduce costs.	*Capital Expense*	Cost savings based on projected avoided design costs by utilizing similar station design elements which developed various process efficiencies.	Estimated total expense
		Capital Depreciation		Annual expense based on estimated useful life of 30 years
3.1.6 Vendor and Supplier Engagement	Fostered strong relationships with vendors and suppliers, resulting in favourable pricing for critical equipment relative to industry averages	*Capital Expense*	Cost savings were determined by benchmarking Hydro Ottawa's largest commodity unit prices against FRED annual average increases. The difference between FRED unit prices and the actual unit prices is the recognized savings in this rate application.	Estimated total expense
		Capital Depreciation		Annual expense based on estimated useful life of 30 years

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-26

EVIDENCE REFERENCE:

[Ex.1-3-4, p.15-17] With respect to distribution capital program delivery optimization initiative:

QUESTION(S):

a. Figure 1 shows the Average Annual Labour per Pole Installation:
   i. Please provide the supporting calculations to the table included in Figure 1
   ii. Please provide the average annual labour hours per pole installation, for each year, between 2016 and 2024.
   iii. What was the average annual labour hours per pole installation embedded in 2016 to 2020 rates?
b. Figure 2 shows Distribution Capital Program Labour Efficiency 2021-2030:
   i. Please provide the table in a tabular format and provide all supporting calculations, including the labour costs of each program included in Figure 2.
   ii. Please confirm that Hydro Ottawa's reduction in average annual labour hours per pole installation, as shown in Figure 1 (23.6%), was applied to all capital programs. If confirmed, please provide quantifiable evidence that is an appropriate proxy for all other capital programs.

RESPONSE(S):

a)

i) Figure 1 is calculated by taking total internal labour hours divided by total pole units per year for both regular and overtime hours. The average of hours per pole between 2019-2020 and 2021-2024 reveal a 23.6% decrease in the average annual labor hours per pole.

ii) Table A below provides the annual labour hours per pole installation for 2019 to 2024. Hydro Ottawa upgraded to a new JDE (ERP) system in 2018, a change driven by inefficiencies in the previous version. This system transition involved a complete overhaul of data coding and unit structures. As a result, the methodology and data extraction techniques used for the pole productivity analysis cannot be applied to pre-2019 data. To maintain data integrity and prevent misinterpretation, all relevant data for this analysis was extracted specifically from the new JDE system, starting in 2019. Consequently, only average annual labor hours per pole from 2019 to 2024 are available.

Table A - Annual Labour Hours Per Pole Installation 2019-2024

	Historical Years					
	2019	2020	2021	2022	2023	2024
Total Hours	105	112	74	82	75	101

iii) As mentioned above, data pre-2019 is unavailable for comparison in this analysis and cannot be used to calculate the average annual labour hours per pole installation embedded in 2016 to 2020 rates. Using Table A, the average annual labour hours per pole installation for 2019-2020 is 108 hours per pole.

b)

i) Please see Tables B through I showing Labour Spend per Capital Program from 2021-2025 and Labour Spend per Capital Program from 2026-2030. Figure 2 calculation is derived by taking the total of the years (A) and multiplying by (K).

(K) = Average 23.6% is broken down into Average Regular and Overtime Rate and applied individually to each program. The variance between (A) and (K) is the Internal Labour Savings in that rate period.

Table B - Capital Program Regular Labour Without Efficiency 2021-2025 ($'000 000)

Program Labour Spend	Historical Years			Bridge Years		Total
	2021	2022	2023	2024	2025	2021-2025
Stations and Buildings Infrastructure Renewal	$ 0.7	$ 0.7	$ 0.5	$ 0.9	-	$ 2.8
Capacity Upgrades	$ 0.5	$ 1.1	$ 0.7	$ 1.1	$ 0.2	$ 3.5
OH Distribution Asset Renewal	$ 1.7	$ 2.5	$ 1.5	$ 1.6	$ 2.6	$ 10.0
Distribution Enhancements	$ 1.0	$ 0.3	$ 0.2	$ 0.3	$ 1.2	$ 2.9
Plant Relocation	$ 2.2	$ 1.7	$ 1.3	$ 1.8	$ 1.4	$ 8.3
System Expansion	$ 1.4	$ 0.9	$ 0.5	$ 2.0	$ 4.0	$ 8.7
UG Distribution Assets Renewal	$ 0.0	$ 0.0	$ 0.0	$ 0.1	$ 0.1	$ 0.2
Corrective Renewal	$ 3.0	$ 2.8	$ 2.2	$ 4.0	$ 2.7	$ 14.8
Customer Connections	$ 4.0	$ 3.8	$ 4.1	$ 5.1	$ 4.1	$ 21.0
ANNUAL TOTAL	**$ 14.5**	**$ 13.6**	**$ 11.0**	**$ 16.9**	**$ 16.4**	**$ 72.3**

Table C - Capital Program Regular Labour Efficiency 2021-2025 ($'000 000)

Program Labour Spend	Historical Years			Bridge Years		Total
	2021	2022	2023	2024	2025	2021-2025
Stations and Buildings Infrastructure Renewal	$ 0.6	$ 0.6	$ 0.4	$ 0.8	-	$ 2.3
Capacity Upgrades	$ 0.4	$ 0.9	$ 0.6	$ 0.9	$ 0.2	$ 2.9
OH Distribution Asset Renewal	$ 1.4	$ 2.1	$ 1.3	$ 1.3	$ 2.1	$ 8.2
Distribution Enhancements	$ 0.8	$ 0.2	$ 0.2	$ 0.3	$ 1.0	$ 2.4
Plant Relocation	$ 1.8	$ 1.4	$ 1.0	$ 1.5	$ 1.2	$ 6.8
System Expansion	$ 1.1	$ 0.7	$ 0.4	$ 1.7	$ 3.3	$ 7.2
UG Distribution Assets Renewal	$ 0.0	$ 0.0	$ 0.0	$ 0.1	$ 0.1	$ 0.2
Corrective Renewal	$ 2.5	$ 2.3	$ 1.8	$ 3.3	$ 2.3	$ 12.1
Customer Connections	$ 3.3	$ 3.1	$ 3.3	$ 4.2	$ 3.4	$ 17.2
ANNUAL TOTAL	**$ 11.9**	**$ 11.2**	**$ 9.0**	**$ 13.9**	**$ 13.4**	**$ 59.4**

Table D - Capital Program Overtime Labour Without Efficiency 2021-2025 ($'000 000)

Program Labour Spend	Historical Years			Bridge Years		Total
	2021	2022	2023	2024	2025	2021-2025
Stations and Buildings Infrastructure Renewal	$ 0.2	$ 0.1	$ 0.1	$ 0.1	-	$ 0.4
Capacity Upgrades	$ 0.0	$ 0.1	$ 0.1	$ 0.1	$ 0.0	$ 0.4
OH Distribution Asset Renewal	$ 0.1	$ 0.3	$ 0.1	$ 0.1	$ 0.3	$ 0.9
Distribution Enhancements	$ 0.2	$ 0.0	$ 0.0	$ 0.0	$ 0.2	$ 0.5
Plant Relocation	$ 0.4	$ 0.4	$ 0.2	$ 0.2	$ 0.2	$ 1.4
System Expansion	$ 0.2	$ 0.1	$ 0.1	$ 0.2	$ 0.1	$ 0.7
UG Distribution Assets Renewal	-	$ 0.0	$ (0.0)	$ 0.0	$ 0.0	$ 0.0
Corrective Renewal	$ 1.3	$ 1.2	$ 1.1	$ 0.6	$ 0.9	$ 5.2
Customer Connections	$ 0.5	$ 0.5	$ 0.5	$ 0.4	$ 0.2	$ 2.0
ANNUAL TOTAL	**$ 2.8**	**$ 2.6**	**$ 2.2**	**$ 2.0**	**$ 1.8**	**$ 11.4**

Table E - Capital Program Overtime Labour Efficiency 2021-2025 ($'000 000)

Program Labour Spend	Historical Years			Bridge Years		Total
	2021	2022	2023	2024	2025	2021-2025
Stations and Buildings Infrastructure Renewal	$ 0.1	$ 0.1	$ 0.0	$ 0.1	- .0	$ 0.3
Capacity Upgrades	$ 0.0	$ 0.0	$ 0.1	$ 0.1	$ 0.0	$ 0.2
OH Distribution Asset Renewal	$ 0.1	$ 0.2	$ 0.0	$ 0.1	$ 0.2	$ 0.6
Distribution Enhancements	$ 0.1	$ 0.0	$ 0.0	$ 0.0	$ 0.1	$ 0.3
Plant Relocation	$ 0.2	$ 0.2	$ 0.1	$ 0.2	$ 0.1	$ 0.9
System Expansion	$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ 0.1	$ 0.4
UG Distribution Assets Renewal	- .0	$ 0.0	$ (0.0)	$ 0.0	$ 0.0	$ 0.0
Corrective Renewal	$ 0.8	$ 0.8	$ 0.7	$ 0.4	$ 0.6	$ 3.4
Customer Connections	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.1	$ 1.3
ANNUAL TOTAL	**$ 1.8**	**$ 1.7**	**$ 1.4**	**$ 1.3**	**$ 1.2**	**$ 7.4**

Table F - Capital Program Regular Labour Without Efficiency 2026-2030 ($'000 000)

Program Labour Spend	Test Years					Total
	2026	2027	2028	2029	2030	2026-2030
Stations and Buildings Infrastructure Renewal	$ 2.9	$ 2.8	$ 3.0	$ 3.0	$ 3.6	$ 15.3
Capacity Upgrades	$ 2.1	$ 3.4	$ 3.8	$ 2.9	$ 2.9	$ 15.0
OH Distribution Asset Renewal	$ 2.0	$ 2.8	$ 3.8	$ 3.3	$ 3.5	$ 15.3
Distribution Enhancements	$ 1.3	$ 2.0	$ 2.2	$ 1.9	$ 1.9	$ 9.3
Plant Relocation	$ 0.5	$ 1.0	$ 1.4	$ 1.2	$ 1.3	$ 5.4
System Expansion	$ 5.9	$ 2.5	$ 1.9	$ 0.7	$ 1.7	$ 12.7
UG Distribution Assets Renewal	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.5
Corrective Renewal	$ 1.4	$ 2.0	$ 2.7	$ 2.3	$ 2.5	$ 10.8
Customer Connections	$ 2.1	$ 8.4	$ 7.3	$ 5.3	$ 6.1	$ 29.3
ANNUAL TOTAL	**$ 18.2**	**$ 25.1**	**$ 26.2**	**$ 20.6**	**$ 23.6**	**$ 113.7**

Table G - Capital Program Regular Labour Efficiency 2026-2030 ($'000 000)

Program Labour Spend	Test Years					Total
	2026	2027	2028	2029	2030	2026-2030
Stations and Buildings Infrastructure Renewal	$ 2.4	$ 2.3	$ 2.5	$ 2.4	$ 3.0	$ 12.6
Capacity Upgrades	$ 1.7	$ 2.8	$ 3.1	$ 2.3	$ 2.4	$ 12.3
OH Distribution Asset Renewal	$ 1.6	$ 2.3	$ 3.1	$ 2.7	$ 2.9	$ 12.6
Distribution Enhancements	$ 1.1	$ 1.7	$ 1.8	$ 1.5	$ 1.6	$ 7.7
Plant Relocation	$ 0.4	$ 0.9	$ 1.2	$ 1.0	$ 1.0	$ 4.5
System Expansion	$ 4.8	$ 2.1	$ 1.5	$ 0.6	$ 1.4	$ 10.4
UG Distribution Assets Renewal	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.4
Corrective Renewal	$ 1.2	$ 1.6	$ 2.2	$ 1.9	$ 2.0	$ 8.9
Customer Connections	$ 1.7	$ 6.9	$ 6.0	$ 4.4	$ 5.0	$ 24.0
ANNUAL TOTAL	**$ 15.0**	**$ 20.6**	**$ 21.5**	**$ 16.9**	**$ 19.4**	**$ 93.4**

Table H - Capital Program Overtime Labour Without Efficiency 2026-2030 $'000 000)

Program Labour Spend	Test Years					Total
	2026	2027	2028	2029	2030	2026-2030
Stations and Buildings Infrastructure Renewal	$ 0.2	$ 0.3	$ 0.2	$ 0.3	$ 0.3	$ 1.4
Capacity Upgrades	$ 0.2	$ 0.3	$ 0.2	$ 0.2	$ 0.2	$ 1.1
OH Distribution Asset Renewal	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 1.3
Distribution Enhancements	$ 0.2	$ 0.3	$ 0.2	$ 0.2	$ 0.2	$ 1.1
Plant Relocation	$ 0.1	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.8
System Expansion	$ 0.1	$ 0.0	$ 0.2	$ 0.1	$ 0.2	$ 0.6
UG Distribution Assets Renewal	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0
Corrective Renewal	$ 0.6	$ 0.8	$ 0.8	$ 0.8	$ 0.7	$ 3.7
Customer Connections	$ 0.4	$ 0.3	$ 0.4	$ 0.4	$ 0.4	$ 1.9
ANNUAL TOTAL	**$ 2.1**	**$ 2.4**	**$ 2.4**	**$ 2.4**	**$ 2.5**	**$ 11.9**

Table I - Capital Program Overtime Labour Efficiency 2026-2030 $'000 000)

Program Labour Spend	Test Years					Total
	2026	2027	2028	2029	2030	2026-2030
Stations and Buildings Infrastructure Renewal	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.9
Capacity Upgrades	$ 0.1	$ 0.2	$ 0.2	$ 0.1	$ 0.1	$ 0.7
OH Distribution Asset Renewal	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.9
Distribution Enhancements	$ 0.1	$ 0.2	$ 0.1	$ 0.1	$ 0.1	$ 0.7
Plant Relocation	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.5
System Expansion	$ 0.0	$ 0.0	$ 0.1	$ 0.1	$ 0.1	$ 0.4
UG Distribution Assets Renewal	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0
Corrective Renewal	$ 0.4	$ 0.5	$ 0.5	$ 0.5	$ 0.5	$ 2.4
Customer Connections	$ 0.3	$ 0.2	$ 0.2	$ 0.3	$ 0.3	$ 1.3
ANNUAL TOTAL	**$ 1.4**	**$ 1.6**	**$ 1.6**	**$ 1.6**	**$ 1.6**	**$ 7.7**

ii) No, Hydro Ottawa's reduction in average annual labour hours per pole installation, as shown in Figure 1 (23.6%), was not applied to all capital programs. As per Schedule 1-3-4 - Facilitating Innovation and continuous Improvement, this encompasses all capital programs within the System Access, System Service and System Renewal categories, with the exception of stations-related programs.

After submitting the 2026-2030 Rate Application, it was noticed that projects under System Expansion and Residential Subdivision in the System Access investment category were erroneously included in the analysis. Hydro Ottawa has recalculated the productivity savings excluding these projects and presented the Revised Internal Labour Savings in Table J below. For the 2021-2025 period the correction resulted in $415,000 less savings with an impact on the depreciation calculation of $14,000. For the 2026-2030 period, the correction resulted in $1.1 million less savings, with an impact on the depreciation calculation of $38,000.

Table J - Revised Internal Labour Savings 2021-2030 ($'000s)

	2021 - 2025 Actual	2021-2025 Without Efficiency	Variance	2026-2030 Test Years	2026-2030 Without Efficiency	Variance
Internal Labour Savings						
Regular Time	$ 57,940	$ 70,560	$ 12,619	$ 88,709	$ 108,030	$ 19,321
Overtime	$ 7,256	$ 11,138	$ 3,883	$ 7,518	$ 11,541	$ 4,023
TOTAL	**$ 65,196**	**$ 81,698**	**$ 16,502**	**$ 96,226.7**	**$ 119,570**	**$ 23,344**
Depreciation						
Regular Time			$ 421			$ 644
Overtime			$ 129			$ 134
TOTAL	**-**	**-**	**$ 550**	**-**	**-**	**$ 778**

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-27

EVIDENCE REFERENCE:

[Ex.1-3-4, p.23-26] With respect to Innovation and Digital Transformation Initiatives:

QUESTION(S):

a. Please revise Table 4 and 5 to show the benefits for each year between 2021 and 2030.
b. For each initiative listed in Table 4 and Table 5, please provide a detailed description of the methodology and supporting calculations used to calculate the specific productivity benefit.

RESPONSE(S):

a) See Tables A through D below.

After submitting the 2026-2030 Rate Application, it was noticed that 3.2.2 Online Billing Enhancements excluded $24k per year in savings. Hydro Ottawa has recalculated the productivity savings and these changes are reflected in the amounts below.

Table A- Innovation and Digital Transformation Initiatives (Quantifiable)[1] ($'000s) 2021-2025

Initiative	Description		Productivity Benefits					
			2021	2022	2023	2024	2025	Total 2021-2025
3.2.1 Net Metering Automation	Streamlined net metering billing processes, saving significant labor hours per month.	OM&A						n/a
3.2.2 Online Billing Enhancements	Expanded online billing, reducing mailing and printing costs (with ancillary savings related to Account Overdue Notices)	OM&A	$ 232	$ 765	$ 972	$ 1,546	$ 2,880	$ 6,394
3.2.3 Remote Disconnection Technology	Expanded use of remote disconnect meters, reducing labor costs for service terminations and reconnections.	OM&A	$ 282	$ 376	$ 520	$ 826	$ 865	$ 2,869
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	*Capital Expense*	*$ 132*	*$ 177*	*$ 175*	*$ 170*	*$ 179*	*$ 834*
		Capital Depreciation	$ 4	$ 6	$ 6	$ 6	$ 6	$ 28
		Services to Third Parties	$ 88	$ 118	$ 117	$ 113	$ 120	$ 556
3.2.5 Disconnection Notification Automation	Replacement of manual delivery of disconnection notices with automated notifications	OM&A	$ 346	$ 355	$ 369	$ 383	$ 396	$ 1,849
3.2.6 Satellite Imaging for Vegetation Management	Used satellite data to identify high-risk vegetation areas and optimize trimming schedules.	OM&A						n/a

[1] Totals may not sum due to rounding.

Initiative	Description		Productivity Benefits					
			2021	2022	2023	2024	2025	Total 2021-2025
3.2.7 Blue Beam for Plant Inspectors	Digitalized project documentation and plant inspections, reducing paper use and improving workflow efficiency.	*Capital Expense*	*$ 205*	*$ 208*	*$ 211*	*$ 231*	*$ 239*	*$ 1,095*
		Capital Depreciation	$ 7	$ 7	$ 7	$ 8	$ 8	$ 36
3.2.8 Move-In Move-Out Automation	Automated customer move-in/move-out requests to reduce manual processing and errors.	OM&A	-	$ 38	$ 134	$ 159	$ 171	$ 502
3.2.9 Salesforce Field Service for Reliability Operations	Centralized work requests and scheduling, reducing reliance on manual communication and increasing productivity.	OM&A					$ 141	$ 141
3.2.10 Damage to Plant Process Automation	Implemented a Google Form-based system for faster and more efficient reporting of infrastructure damage.	*Capital Expense*	*$ 4*	*$ 4*	*$ 4*	*$ 4*	*$ 5*	*$ 21*
		Capital Depreciation	-	-	-	-	-	-
3.2.11 Customer Information System Reduced Fees	Reduced managed service costs	OM&A	$ 264	$ 216				$ 480
Total Capital Expense			**$ 341**	**$ 389**	**$ 390**	**$ 406**	**$ 423**	**$ 1,950**
Total Capital Depreciation			**$ 11**	**$ 13**	**$ 13**	**$ 13**	**$ 14**	**$ 64**
Total OM&A			**$ 1,124**	**$ 1,750**	**$ 1,995**	**$ 2,914**	**$ 4,453**	**$ 12,236**
Total Third Party Services			**$ 88**	**$ 118**	**$ 117**	**$ 113**	**$ 120**	**$ 556**

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Table B - Innovation and Digital Transformation Initiatives (Quantifiable)[2] ($'000s) 2026-2030

Initiative	Description		Productivity Benefits					
			2026	2027	2028	2029	2030	Total 2026-2030
3.2.1 Net Metering Automation	Streamlined net metering billing processes, saving significant labor hours per month.	OM&A	$241	$554	$1,403	$1,934	$2,620	$6,751
3.2.2 Online Billing Enhancements	Expanded online billing, reducing mailing and printing costs (with ancillary savings related to Account Overdue Notices)	OM&A	$ 524	$ 804	$ 1,092	$ 1,386	$ 1,689	$5,495
3.2.3 Remote Disconnection Technology	Expanded use of remote disconnect meters, reducing labor costs for service terminations and reconnections.	OM&A	$904	$945	$987	$1,030	$1,074	$4,941
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	*Capital Expense*	*$200*	*$222*	*$247*	*$274*	*$305*	*$1,248*
		Capital Depreciation	$7	$7	$8	$9	$10	$42
		Services to Third Parties	$133	$148	$165	$183	$203	$832
3.2.5 Disconnection Notification Automation	Replacement of manual delivery of disconnection notices with automated notifications	OM&A	$410	$425	$440	$455	$472	$2,202
3.2.6 Satellite Imaging for Vegetation Management	Used satellite data to identify high-risk vegetation areas and optimize trimming schedules.	OM&A	$178	$358	$363	$367	$372	$1,637
3.2.7 Blue Beam for Plant Inspectors	Digitalized project documentation and plant	*Capital Expense*	*$247*	*$255*	*$263*	*$270*	*$278*	*$1,313*

[2] Totals may not sum due to rounding.

Initiative	Description		Productivity Benefits					
			2026	2027	2028	2029	2030	Total 2026-2030
	inspections, reducing paper use and improving workflow efficiency.	Capital Depreciation	$8	$8	$9	$9	$9	$44
3.2.8 Move-In Move-Out Automation	Automated customer move-in/move-out requests to reduce manual processing and errors.	OM&A	$173	$173	$192	$192	$192	$923
3.2.9 Salesforce Field Service for Reliability Operations	Centralized work requests and scheduling, reducing reliance on manual communication and increasing productivity.	OM&A	$146	$150	$154	$158	$162	$769
3.2.10 Damage to Plant Process Automation	Implemented a Google Form-based system for faster and more efficient reporting of infrastructure damage.	Capital Expense	$5	$5	$5	$5	$5	$25
		Capital Depreciation	$0	$0	$0	$0	$0	$1
3.2.11 Customer Information System Reduced Fees	Reduced managed service costs	OM&A						n/a
Total Capital Expense			**$452**	**$482**	**$515**	**$550**	**$588**	**$2,586**
Total Capital Depreciation			**$15**	**$16**	**$17**	**$18**	**$20**	**$86**
Total OM&A			**$2,577**	**$3,409**	**$4,629**	**$5,523**	**$6,580**	**$22,717**
Total Third Party Services			**$133**	**$148**	**$165**	**$183**	**$203**	**$832**

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Table C - Breakdown of Productivity Benefits for Online Billing and Account Overdue Notices ($'000 000s) 2021-2025

	Productivity Benefits					
	2021	2022	2023	2024	2025	2021-2025
Online Billing	$0.2	$0.7	$0.9	$1.4	$2.7	$5.8
Account Overdue Notices (AON)	$0.1	$0.1	$0.1	$0.1	$0.2	$0.6
TOTAL	**$ 0.2**	**$ 0.8**	**$ 1.0**	**$ 1.5**	**$ 2.9**	**$ 6.4**

Table D - Breakdown of Productivity Benefits for Online Billing and Account Overdue Notices ($'000 000s) for 2026-2030

	Productivity Benefits					
	2026	2027	2028	2029	2030	2026-2030
Online Billing	$0.3	$0.6	$0.8	$1.1	$1.4	$4.2
Account Overdue Notices (AON)	$0.2	$0.3	$0.3	$0.3	$0.3	$1.3
TOTAL	**$ 0.5**	**$ 0.8**	**$ 1.1**	**$ 1.4**	**$ 1.7**	**$ 5.5**

b) For each initiative listed in Table 4 and 5 per Schedule 1-3-4 Facilitating Innovation and Continuous Improvement, please see the table below with a description of the methodology used to calculate the specific productivity benefit. For detailed calculations, please refer to Attachment 1-SEC-27(A) - Supporting Calculations for Productivity Initiatives. Note that initiative 3.2.2 Online Billing Enhancements (Table 5 per Schedule 1-3-4 Facilitating Innovation and Continuous Improvement) contains calculations for online billing and account overdue notices (AON).

Table E - Calculation Details

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
3.2.1 Net Metering Automation	Streamlined net metering billing processes, saving significant labor hours per month.	OM&A	Net Metering Automation savings are determined by multiplying the volume of automated bills by the determined cost per manual bill, based on the time saved for different rate plans and the internal labor rate, and offsetting these savings by IT depreciation costs.	n/a
3.2.2 Online Billing Enhancements	Expanded online billing, reducing mailing and printing costs (with ancillary savings related to Account Overdue Notices)	OM&A	Online billing savings are determined by multiplying the total number of customers who opt for paperless billing by the cost saved per electronic bill, which incrementally increases each year due to rising print and postage expenses. This calculation also incorporates additional savings from sending overdue notices electronically, all built on the assumption of high e-bill adoption rates.	n/a
3.2.3 Remote Disconnection Technology	Expanded use of remote disconnect meters, reducing labor costs for service terminations and reconnections.	OM&A	Remote disconnection savings are determined by multiplying the volume of all remote activities (both disconnections and subsequent reconnections) by the labor and fleet cost saved per remote event. This	n/a

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
			calculation assumes that 80% of all disconnect/reconnect activities will be handled remotely, generating substantial cost avoidance compared to field operations.	
3.2.4 Customer Relationship Management (CRM) Platform Implementation	Replacement of legacy service desk with a comprehensive CRM system to automate workflows and improve efficiency	*Capital Expense*	Efficiency gains were determined as the time saved per job multiplied by the number of jobs expected annually. The hours saved annually were multiplied by the year's internal labour rate to determine total actual/expected savings. This amount was then divided between Capital and Third Party Services based on the proportion of each in the total annual jobs.	The savings for that year applied to capital jobs.
		Capital Depreciation		The savings for prior years that would have been applied to capital jobs, divided by the typical useful life.
		Third Party Services		The difference between the savings for that year less the amount applied to capital expense
3.2.5 Disconnection Notification Automation	Replacement of manual delivery of disconnection notices with automated notifications	OM&A	Disconnection Notification Automation savings are determined by eliminating the manual hand-delivery of notices, which previously consumed 50% of field collection time.	n/a
3.2.6 Satellite Imaging for Vegetation Management	Used satellite data to identify high-risk vegetation areas and optimize trimming schedules.	OM&A	Overstory Software expected to reduce trimming spend up to 20% by use of scan results allowing for more efficient targeted	n/a

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
			trimming. Savings are calculated as the difference between the forestry maintenance budget and what the budget would have been without the Overstory efficiency. Expected efficiency is 15% in 2026, and 20% from 2027-2030.	
3.2.7 Blue Beam for Plant Inspectors	Digitalized project documentation and plant inspections, reducing paper use and improving workflow efficiency.	*Capital Expense*	Use of Blue Beam Software estimated to have saved 2,600 hours across the inspectors group due to workflow and collaborative abilities that eliminate non value added travel time. Savings are calculated by 2,600 hours multiplied by the annual labour rate.	The savings for that year applied to capital jobs.
		Capital Depreciation		The savings for prior years that would have been applied to capital jobs, divided by the typical useful life.
3.2.8 Move-In Move-Out Automation	Automated customer move-in/move-out requests to reduce manual processing and errors.	OM&A	Savings are determined by summing the savings from both fully and semi-automated online move-in/out processes, based on the volume of each and the reduced back-office labor costs per minute. These gross savings are then offset by estimated depreciation costs to arrive at the net savings.	n/a

Initiative	Description		Methodology and supporting calculation	What is captured in Capital Expenses versus Capital Depreciation category
3.2.9 Salesforce Field Service for Reliability Operations	Centralized work requests and scheduling, reducing reliance on manual communication and increasing productivity.	OM&A	Centralized workload and prioritization using Salesforce Software estimates 1,800 field tech and crew hours saved per year. Savings are calculated by 1,800 hours multiplied by the annual labour rate. These gross savings are then offset by estimated costs of Salesforce licenses to arrive at the net savings.	n/a
3.2.10 Damage to Plant Process Automation	Implemented a Google Form-based system for faster and more efficient reporting of infrastructure damage.	*Capital Expense*	Damage to Plant ('DTP') Process Automation of using a Google Form is estimated to have a saving of 20 min per DTP case. Savings are calculated by taking 148 DTP cases per year multiplied by 20 minutes multiplied by the annual labour rate.	The savings for that year applied to capital jobs.
		Capital Depreciation		The savings for prior years that would have been applied to capital jobs, divided by the typical useful life.
3.2.11 Customer Information System Reduced Fees	Reduced managed service costs	OM&A	Customer Information System savings are determined directly from cost reductions achieved through renegotiating the CIS support contract in 2019. The methodology simply quantifies these identified contract cost reductions over the 2021-2025 rate period.	n/a

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-28

EVIDENCE REFERENCE:

[Ex.1-3-4, Attachment A] With respect to the 2024 productivity scorecard:

QUESTION(S):

a. Please provide the final year-end for each year between 2021 and 2024.
b. Please provide the latest 2025 scorecard.

RESPONSE(S):

a) Please find 2021-2024 actuals for the measures included in the corporate productivity scorecard in Table A below.

Footnotes have been inserted, where appropriate, to clarify the scope of individual performance measures.

Table A - Productivity Performance Measures (2021-2024 Results)[1]

	Measures	Description	2021A	2022A	2023A	2024A
Labour Utilization	Productive Time[2]	% of Billable Hours / Total Regular Hours	73%	69%	73%	71%
	Regular Labour Allocation to Maintenance & Admin[2]	% of Labour Time on Mtnce & Admin / Total Productive Time	29%	35%	35%	34%
	Average Sick Days per FTE (annualized)[3]	Total Sick Days / Total Employees	7.8	8.1	6.0	6.0
	e-Learning Training per employee (annualized)[3]	Number of hours of e-learning / Total Employees	5.4	4.9	6.2	8.5
OM&A	Bad Debt as a % of Total Electricity Revenue[2]	Bad Debt / Total Electricity Revenue	0.07%	0.18%	0.20%	0.22%
Asset Efficiency	Technology Infrastructure Cost per Employee (annualized)[3]	(External IT support costs + computer hardware & software depn) / # of FTE	$28.9K	$30.0K	$32.7K	$33.4K
Profitability Metrics	EBITDA as a % Revenue (HOL)[2]	EBITDA $ / Total Revenue - Hydro Ottawa Limited	55%	50%	48%	49%
	Inventory Turnover Ratio and Value[3]	Cost of Materials Used / Average Inventory	1.24	1.07	1.01	0.67

b) The results for the latest version of the corporate productivity scorecard (i.e. Q1 2025) are included in Table B below.

[1] In Attachment 1-3-4(A) - Corporate Productivity Scorecard, Hydro Ottawa redacted individual productivity measures which pertained exclusively to the utility's affiliates. Those measures have likewise been omitted from Tables A and B in this interrogatory response.
[2] This measure applies exclusively to the utility, in both Tables A and B.
[3] This measure applies to both the utility and its affiliates, in both Tables A and B.

Table B - Productivity Performance Measures (Q1 2025 Results)

	Measures	Description	2023A	2024A	2025 Target	Q1 YTD Target	Q1 YTD Actual	Assessment ● X / Q1 2025 Explanation
Labour Utilization	Productive Time	% of Billable Hours / Total Regular Hours	73%	71%	≥73%	≥73%	75%	● Achieved target.
	Regular Labour Allocation to Maintenance & Admin	% of Labour Time on Mtnce & Admin / Total Productive Time	35%	34%	≤33%	≤33%	35%	X Missed target due to higher station-related maintenance work.
	Average Sick Days per FTE (annualized)	Total Sick Days / Total Employees	6.0	6.0	≤6.0	≤6.0	6.0	● Achieved target.
	e-Learning Training per employee (annualized)	Number of hours of e-learning / Total Employees	6.2	8.5	≥7.0	≥7.0	11.1	● Achieved target.
OM&A	Bad Debt as a % of Total Electricity Revenue	Bad Debt / Total Electricity Revenue	0.20%	0.22%	≤0.18%	≤0.20%	-0.06%	● Outperformed target due to the resolution of the Canada Post strike, which allowed billing and payments to normalize.
Asset Efficiency	Technology Infrastructure Cost per Employee (annualized)	(External IT support costs + computer hardware & software depn) / # of FTE	$32.7K	$33.4K	≤$34.0K	≤$34.4K	$36.5K	X Missed target. Costs are 3% above budget and headcount is below budget.
Profitability Metrics	EBITDA as a % Revenue (HOL)	EBITDA $ / Total Revenue - Hydro Ottawa Limited	48%	49%	≥50%	≥50%	53%	● Achieved target.
	Inventory Turnover Ratio and Value	Cost of Materials Used / Average Inventory	1.01	0.67	≥1.5	≥1.5	0.79	X Missed target mainly in transformers and cables based on operational requirements.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-29

EVIDENCE REFERENCE:

[Ex.1-4-1, Attachment D]

QUESTION(S):

With respect to the Utility Plus, Electric Utility Large Customer Satisfaction Survey, please provide a list of the utilities included in the "Cohort Average".

RESPONSE(S):

The utilities included in "Cohort Average" in Utility Pulse's 2024 Electric Utility Large Customer Satisfaction Survey are:

- Burlington Hydro
- Elexicon
- Enwin
- GrandBridge Energy
- Hydro Ottawa
- London Hydro
- Milton Hydro
- Oakville Hydro

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-30

EVIDENCE REFERENCE:

[Ex.1-4-1, Attachment E, p.36]

QUESTION(S):

With respect the Innovative Research Group, National Electricity Customer Satisfaction Report, please provide a list of the companies included in the “Customer Satisfaction Index”.

RESPONSE(S):

Hydro Ottawa is unable to provide a list of the companies included in the “Customer Satisfaction Index”. As part of its confidential commitments, Electricity Canada does not provide members with that information.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

1-SEC-31

EVIDENCE REFERENCE:

[Ex.1-4-2, p.10; 1-4-2, Attachment A, p.318, 411, 489]

QUESTION(S):

Please explain why the response options for the question include multiples variations of support, but only one indicating opposition.

RESPONSE(S):

Hydro Ottawa's customer engagement was conducted in two phases. In Phase I, Hydro Ottawa conducted focus groups and surveys to understand core customer needs and preferences. The results of this phase were distilled into the principles and priorities that guided the development of Hydro Ottawa's Distribution System Plan (DSP) and Business Plan.

In Phase II, Hydro Ottawa sought more specific input from customers on the tactical decision points within the Business Plan and DSP, which were already reflective of the customer priorities identified within Phase I. Questions, particularly those in Attachment 1-4-2(A) - Customer Engagement Report on Hydro Ottawa's 2026-2030 Rate Application, pages 318, 410, 489, aimed to ascertain varied customer perspectives on the overall rate impact after respondents had time to review the proposed investment choices and their financial implications. The questions and response options sought a deeper understanding of customer perspectives beyond simple support/opposition, providing richer customer sentiment data for strategic planning and for the OEB to review. This aligns with standard survey research for nuanced, actionable data.

Respondents were provided an opportunity to express concerns or dissent through open-ended comment fields, which were reviewed alongside quantitative results. This ensured that all feedback, including dissenting views, was captured and considered.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-32

EVIDENCE REFERENCE:

[Ex.2-5-3]

QUESTION(S):

Please update the following tables to include 2024 data: Tables 18, 19, 25 and 26

RESPONSE(S):

Tables 18, 19, 25 and 26 have been updated to include 2024 data, and are included below as Tables A, B, C and D respectively.

Table A - 2019-2024 SAIFI Reliability Performance

KPI		2019	2020	2021	2022	2023	2024
SAIFI	All Interruptions	1.08	1.00	0.98	1.95	1.48	0.79
	Excluding LoS	0.95	0.81	0.67	1.51	1.18	0.58
	Excluding LoS & MEDs	0.75	0.72	0.62	0.69	0.63	0.54
	SAIFI Target[1]	0.74	0.74	0.74	0.72	0.71	0.68

[1] This value represents the rolling five-year historical average excluding LoS and MED

Table B - 2019-2024 SAIDI Reliability Performance

KPI		2019	2020	2021	2022	2023	2024
SAIDI	All Interruptions	1.30	1.70	1.11	39.42	6.92	1.10
	Excluding LoS	1.17	1.60	0.93	39.28	6.82	0.97
	Excluding LoS & MEDs	0.77	0.83	0.83	1.02	1.03	0.87
	SAIDI Target[2]	1.02	0.96	0.91	0.88	0.86	0.89

[2] This value represents the rolling five-year historical average excluding LoS and MED

Table C - 2019-2024 SAIFI and SAIDI Contribution by Outage Type (Excluding MEDs)

Code - Cause	SAIFI & SAIDI Contribution	2019	2020	2021	2022	2023	2024
0 - Unknown	Number of Interruptions	65	53	28	36	61	53
	Customer Interruptions	31,447	33,536	10,420	22,886	20,294	13,703
	Customer-Hours	25,623	20,163	9,138	31,339	21,762	11,452
1 - Scheduled Outages	Number of Interruptions	645	753	740	614	550	919
	Customer Interruptions	13,621	22,520	17,044	20,529	29,634	31,992
	Customer-Hours	34,807	49,203	59,257	45,350	55,557	94,831
2 - Loss of Supply	Number of Interruptions	24	26	34	38	19	11
	Customer Interruptions	44,089	64,759	107,282	155,674	107,874	76,784
	Customer-Hours	42,548	37,565	64,603	52,284	35,794	49,359
3 - Tree Contact	Number of Interruptions	60	104	82	101	95	66
	Customer Interruptions	32,418	18,548	21,460	43,967	32,733	21,833
	Customer-Hours	35,526	30,671	30,337	74,967	47,158	37,971
4 - Lightning	Number of Interruptions	21	27	16	9	22	10
	Customer Interruptions	24,659	12,188	11,031	7,008	18,931	1,214
	Customer-Hours	8,284	6,797	13,883	3,812	15,713	1,188
5 - Equipment Failure	Number of Interruptions	262	265	247	209	158	145
	Customer Interruptions	64,747	94,236	65,871	100,769	43,302	56,480
	Customer-Hours	79,803	104,622	97,052	144,848	84,798	92,951
6 - Adverse Weather	Number of Interruptions	13	6	11	10	41	37
	Customer Interruptions	3,671	1,393	10,706	4,285	13,228	29,986
	Customer-Hours	4,237	4,750	7,511	5,852	34,915	58,147
7 - Adverse Environment	Number of Interruptions	9	4	9	3	2	3
	Customer Interruptions	1,327	197	8,740	221	1,243	49
	Customer-Hours	2,190	475	9,754	530	2,436	557
8 - Human Element	Number of Interruptions	23	9	17	14	11	17
	Customer Interruptions	33,391	8,267	19,019	11,109	28,727	23,992
	Customer-Hours	16,452	1,508	13,139	3,720	33,600	14,894
9 - Foreign Interference	Number of Interruptions	208	177	151	109	169	142
	Customer Interruptions	47,360	55,962	53,375	36,416	41,057	33,572
	Customer-Hours	51,891	65,971	48,916	54,714	77,856	44,897

Table D - 2019-2024 Equipment Failure by Primary Apparatus

Primary Apparatus	2019	2020	2021	2022	2023	2024
OH Conductor	17	21	13	9	24	8
OH Switchgear	34	46	27	26	25	17
OH Transformers	34	26	19	24	20	11
Pole	4	6	7	8	2	5
Pole Attachment	14	12	11	15	11	9
UG Cable	63	44	48	51	34	59
UG Cable Attachment	8	12	7	8	8	11
UG Switchgear	1	2	1	6	3	5
UG Transformers	34	67	92	49	41 (24 leakers)	14 (42 leakers)
Vault Equipment	1	2	2	5	3	1

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-33

EVIDENCE REFERENCE:

[Ex.2-1-1]

QUESTION(S):

Please provide a revised version of each of Appendices 2-AA and 2-AB on an in-service additions basis.

RESPONSE(S):

Please see the following revised attachments, that have been updated from the Appendices submitted on June 4, 2025 on an in-service additions basis:

- Attachment 2-SEC-33(A) - OEB Appendix 2-AA - Capital Programs Table - In-Service Additions basis
- Attachment 2-SEC-33(B) - OEB Appendix 2-AB - Capital Expenditures Summary - In-Service Additions basis

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-34

EVIDENCE REFERENCE:

[Ex.2-1-1]

QUESTION(S):

Please provide a revised version of Appendix 2-AA that shows for 2025 year-to-date actuals, as well as year-to-date actuals for the same point in time in 2023 and 2024.

RESPONSE(S):

Please see Attachment 1-Staff-1(A) - Chapter 2 Appendices to interrogatory 1-Staff-1.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-35

EVIDENCE REFERENCE:

[Ex.2-1-1]

QUESTION(S):

Please complete Excel file 2-SEC-35.

RESPONSE(S):

Please see completed Excel attachment 2-SEC-35(A) - Capital Expenditures - ISA Conversion.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-36

EVIDENCE REFERENCE:

[Ex.2-5-2]

QUESTION(S):

Please provide the annual spending per year that relates to work, i) identified in the most recent Regional Infrastructure Plan and ii) identified as part of the latest Region Scoping Assessment Outcome Report, or, if available, the most recent draft IRRP report/results.

RESPONSE(S):

Table A below shows Hydro Ottawa's annual spending on projects from the most recent Regional Infrastructure Plan (RIP) completed in 2020 and Integrated Regional Resource Planning (IRRP) completed in 2025 for Greater Ottawa. This includes Hydro Ottawa projects and capital contributions to Hydro One projects. Please note that spending details for projects solely managed by Hydro one are not available.

i) The list below includes projects from the 2020 RIP that are currently in the planning, in-progress or complete stages.

- Lincoln Heights TS end-of-life T1/T2 replacement
  - Project lead: Hydro One
  - Energization completed in 2023 & 2024
  - No capital contribution required from Hydro Ottawa
- New Piperville transformer station for south-east Ottawa
  - Project lead: Hydro Ottawa

- Expected energization by 2026
- See Table A for capital contribution required for transmission connection cost

- Russell TS end-of-life T1/T2 replacement
  - Project Lead: Hydro One
  - Expected energization by 2026-2028
  - Initial CCRA discussions are underway with Hydro One; cost information is not yet available
- Replace end-of-life 115 kV breakers at Riverdale TS
  - Project lead: Hydro One
  - Expected energization by 2028
  - No capital contribution required from Hydro Ottawa
- Merivale TS T22 end-of-life replacement
  - Project lead: Hydro One
  - Expected energization by 2029
  - No capital contribution required from Hydro Ottawa

ii) As per Section 2.5.1 of Schedule 2-5-8 - System Service Investments, a scoping assessment was done in 2023 pre-IRRP. The outcomes of this assessment are further reviewed in the IESO's 2025 Ottawa Sub-Region Integrated Regional Resource Plan, published in July 2025. The following projects were identified as part of the scoping assessment completed in 2023:

- Slater TS Transformer upgrades
  - Project lead: Hydro One
  - Energization completed in 2024
  - See Table A for capital contribution required from Hydro Ottawa
- New Mer Bleue MTS
  - Project lead: Hydro Ottawa
  - Expected energization by 2028
  - See Table A for capital contribution required for transmission connection cost

The following projects were identified through the IESO's 2025 IRRP:

- Carling TS secondary cable upgrade
  - Project lead: Hydro One
  - Expected energization by 2026
  - See Table A for capital contribution required from Hydro Ottawa
- Lisgar TS secondary cable upgrade
  - Project lead: Hydro One
  - Expected energization by 2026
  - Initial CCRA discussions are underway with Hydro One; cost information is not yet available
- New Kanata North station
  - Project lead: Hydro Ottawa
  - Expected energization by 2028
  - Connection costs included in Table A, full transmission upgrade required with cost unknown at this time
- New Greenbank MTS
  - Project lead: Hydro Ottawa
  - Expected energization by 2028
  - Transmission upgrade required with cost unknown at this time
- Cyrville transformer capacity upgrade
  - Project lead, Hydro Ottawa
  - Expected energization by 2028
    - Hydro Ottawa acknowledges a discrepancy between the energization date and the requested budget timelines for this project in the original application material. Please refer to 1-Staff-1 for more details.
  - Transmission upgrade required with cost unknown at this time.
- King Edward secondary cable upgrade
  - Project lead, Hydro One
  - Expected energization by 2029
  - Initial CCRA discussions are underway with Hydro One; cost information is not yet available.

- Bronson station 13kV upgrade
    - Project lead, Hydro Ottawa
    - Expected energization by 2032
    - See Table A for capital contribution required for transmission connection cost

TABLE A - Annual spending for work related to 2020 RIP and 2025 IRRP

Type	Project	Historical Years				Bridge Year	Test Years				
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
CCRA	Slater T1 Emerg, T2, T3 Repl	-	-	$ 0.5	$ 0.0	-	-	-	-	-	-
Hydro Ottawa	Piperville MTS	$ 0.0	$ 0.1	$ 1.1	$ 8.2	$ 23.9	$ 3.6	- .0	- .0	- .0	- .0
CCRA	Piperville MTS	- .0	- .0	$ 0.7	$ 1.3	$ 3.0	- .0	- .0	- .0	- .0	- .0
Hydro Ottawa	New Mer Bleue MTS	-	$ 0.0	$ 0.0	$ 10.3	$ 9.8	$ 24.7	$ 9.3	-	-	-
CCRA	New Mer Bleue MTS	-	-	-	-	$ 1.0	$ 5.3	-	-	-	-
CCRA	Carling TS secondary cable upgrade	-	-	-	-	-	$ 2.1	-	-	-	-
Hydro Ottawa	Kanata North station	-	-	-	$ 2.2	-	$ 14.4	$ 26.4	$ 4.1	-	-
CCRA	Kanata North station	-	-	-	-	-	$ 5.3	-	-	-	-
Hydro Ottawa	Greenbank MTS	-	-	-	$ 2.7	-	$ 11.3	$ 23.6	$ 3.6	-	-
CCRA	Greenbank MTS	-	-	-	-	-	$ 4.7	-	-	-	-
Hydro Ottawa	Cyrville Capacity Upgrade	-	-	-	-	-	-	$ 0.1	$ 1.4	$ 13.4	$ 20.4
Hydro Ottawa	New 13kV Bronson Station	-	-	-	-	-	-	$ 0.1	$ 1.4	$ 13.4	$ 20.2
CCRA	New 13kV Bronson Station	-	-	-	-	-	-	-	$ 5.7	-	-

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-37

EVIDENCE REFERENCE:

[Ex.2-5-3]

QUESTION(S):

Please provide in a single table, the results of each of the 2021-2025 DSP KPIs for each year between 2021 and 2024. Please explain any material or noteworthy variance in 2024 actuals, relative to previous years.

RESPONSE(S):

The results of each of the 2021-2025 DSP KPIs for each year between 2021 and 2024 are included in Table A. For more information regarding the results for 2021, 2022 and 2023 please refer to Section 3 - Historic (2021-2025) DSP Performance of Schedule 2-5-3 - Performance Measurement for Continuous Improvement.

The Customer Loyalty KPI has continued to increase for Hydro Ottawa since 2021, despite fluctuations in the annual target. It's important to note that Hydro Ottawa's target is defined as 2% better than the Ontario average. This metric is determined by customers' overall satisfaction, their likelihood to remain customers, and their willingness to recommend a utility company's services. In 2024, the Ontario average for all three of these components declined, while Hydro Ottawa experienced improvements in each. This divergence accounts for both Hydro Ottawa's improved loyalty results and the simultaneous decrease in the provincial target.

In 2024, the Equipment Failure SAIFI per 100 customers for overhead assets saw a significant decrease. This positive trend is primarily attributed to fewer severe weather events during the year, which are the typical cause of equipment failure in overhead infrastructure. Following this trend, SAIFI values for all three categories (All Interruptions, Excluding LoS, Excluding LoS & MEDs) have also decreased in 2024. The number of customer interruptions (SAIFI) has continued to decline, largely due to prioritizing asset renewals in deteriorating conditions that affect system reliability. This improvement is also attributed to ongoing enhancements in protection coordination, feeder reconfigurations and increased redundancy. These efforts are in alignment with Hydro Ottawa's continuous improvement activities. For more information, please refer to Section 5 - Continuous Improvement of Schedule 2-5-3 - Performance Measurement for Continuous Improvement.

In 2024, SARFI results saw a significant increase when compared to 2023. Previous instances of elevated SARFI values were observed in 2020 and 2022. These earlier increases were primarily caused by transient supply voltage fluctuations upstream from the transmitter, leading to short-duration voltage swell events until the station transformer tap changer could effectively operate. The 2024 increase, however, is attributed to a broader range of factors, including faults, equipment failure, foreign interference, load disconnection, and necessary voltage adjustments.

Public Safety Concerns have increased since 2023, which can be attributed to the ESA increasing their efforts and inspections. Therefore, more public safety concerns are being reported.

Table A - Results of the 2021-2025 DSP KPIs for Each Year Between 2021 and 2024

Annual Electric Utility Customer Satisfaction Survey					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
Customer Satisfaction: Residential & Small Commercial	**≥90%**	94%	93%	91%	92%
Customer Satisfaction: Large Commercial	**≥90%**	N/A	94%	N/A	97%
Staff Helpfulness	**≥80%**	69%	74%	78%	79%
Value for Money	Result	74%	73%	73%	75%
	Target[1]	**74%**	**73%**	**74%**	**75%**
Customer Loyalty	Result	43%	47%	48%	53%
	Target[1]	**46%**	**38%**	**50%**	**35%**
Contact Centre Satisfaction					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
Call Center Customer Satisfaction	**≥85%**	86%	84%	85%	85%
Staff Knowledge	**≥90%**	88%	86%	87%	87%
Staff Courtesy	**≥90%**	87%	86%	87%	86%
First Call Resolution	**≥85%**	89%	86%	86%	87%
SAIFI Reliability Performance					
KPI		**2021**	**2022**	**2023**	**2024**
SAIFI	All Interruptions	0.98	1.95	1.48	0.79
	Excluding LoS	0.67	1.51	1.18	0.58
	Excluding LoS & MEDs	0.62	0.69	0.63	0.54
	SAIFI Target[2]	0.74	0.72	0.71	0.68
SAIDI Reliability Performance					
KPI		**2021**	**2022**	**2023**	**2024**
SAIDI	All Interruptions	1.11	39.42	6.92	1.10
	Excluding LoS	0.93	39.28	6.82	0.97
	Excluding LoS & MEDs	0.83	1.02	1.03	0.87
	SAIDI Target[2]	0.91	0.88	0.86	0.89

[1] The Hydro Ottawa target is defined as 2% better than Ontario Average.
[2] This value represents the rolling five-year historical average excluding LoS and MED.

CAIDI Reliability Performance					
Metric		**2021**	**2022**	**2023**	**2024**
CAIDI	Excluding LoS & MED	1.34	1.48	1.63	1.62
	5-Year Historical Average	1.23	1.22	1.22	1.33
FEMI Reliability Performance					
Metric	**Target**	**2021**	**2022**	**2023**	**2024**
$FEMI_{10}$	**10**	5	4	8	5
SARFI Performance					
Metric		**2021**	**2022**	**2023**	**2024**
SARFI		11	20	14	33
Distribution System Plan Implementation Progress					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
DSP Implementation Progress	**100 %**	92%	90%	75%	95%
Productive Time					
KPI		**2021**	**2022**	**2023**	**2024**
Productive Time		73%	69%	73%	71%
Target		**≥72%**	**≥72%**	**≥73%**	**≥73%**
Labour Allocation					
KPI		**2021**	**2022**	**2023**	**2024**
Labour Allocation		29%	35%	35%	34%
Target		**≤ 33%**	**≤ 32%**	**≤ 32%**	**≤ 33%**
Equipment Failure SAIFI per 100 Customers					
Asset – SAIFI x 100	**Target**	**2021**	**2022**	**2023**	**2024**
Overhead Assets	**10.12**	9.11	15.73	7.49	4.07
Station Assets	**1.67**	0.32	1.25	0.27	0.79
Underground Assets	**11.16**	9.26	11.26	4.17	10.43
Public Safety Concerns					
KPI		**2021**	**2022**	**2023**	**2024**
Public Safety Concerns		7	9	21	28

1

Annual Oil Spilled					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
Oil Spilled (L)	**0**	804 L	781 L	1,230 L	950 L
Oil Remediation ($000)	**0**	$ 1,897	$ 1,565	$ 1,099	$1,864
Stations Exceeding Planning Capacity					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
SEPC %	**≤ 5%**	7.7%	4.3%	8.7%	6.5%
Count		7	4	8	6
Stations Approaching Rated Capacity					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
SARC %	**0%**	1.1%	0%	0%	0%
Count		1	0	0	0
Feeders Exceeding Planning Capacity					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
FEPC %	**≤ 10%**	1.0%	0.9%	2.2%	2.6%
Count		8	10	19	22
Feeders Approaching Rated Capacity					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
FARC %	**0%**	0.1%	0%	0%	0%
Count		1	0	0	0
System Losses					
KPI	**Target**	**2021**	**2022**	**2023**	**2024**
Losses %	**≤ 3.02%**	2.89%	3.05%	3.10%	3.18%

1

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-38

EVIDENCE REFERENCE:

[Ex.2-5-4, p.38]

QUESTION(S):

With respect to Hydro Ottawa's Predictive Analytics, please explain what assumptions were used to predict asset degradation over-time.

RESPONSE(S):

Copperlead Predictive Analytics (PA) forecasts asset degradation and determines future asset risk levels primarily through the use of asset failure curves. These curves are developed using statistical techniques applied to Hydro Ottawa's asset registry and replacement data, or by aligning with industry consensus when data is less mature, as detailed in Section 4.4.4 of Schedule 2-5-4 - Asset Management Process. PA also incorporates an asset's health index to establish its baseline condition. It then uses asset failure curves, unique to each asset type, to predict degradation patterns and future risk values. If health index information is unavailable, the asset's age is translated to an equivalent condition based on established age-condition curves. Based on the asset's condition and probability of failure curve, PA outputs the asset's failure probability and its expected degradation pattern over time. Further information on the risk assessment process using Copperleaf PA can be found in Section 5.1.4 of Schedule 2-5-4 - Asset Management Process.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-39

EVIDENCE REFERENCE:

[Ex.2-5-4, p. 40, 57-60] With respect to Hydro Ottawa's Asset Condition Assessment:

QUESTION(S):

a. [p.40] Please provide a copy of the internal guide explaining in detail Hydro Ottawa's ACA framework, including the specific calculation, formula, and methodology used to derive the Health Indices.
b. [p.60] Please list all work Hatch has done for Hydro Ottawa in, a) the past 10 years, and b) related to development or assessment of Hydro Ottawa's capital planning processes, including but not limited to, asset management process, ACA framework, and asset risk assessment tools and framework.
c. [Attachment C] Is the 3 page Hatch letter the entirety of the deliverable to Hydro Ottawa regarding its assessment of its ACA Framework? If not, please provide a copy of any other deliverables (e.g. reports, presentations, etc.).

RESPONSE(S):

a) GEG0001: Asset Health Index Guideline is Hydro Ottawa's internal guide highlighting the ACA framework, including the specific calculation, formula, and methodology used to derive the Health Indices. Please see Attachment 2-SEC-39(A) - GEG0001 - Asset Health Index Guideline 2024.

b) In the past decade, Hatch has completed the following work for Hydro Ottawa concerning the development or assessment of its capital planning process:

- **2024-2025 - Enterprise Asset Management Roadmap:** Hatch was engaged to develop an EAM roadmap in 2025 to inform EAM project scope including evaluation and selection of EAM technology for execution beginning in 2026.
- **2024 - Assessment of ACA Implementation:** This assessment confirmed the robustness of Hydro Ottawa's ACA framework, noting its use of best-practice formulations and strong integration with broader asset management processes. Refer to Attachment 2-5-4(C) - Asset Condition Assessment Third Party Review for more details.
- **2024 - Review of Copperleaf Predictive Analytics (PA) Value Framework:** Before Hydro Ottawa developed its distribution asset model in Copperleaf PA, Hatch reviewed the PA value framework. Specifically, Hatch's role involved validating assumptions and calculations related to risk measures within the framework.
- **2024 - Asset Failure Curve Analysis:** Concurrent with the Copperleaf PA implementation, Hatch was engaged to enhance Hydro Ottawa's asset failure curve knowledge and insights, aiming to refine the utility's risk-based and value-based asset management framework. A detailed report is available in Attachment 2-5-4(D) - Failure Curves Review.
- **2024 - Grid Modernization Key Performance Indicator (KPI) Development:** Hatch was engaged to identify and refine KPIs to monitor the progress of Hydro Ottawa's Grid Modernization Roadmap.
- **2024 - Technical Review of Sentient Energy ENGO + GEMS:** Hatch was engaged by Hydro Ottawa to technically review Sentient Energy's ENGO + GEMS solution. This involved analyzing Hydro Ottawa's data (GEMS software, transformer, expense spreadsheets) and conducting a technical assessment based on average voltage and standard deviation, voltage violation frequency, power consumption, and power factor. Hatch also assessed the financial and environmental impacts of the solution and provided recommendations.
- **2023 - Grid Modernization Strategy & Roadmap:** Hatch implemented a two-phase approach for Hydro Ottawa's Grid Modernization Strategy. Phase 1 involved a Grid Modernization Maturity Assessment, which included baselining current system capabilities, mapping future requirements (short, mid, and long-term), and conducting a needs assessment to identify gaps. Phase 2 focused on Strategy and Roadmap Development, building upon the corporate mission, existing roadmaps, current initiatives, and a jurisdictional scan (see Section 3.4.2 of Schedule 2-5-4 - Asset Management Process for

details).

- **2020-2021 - FLISR- Architecture and Proof of Concept:** Hatch's work on the FLISR project encompassed a present-state assessment and future vision, leading to the development of a FLISR Roadmap and Automation Specification Framework. This involved feeder analysis, approach assessment, gap analysis, roadmap creation, and automation specification. The project highlighted the necessity of a broader grid modernization roadmap for efficient FLISR deployment.

c) A final presentation was also shared by Hatch around the ACA Framework Assessment. Please see Attachment 2-SEC-39(B) - HOL ACA Methodology Workshop 2026-2030 Review.

HydroOttawa		TITLE: **Guideline**	
RECOMMENDED:	**Pranav Pattabi P.Eng/ Mohmadmahir Momin**	NO: **GEG0001**	REV: **1**
APPROVED:	**Margaret Flores P.Eng**		
REV. DATE:	**2024-02-01**		

Asset Health Index Guideline

See Hydro Ottawa's Intranet site for the latest revisions

REVISION SHEET

Revision	Description of Change	Date	Initial
0	Original Document	2018-06-25	rar/mrm
1	Overall review and update of condition parameters and criteria	2024-02-01	pp/mm/mf

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1 Introduction

Hydro Ottawa is implementing asset health indices for its assets in an effort to improve system reliability, customer satisfaction and business efficiency. The collection and analysis of asset health index data will be a key part of how Hydro Ottawa makes asset replacement/repair decisions into the future.In order to get the most out of the asset health index program, Hydro Ottawa consulted with METSCO in the past, an industry leader in the area of health index development and further updated the condition criteria in 2024 on its own.

2 References

1. METSCO Energy Solutions. 2014, Asset health index formulation review. METSCO Data\Hydro Ottawa Asset Health Index Formulation Review (5 Nov 2014) (Track C.docx)
2. METSCO Energy Solutions. 2014, Asset health index formulation review tier 2 assets. METSCO Data\Hydro Ottawa Best Practices (Tier 2 Assets) - Nov 27 Draft.docx
3. Hydro Ottawa. 2015, Asset health & risk assessment method.

3 Scope

This document describes the current methodology for performing asset condition assessment. Each asset class describes how to derive the qualitative and quantitative criteria to calculate the total health index score.

The following assets have been included which have enough information to formulate a Health Index score:

- Station Assets
  - Power Transformers
    - Tap Changers
  - HV SF6 Breakers
  - Circuit Switchers
  - Metalclad Breakers
  - Oil Reclosers
- Overhead Assets
  - Wood Poles
  - Critical Loadbreak Switches
  - Polemounted Transformers
- Underground Assets
  - PILC Cable
  - XLPE/TRXLPE Cable
  - Padmounted Transformers
  - Padmounted Switchgear
  - Manholes

4 Methodology

A health index is an indicator of an assets remaining life given as a score from 100% to 0%. A new asset will have a health index of 100% and an asset in poor condition should have a health index below 30%.

Table 4-1 presents the health index ranges, corresponding asset condition, and generally the required action associated with each health index.

Table 4-1 - Asset condition based on health index

Health Index (%)	Condition	Description	Requirements
85–100	Very Good	Some aging or minor deterioration of a limited number of components	Normal maintenance
70–85	Good	Significant deterioration of some components	Normal maintenance
50–70	Fair	Widespread significant deterioration or serious deterioration of specific components	Increase diagnostic testing; possible remedial work or replacement needed depending on criticality
30–50	Poor	Widespread serious deterioration	Start planning process to replace or rehabilitate considering risk and consequences of failure
0–30	Very Poor	Extensive serious deterioration	Asset has reached its end-of-life; immediately assess risk; replace or refurbish based on assessment

To determine the health index for an asset, formulations are developed based on criteria that lead to asset failure. A weight is assigned to each criterion to indicate the amount of influence on the overall asset health index score.

Table 4-2 - Health Index Calculation Example

	Criteria	Weight	Ranking	Numerical Grade	Max Grade
1	Criteria 1	4	A-E	4-0	16
2	Criteria 2	6	A,C,E	4,2,0	24
3	Criteria 3	6	A-E	4-0	24
Total Score					**64**

Each criterion is ranked from A to E and each rank corresponds to a numerical grade, the conversion from ranking to numerical grade is available in Table 4-3:

Table 4-3 - Ranking to Numerical Grade conversion

A – 4	Best Condition
B – 3	Normal Wear
C – 2	Requires Remediation
D – 1	Rapidly Deteriorating
E – 0	Beyond Repair

The Health Index (HI) is then calculated as follows:

$$HI = \left(\frac{\sum_{i=1} Weight_i * Numerical\ \ Grade_i}{Total\ Score}\right)\ x\ 100$$

Where i corresponds to the criteria number and the health index is representing the remaining life of the asset.

Note: A health index is considered valid when 70% of the total health index score parameters are available.

5 Station Assets

5.1. Power Transformers

The following table represents the total health index weighting and scoring:

Table 5-1: Station Transformer Health Index

Transformer Condition Criteria	W	Condition	Numerical Grade	Max Grade
Dissolved Gas Analysis	10	A,B,C,D,E	4,3,2,1,0	40
Load History	10	A,B,C,D,E	4,3,2,1,0	40
Insulation Power Factor	5	A,B,C,D,E	4,3,2,1,0	20
Infrared Scanning	5	A, E	4,0	20
Oil Quality	8	A,C,E	4,2,0	32
Degree of Polymerization	8	A,B,C,D,E	4,3,2,1,0	32
Overall Visual Condition	6	A,B,C,D,E	4,3,2,1,0	24
Bushing Condition	5	A,B,C,D,E	4,3,2,1,0	20
Main Tank Corrosion	4	A,B,C,D,E	4,3,2,1,0	16
Cooling Equipment	2	A,B,C,D,E	4,3,2,1,0	8
Oil Tank Corrosion	1	A,B,C,D,E	4,3,2,1,0	4
Foundation	1	A,B,C,D,E	4,3,2,1,0	4
Grounding	1	A,B,C,D,E	4,3,2,1,0	4
Gaskets and Seals	1	A,B,C,D,E	4,3,2,1,0	4
Connectors	1	A,B,C,D,E	4,3,2,1,0	4
Oil Leaks	5	A,B,C,D,E	4,3,2,1,0	20
Oil Level	3	A,B,C,D,E	4,3,2,1,0	12
Service Age	5	A,B,C,D,E	4,3,2,1,0	20
Turns Ratio	4	A,B,C,D,E	4,3,2,1,0	16
Winding Resistance	6	A,B,C,D,E	4,3,2,1,0	24
Bushing Power Factor	6	A,B,C,D,E	4,3,2,1,0	24
Insulation Moisture Content	4	A,B,C,D,E	4,3,2,1,0	16
Transformer + Bushing Score				**404**

Note that station power transformers will have additional criteria for on-load tap changers if installed.

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.1.1. Dissolved Gas Analysis

Hydro Ottawa station transformers are tested for dissolved gas concentrations, namely hydrogen (H_2), methane (CH_4), acetylene (C_2H_2), ethylene (C_2H_4), ethane (C_2H_6), carbon monoxide (CO), and carbon dioxide (CO_2). The concentration of total dissolved combustible gases (TDCG) is also measured. Hydro Ottawa's dissolved gas concentration limits and rate of change limits conform to the *IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers.* Permissible dissolved gas concentration limits (in ppm) as a function of O_2/N_2 ratio and transformer age per IEEE Std. C57.104 -2019 as summarized in Table 5-2.

Table 5-2- Dissolved gas concentration limits, in ppm

Dissolved Gas	O_2 / $N_2 \leq 0.2$				O_2 / $N_2 > 0.2$			
	Transformer Age (years)				**Transformer Age (years)**			
	Unknown	**1-9**	**10-30**	**> 30**	**Unknown**	**1-9**	**10-30**	**> 30**
Hydrogen (H_2)	80	75		100	40	40		
Methane (CH_4)	90	45	90	110	20	20		
Ethane (C_2H_6)	90	30	90	150	15	15		
Ethylene (C_2H_4)	50	20	50	90	50	25	60	
Acetylene (C_2H_2)	1	1			2	2		
Carbon monoxide (CO)	900	900			500	500		
Carbon dioxide (CO_2)	9000	5000	10000		5000	3500	5500	

The rate of change of the gas concentration (in ppm/day) as measured by an online gas monitoring device determines the sampling interval, operation rates, and gas rate score of the station transformer. The rate of change in gas concentration limits are summarized in Table 5-3.

Table 5-3: Permissible absolute level change between successive laboratory DGA samples (in ppm) (based on IEEE Std. C57.104 -2019)

Dissolved Gas	**Maximum µL/L (ppm) variation between consecutive laboratory DGA samples**	
	O_2 / $N_2 \leq 0.2$	O_2 / $N_2 > 0.2$
Hydrogen (H_2)	40	25
Methane (CH_4)	30	10
Ethane (C_2H_6)	25	7
Ethylene (C_2H_4)	20	
Acetylene (C_2H_2)	Any Increase	

Carbon monoxide (CO)	250	175
Carbon dioxide (CO_2)	2500	1750

The condition rating for dissolved gas analysis is determined based on the permissible gas concentration limits outlined in Table 5-2 and the absolute level change between successive laboratory DGA samples shown in Table 5-3, as shown in Table 5-4.

Table 5-4: Dissolved gas condition rating, based on gas concentration and absolute change between successive laboratory DGA sampling

Number of dissolved gases violating the permissible absolute magnitude or level change limits	Condition Grade
None	A
One	B
Two	C
Three	D
Four or more	E

5.1.2. Load History

Peak load data (daily, monthly or yearly) is used in the station transformer health index formulation. The maximum load percentage of each transformer is computed on a daily, monthly or yearly basis, with respect to the nameplate rating. This ratio computed is used to arrive at a condition rating for transformer load history as shown in Table 5-5.

Table 5-5: Load History Condition Rating based on the maximum yearly maximum load percentage

Maximum yearly load percentage	Condition Grade
< 50%	A
50% – 75%	B
75% – 100%	C
100% – 125%	D
> 125%	E

5.1.3. Insulation Power Factor

The highest measured power factor (PF_{MAX}) is used to calculate the insulation power factor condition rating, as shown in Table 5-6.

Table 5-6: Insulation power factor condition based on the maximum measured power factor (PF_{MAX})

Condition	PF_{MAX} [%]
A	PFMAX < 0.5
B	0.5 ≤ PFMAX < 1
C	1 ≤ PFMAX < 1.5
D	1.5 ≤ PFMAX < 2
E	PFMAX ≥ 2

5.1.4. Infrared Scanning

Infrared scanning is a useful diagnostic procedure to detect specific thermal issues with power transformers. In grading a power transformer based on infrared scanning, specific thermal information regarding the following transformer components is to be considered: cooling system (radiators), the main tank, LTC (if present), bushings, secondary cable enclosure (if present), control enclosure and the conservator.

Table 5-7: Criteria for power transformer condition assessment based on infrared scanning

Main Tank	Radiators	LTC	Bushings, Secondary Cable Enclosure, Control Enclosure, Online Monitoring Equipment and Conservator
No hotspots	Not warmer than the main tank and a 10°C gradient from top to bottom	Not warmer than the main tank	No hotspots

Based on the criteria for power transformer infrared scanning, as outlined in Table 5-7, the condition grading for infrared scanning of power transformers is shown in Table 5-8.

Table 5-8: Condition grading for power transformers based on infrared scanning

Number of power transformer components violating the infrared scanning criteria	Condition Grade
None	A
One	B
Two	C
Three	D
Four or more	E

In the absence of infrared scanning information granular up to the transformer component level, the following condition grading criteria shall be used:

Table 5-9: Station transformer IR scanning condition criteria)

Infrared Scanning Result – Issue Found	Condition Grade
Yes	E
No	A

5.1.5. Oil Quality

The results of each oil quality test should be interpreted based on the station transformer's operating voltage. The oil quality condition can be determined for each test as described in Table 5-10. The worst test score may be taken as the overall oil quality score for the station transformer.

Table 5-10: Oil quality test condition assessment based on IEEE Std. C57. 106 – 2006

Test	Station Transformer Voltage Class			Oil Quality Condition
	U ≤ 69 kV	69 kV < U < 230 kV	U ≥ 230 kV	
Acid number	≤0.05	≤0.04	≤0.03	A
	0.05-0.20	0.04-0.15	0.03-0.10	C
	≥0.20	≥0.15	≥0.10	E
IFT [mN/m]	≥30	≥35	≥36	A
	25-30	30-35	32-36	C
	≤25	≤30	≤32	E
Dielectric strength[1] **[kv]**	>40	>47	>50	A
	≤40	≤47	≤50	E
Water content [ppm]	<35	<25	<20	A
	≥35	≥25	≥20	E
Power factor in oil	< 0.5	< 0.5	< 0.5	A

(at 25°, in %)	≥ 0.5	≥ 0.5	≥ 0.5	E

Note: U ≥ 230 kV station transformer voltage is not applicable for HOL.

5.1.6. Degree of Polymerization (Transformer Age)

The insulation aging process of a power transformer unit is widely governed by the value of degree of polymerization (DP). The DP indicates the average length associated with the cellulose macromolecules in the power transformer insulation system. During the normal aging process and/or due to undesirable excess heating produced in the insulation, the value of DP tends to reduce, alongside the overall tensile strength. The degradation of the transformer insulation system is influenced by the by-products of the insulation paper (2-FAL, CO_2 and CO). A new transformer is estimated to have a DP value of 1200 or 1000.

The DP is to be computed based on the quadratic relationship between CO_2/CO and DP as shown in the following equation:

$$DP=0.318CR^2-33.799CR+1003.2$$

Where,

$$CR=\frac{CO_2 \text{ concentration (ppm)}}{CO \text{ concentration (ppm)}}$$

Based on the computed DP value, the condition grading for power transformers using DP is shown in below table.

Table 5-11: Condition grading based on DP

Degree of Polymerization (DP)	Condition Grade
800 ≥ DP ≤ 1000	A
600 ≥ DP < 800	B
500 ≥ DP < 600	C
250 ≥ DP < 500	D
DP < 250	E

5.1.7. Visual Inspections

The following fields are inspected and given an appropriate condition:

- Overall visual condition
- Bushing condition
- Main tank corrosion
- Cooling equipment
- Oil tank corrosion
- Foundation
- Grounding
- Gaskets and seals
- Connectors
- Oil leaks

- Oil Levels

Table 5-12: Overall visual station transformer condition criteria

Condition	Visual Inspection Criteria – Overall Visual Condition
A	Station transformer is externally clean and corrosion free. All monitoring, protection and control, pressure relief, gas accumulation and silica gel devices, and auxiliary systems mounted on the station transformer are in good condition. No external evidence of overheating or internal overpressure. Appears to be well maintained with service records readily available.
B	Normal signs of wear with respect to the above characteristics.
C	One or two of the below characteristics are unacceptable.
D	More than two of the below characteristics are unacceptable – repairable.
E	More than two of the below characteristics are unacceptable – damaged beyond repair.

Table 5-13: Station transformer bushing condition criteria

Condition	Visual Inspection Criteria – Bushing Condition
A	Bushings are not broken and are free of chips, radial cracks, flashover burns, copper splash, and copper wash. Cementing and fasteners are secure.
B	Bushings are not broken, but minor chips and cracks are visible. Cementing and fasteners are secure.
C	Bushings are not broken; however, major chips and some flashover burns and copper splash are visible. Cementing and fasteners are secure.
D	Bushings are broken or cementing and fasteners are not secure.
E	Bushings, cementing, or fasteners are broken/damaged beyond repair.

Table 5-14: Station transformer main tank corrosion condition criteria

Condition	Visual Inspection Criteria – Main Tank Corrosion
A	No rust, corrosion, or moisture evident on main tank.
B	No rust or corrosion on main tank, but some evidence of moisture ingress or condensation.
C	Some rust and corrosion on main tank.
D	Significant corrosion on main tank – repairable.
E	Significant corrosion on main tank – degradation beyond repair.

Table 5-15: Station transformer cooling equipment condition criteria

Condition	Visual Inspection Criteria – Cooling Equipment
A	No rust or corrosion on body of radiators. Fan and pump enclosures are free of rust and corrosion and securely mounted in position. Pump bearings are in good condition and fan controls are operating per design.
B	Normal signs of wear with respect to the above characteristics.

C	One or two of the above characteristics are unacceptable.
D	More than two of the above characteristics are unacceptable.
E	Fan and pump enclosures damaged/degraded beyond repair.

Table 5-16: Station transformer oil tank corrosion condition criteria

Condition	Visual Inspection Criteria – Oil Tank Corrosion
A	No rust, corrosion, or moisture evident on oil tank.
B	No rust or corrosion on oil tank, but some evidence of moisture ingress or condensation.
C	Some rust and corrosion on oil tank.
D	Significant corrosion on oil tank – repairable.
E	Significant corrosion on oil tank – degradation beyond repair.

Table 5-17: Station transformer foundation condition criteria

Condition	Visual Inspection Criteria – Foundation
A	Concrete foundation is level and free from cracks and spalling. Support steel and/or anchor bolts are tight and free from corrosion.
B	Normal signs of wear with respect to the above characteristics.
C	One of the above characteristics is unacceptable.
D	Two of the above characteristics are unacceptable.
E	Foundation or supports are damaged/degraded beyond repair.

Table 5-18: Station transformer grounding condition criteria

Condition	Visual Inspection Criteria – Grounding
A	Ground connections are tight and free of corrosion. Connections are made directly to tanks, radiators, cabinets and supports without any intervening paint or corrosion.
B	Normal signs of wear with respect to the ground connections.
C	One ground connection is visibly detached/missing.
D	Two ground connections are visibly detached/missing.
E	Ground connections are damaged/degraded beyond repair or more than two missing ground connections.

Table 5-20: Station transformer gaskets and seals condition criteria

Condition	Visual Inspection Criteria – Gaskets and Seals
A	No external sign of deterioration of tank gaskets, weld seams, or gaskets on valve fittings.
B	Normal signs of wear with respect to the above characteristics.
C	One of the above characteristics is unacceptable.
D	Two or more of the above characteristics are unacceptable – repairable.
E	Two of more of the above characteristics are unacceptable – damaged beyond repair.

Table 5-19: Station transformer connectors condition criteria

Condition	Visual Inspection Criteria – Connectors
A	All primary and secondary connections are in good condition.
B	Normal signs of wear with respect to the primary and/or secondary connectors.
C	Primary or secondary connectors are in unacceptable condition.
D	Both primary and secondary connectors are in unacceptable condition – repairable.
E	Both primary and secondary connectors are in unacceptable condition – damaged beyond repair.

Table 5-20: Station transformer oil leaks condition criteria

Condition	Visual Inspection Criteria – Oil Leaks
A	No oil leakage or water ingress at any of the bushing-metal interfaces or at gaskets, weld seals, flanges, valve fittings, gauges, monitors.
B	Minor oil leaks evident, but no moisture ingress is likely.
C	Clear evidence of oil leaks but rate of loss is not likely to cause any operational or environmental impacts.
D	Major oil leakage and probable moisture ingress. If left uncorrected it could cause operational and/or environmental problems.
E	Oil leaks or moisture ingress have resulted in complete failure or damage/degradation beyond repair.

Table 5-21: Station transformer oil level condition criteria

Condition	Visual Inspection Criteria – Oil Level
A	Transformer oil level is acceptable with insignificant variation from the previous inspection.
B	Transformer oil level is acceptable with noticeable variation from the previous inspection.
C	Transformer oil level is acceptable, but considerable variation from the previous inspection.
D	Transformer oil level is unacceptable. Topped up during inspection.
E	Transformer oil level is unacceptable and could not be topped up; and/or oil level indicates unsafe transformer operation or hazardous rate of oil loss.

5.1.8 Service Age

The service age of the power transformer is used to arrive at the corresponding condition grade, based on Table 5-22.

Table 5-22: Condition grading based on service age

Service Age (years)	Condition Grade
0-10	A
11-20	B
21-35	C
36-50	D
> 50	E

5.1.9 Turns Ratio Test

The maximum deviation between phases is used to arrive at the condition grade based on turns ratio testing, as shown in Table 5-23.

Table 5-23: Condition grading based on turns ratio test (based on the IEEE Std. C57.152 – 2013)

Maximum deviation between phases (%)	Condition Grade
0 – 0.09	A
0.1 – 0.29	B
0.3 – 0.39	C
0.4 – 0.49	D
≥ 0.5	E

5.1.10 Winding Resistance Test

The maximum deviation between phases is used to arrive at the condition grade based on winding resistance testing, as shown in Table 5-24.

Table 5-24: Condition grading based on winding resistance test (based on the IEEE Std. C57.152 –2013)

Maximum deviation between phases (%)	Condition Grade
0 – 0.49	A
0.5 – 2.49	B
2.5 – 3.99	C
4 – 4.99	D
≥ 5	E

5.1.11 Bushing Dissipation Factor

The ratio of the bushing power factor value with respect to the nameplate specification shall be used to determine the condition grading for the dissipation factor of bushings as shown in Table 5-25.

Table 5-25: Condition grading based on bushing dissipation factor test (based on the IEEE Std. C57.152 – 2013)

Ratio of bushing dissipation factor to nameplate	Condition Grade
0.8 – 1.24	A
1.25 – 1.49	B
1.5 – 1.74	C
1.75 – 1.99	D
≥ 2	E

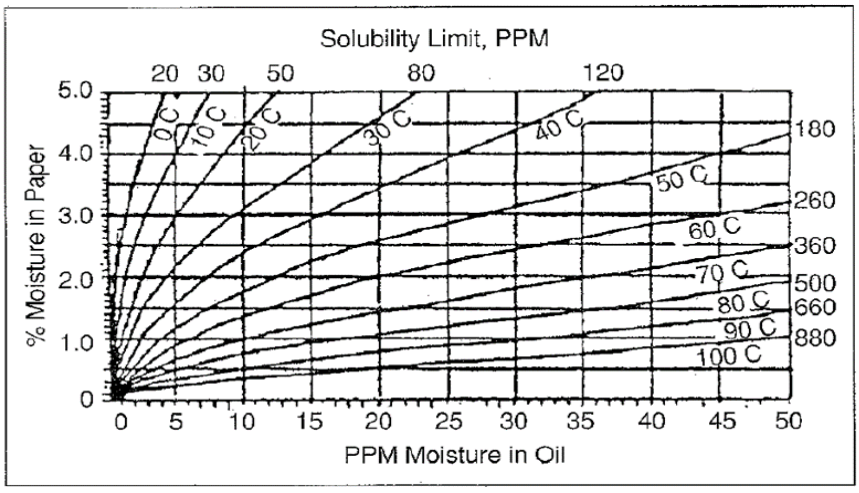
Note: When the transformer bushing does not have a tap electrode, a hot collar test shall be performed to evaluate the condition of the small bushing insulation section, between the current-carrying conductor and the upper porcelain layer. Under such a situation, the watt loss determined through the hot collar test shall be analyzed instead of the dissipation factor, based on the following table (based on the IEEE Std. C57.152 – 2013):

Table 5-26: Condition grading for power loss of station transformer

Watt Loss - W_L (W)	Condition Grade
$0 \leq W_L < 0.1$	A
$0.1 \leq W_L < 0.2$	B
$0.2 \leq W_L < 0.3$	C
$0.3 \leq W_L < 0.5$	D
$W_L \geq 0.5$	E

5.1.12 Insulation Moisture Content

In the absence of advanced diagnostic testing such as dielectric frequency response (DFR), the moisture-in-oil (ppm) shall be used to estimate the insulation moisture content (%), based on the Oommen's[1] curves, shown below. The condition grading for power transformers based on insulation moisture content is shown in Table 5-27.



[1] Y. Du, M. Zahn, B. C. Lesieutre, A. V. Mamishev and S. R. Lindgren, "Moisture equilibrium in transformer paper-oil systems," in IEEE Electrical Insulation Magazine, vol. 15, no. 1, pp. 11-20, Jan.-Feb. 1999, doi: 10.1109/57.744585.

Table 5-27: Condition grading based on insulation moisture content

Insulation Moisture Content (%)	Condition Grade
< 1	A
1 – 1.49	B
1.5 – 1.99	C
2 – 2.99	D
≥ 3	E

5.2 Tap Changers

Tap changers are assessed as an additional component for Power Transformers that have them installed. Replacement or refurbishment of tap changers usually occurs once during the lifetime of a stations transformer, which aligns with the industry average.

Table 5-28 - Tap Changer Health Index

Tap Changer Condition Criteria	W	Condition	Numerical Grade	Max Grade
Dissolved Gas Analysis	4	A - E	4 - 0	16
Oil Quality Tests	3	A, C, E	4, 2, 0	12
Tank Condition	3	A - E	4 - 0	12
Gaskets, Seals and Pressure Relief	2	A, C, E	4, 2, 0	8
LTC Control and Mechanism Cabinet	3	A - E	4 - 0	12
Total Score				**60**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.2.1. Dissolved Gas Analysis

The amount of dissolved gases found in a tap changer depends highly on the tap changer, breathing type, brand of oil, manufacturer, number of operations, and voltage. Proper gas limits must be derived on a case-by-case basis for each tap changer type through historical comparisons.

In the absence of a database, based on historical comparisons, Table 5-29 shall be used to interpret the DGA results in arcing-type LTCs.

Table 5-29: Permissible concentration limits for dissolved gases in arcing-type LTCs (based on the IEEE Std C57.139 – 2010)

Dissolved Gas/Ratio	Concentration Limit (ppm)
Methane (CH_4)	237
Ethylene (C_2H_4)	653
Acetylene (C_2H_2)	1773
Heating gas (TDHG)	1213
Ethylene/Acetylene	0.63
TDHG/Acetylene	1.51

TDHG is the total dissolved heating gas parameter, computed as the sum of the concentrations of ethane, ethylene and methane gasses.

The condition rating for dissolved gas analysis in LTCs is determined based on the permissible gas concentration limits outlined in Table 5-29, as shown in Table 5-30.

Table 5-30: Dissolved gas condition rating for LTCs

Number of dissolved gasses or ratios violating the permissible limits	Condition Grade
None	A
One	B
Two	C
Three	D
Four or more	E

5.2.2. Oil Quality Tests

Table 5-31 summarizes the oil quality test that is recommended by IEC for tap changers. The results of each oil quality test should be interpreted based on the tap changer`s operating voltage. The suggested limits for oil quality tests of in-service tap changers are also included in Table 5-31.

Table 5-31- Tap Changer Oil Quality

Test	Neutral End	Line End		LTC Oil Quality Condition
		≤ 69 kV	> 69 kV	
Dielectric Strength (kV)	> 27	> 35	> 45	A
	≤ 27	≤ 35	≤ 45	E
Water Content (ppm)	< 40	< 30	< 25	A
	≥ 40	≥ 30	≥ 25	E
Corrosive Sulfur	No	No	No	A
	Yes	Yes	Yes	E

5.2.3. Visual Inspections

The following fields are inspected and given an appropriate condition score used for the tap changer’s health index:

- Tank Condition
- Gaskets, Seals, and Pressure Relief Oil
- LTC Control and Mechanism Cabinet

Table 5-32 – Tank Condition

Condition	Visual Inspection Criteria – Tank Condition
A	No rust, deformation, or leaks
B	Normal wear with respect to the number of operations
C	Minor signs of wear with respect to the above characteristics
D	Significant signs of degradation with respect to the above characteristics, but they do not impact safe operation of the tap changer
E	Serious deficiencies with respect to the above listed characteristics requiring repairs

Table 5-33 – Gaskets, Seals, and Pressure Relief

Condition	Visual Inspection Criteria – Gaskets, Seals, and Pressure Relief
A	Gaskets, seals, and pressure relief in new condition
C	Gaskets, seals are loose, requires maintenance
E	Gasket, seals leak oil, replacement of gasket and seals required

Table 5-34 – LTC Control and Mechanism Cabinet

Condition	Visual Inspection Criteria – LTC Control and Mechanism Cabinet
A	Tap changer cabinet and components are in good operating condition, and no corrosion, deformation, leaks, and cracks visible. No external evidence of overheating or switch contact failure.
B	Normal signs of wear with respect to the above characteristics.
C	One or two of the above characteristics are unacceptable.
D	More than two of the above characteristics are unacceptable.
E	More than two characteristics that are unacceptable and cannot be brought into acceptable condition.

5.3 HV SF6 Breakers

The following table represents the total health index weighting and scoring:

Table 5-35: HV SF6 Breakers Health Index

HV SF6 Breakers	W	Condition	Numerical Grade	Max Grade
SF_6 Gas Analysis	3	A-E	4 - 0	12
Coil Signature Test	4	A-E	4 - 0	16
Infrared Scan (IR)	4	A - E	4 - 0	16
Timing Test	3	A,B,D,E	4, 3, 1, 0	12
Contact Resistance	2	A,B,D,E	4, 3, 1, 0	8
Bushing/Support Insulators	4	A-E	4 - 0	16
SF6 Leaks	4	A-E	4 - 0	16
Tank & Mechanism Box	4	A-E	4 - 0	16
Control & Mechanism Components	2	A-E	4 - 0	8
Overall Condition	4	A-E	4 - 0	16
Foundation/Support Steel/Grounding	3	A-E	4 - 0	12
Dewpoint Temperature	4	A-E	4 - 0	16
Operating Counter	2	A,B,D,E	4, 3, 1, 0	8
Insulation Resistance	2	A,E	4,0	8
Service Age	1	A-E	4 - 0	4
Total Score				184

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.3.1. SF_6 Gas Analysis

IEC 60376 ed2.0 cites the maximum recommended humidity limit for SF_6 gas used in electrical equipment as 200 ppm_v. There is no discussion of intermediate moisture volume concentration values, therefore a pass/fail condition rating is presented in for SF_6 gas analysis.

Table 5-36 - Condition ratings based on SF6 gas analysis

Condition	Corresponding condition
A	No abnormal indications, as per IEC specification.
B	High readings on moisture content, air, or CF4.
C	Probable indication of electrical activity (decomposition by-products).
D	Definite indications of electrical activity (decomposition by-products).
E	High levels of abnormal activity that cannot be brought into normal condition.

5.3.2. SF_6 Coil Signature Tests

The coil signature test plots the time dependent current and voltage profiles of the trip and close coil. Results obtained of an in-service station switchgear should not deviate from the profiles provided by the manufacturer or the profiles obtained during the switchgear's commissioning. The condition scores based on the coil signature test results are summarized in Table 5-37.

Table 5-37 - Condition rating based on the SF6 coil signature test results

Condition	Corresponding condition
A	Coil signature values show no degradation from original values.
B	Values within but close to the maximum tolerance limit, with small margin.
C	Values fall beyond the maximum tolerance limit by a small amount.
D	Values significantly beyond the maximum tolerance limit, but the cause is identified and is repairable without major maintenance.
E	Values significantly beyond the maximum tolerance limit, and the cause cannot be identified or cannot be remedied without major maintenance.

5.3.3. Infrared Scanning

The highest measured hot spot temperature is used to calculate the condition rating.

Table 5-38 – HV SF6 Breakers IR scanning

Grade	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 10-20°C)
D	Major Hotspots detected (temperature difference from ambient of 20-40°C)
E	Major Hotspots detected (temperature difference from ambient >40°C)

5.3.4. Timing/Travel Tests

Breaker timing measurements indicate the proper functionality of the SF_6 breaker and consist of measuring the closing and tripping times. The specification limits for SF_6 breaker timing test are shown in Table 5-39 below:

Table 5-39: HV SF6 Breakers Timing Test Parameters

Timing Test Parameter	Specification Limit (ms)		
	U ≤ 69 kV	**110 kV ≤ U ≤ 230 kV**	**U ≥ 345 kV**
Closing Time	250	142	83
Tripping Time	42	42	25

Based on the specification limits outlined in the table above, the condition grading for HV SF_6 breaker timing testing shall be determined based on Table 5-40 below:

Table 5-40: HV SF6 Breakers Condition Grade for Timing Test Measurements

Timing Test Measurement (Tm)	Condition Grade
Tm ≤ 80% of Specification Limit	A
80% of Specification Limit < Tm ≤ 100% of Specification Limit	B
100% of Specification Limit < Tm ≤ 120% of Specification Limit	D
Tm > 120% of Specification Limit	E

5.3.5 Contact Resistance

Breaker contact resistance measurement indicates the proper functionality of the SF_6 breaker and is based on measuring the contact resistance value.

The specification limit for SF_6 breaker contact resistance measurement is shown in Table 5-41 below:

Table 5-41: HV SF6 Breakers Contact Resistance Test Parameters

Contact Resistance Test Parameter	Specification Limit (μΩ)	
	U ≤ 345 kV	**U = 765 kV**
Contact Resistance	150	300

Based on the specification limits outlined in the table above, the condition grading for HV SF_6 contact resistance testing shall be determined based on Table 5-42 below:

Table 5-42: HV SF6 Breakers Condition Grade for Contact Resistance Test Measurements

Contact Resistance Test Measurement (CRm)	Condition Grade
CRm ≤ 80% of Specification Limit	A
80% of Specification Limit < CRm ≤ 100% of Specification Limit	B
100% of Specification Limit < CRm ≤ 120% of Specification Limit	D
CRm > 120% of Specification Limit	E

5.3.6 Dewpoint Temperature

Table 5-43 below outlines the condition grading for HV SF_6 breakers, based on the dewpoint temperature (T_D).

Table 5-43: HV SF6 Breakers Condition Grades for Dewpoint Temperatures

Dewpoint Temperature (T_D)	Dewpoint (ppm)	Condition Grade
$T_D < -30°C$	$Dp < 378$	A
$-25°C \leq T_D \geq -30°C$	$378 \leq Dp < 630$	B
$-15°C \leq T_D > -25°C$	$630 \leq Dp < 1560$	C
$0°C \leq T_D > -15°C$	$1560 \leq Dp < 6096$	D
$T_D > 0°C$	$Dp \geq 6096$	E

5.3.7 Operating Counter

The condition grading for HV SF_6 breaker operating counter shall be determined based on the maximum operating specification limit of 10000, as shown in Table 5-44 below.

Table 5-44: HV SF6 Breakers Condition Grades for Operating Counter

Operating Counter Reading (OCm)	Condition Grade
$OCm \leq 8000$	A
$8000 < OCm \leq 10000$	B
$10000 < OCm \leq 12000$	D
$OCm > 12000$	E

5.3.8 Insulation Resistance

The condition grading for HV SF_6 breakers based on the insulation resistance measured across open contacts is shown in Table 5-45 below (based on NETA MTS – 2019)

Table 5-45: HV SF6 Condition Grade for Insulation Resistance Measurements

Insulation Resistance Measurement (Ir)	Condition Grade
$Ir \geq 100{,}000\ M\Omega$	A
$Ir < 100{,}000\ M\Omega$	E

5.3.9 Service Age

The condition grading for HV SF_6 breakers, based on their age is shown in Table 5-46 below:

Table 5-46: HV SF6 Condition Grade for Breaker Age

HV SF_6 Breaker Age (years)	Condition Grade
0 – 19	A
20 – 29	B
30 – 39	C
40 – 59	D
≥ 60	E

5.3.10. Visual Inspections

The following fields are inspected and given an appropriate condition score:

- Bushing/Support Insulators
- SF6 Leaks
- Tank and Mechanism Box
- Control & Operating Mechanism Components
- Grading Capacitors
- Foundation, Support Steel, Grounding
- General Condition of Circuit Breaker

Table 5-47 – Bushing/Support Insulators

Condition	Visual Inspection Criteria – Bushing/Support Insulators
A	Bushing/Support Insulators are not damaged and are free of chips, cracks, flashover burns, copper splash and copper wash. Cementing and fasteners are secure.
B	Bushing/Support Insulators are not broken or cracked; however, there are some minor surface chips and cracks. No flashover burns or copper splash and copper wash. Cementing and fasteners are secure.
C	Bushing/Support Insulators are not broken or cracked; however, there are major chips and cracks. Come evidence of flashover burns or copper splash or copper wash. Cementing and fasteners are secure
D	Bushing/Support Insulators are broken or damaged to a degree that they require replacement during next scheduled outage.
E	Bushing/Support Insulators are broken or damaged to a degree that they require immediate replacement through emergency repairs.

Table 5-48 – SF6 Leaks

Condition	Visual Inspection Criteria – SF6 Leaks
A	No SF_6 leakage at any of the bushing-metal interfaces, tank or piping interfaces, as determined by inspection of SF_6 pressure gauge and SF_6 refill maintenance records.
B	SF_6 leakage of up to 0.5%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.
C	SF_6 leakage exceeding 1%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.
D	SF_6 leakage exceeding 1.5%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.
E	SF_6 leakage exceeding 2%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill

	maintenance records.

Table 5-49 – Tank and Mechanism Box

Condition	Visual Inspection Criteria – Tank and Mechanism Box
A	No external or internal rust in mechanism box. No paint peeling on tanks or cabinets. Box sealing very effective—no evidence of moisture or insect ingress or condensation.
B	No rust or corrosion on main tank; some evidence of slight moisture ingress or condensation in box.
C	Some rust and corrosion on both tank and on mechanism box. Requires corrective maintenance within the next several months.
D	Significant corrosion on main tank and on mechanism box. Defective sealing leading to water ingress and insects/rodent damage. Requires immediate corrective action.
E	Corrosion, water, insect, or rodent damage or degradation beyond repair.

Table 5-50 – Tank and Mechanism Box

Condition	Visual Inspection Criteria – Tank and Mechanism Box
A	No external or internal rust in mechanism box. No paint peeling on tanks or cabinets. Box sealing very effective—no evidence of moisture or insect ingress or condensation.
B	No rust or corrosion on main tank; some evidence of slight moisture ingress or condensation in box.
C	Some rust and corrosion on both tank and on mechanism box. Requires corrective maintenance within the next several months.
D	Significant corrosion on main tank and on mechanism box. Defective sealing leading to water ingress and insects/rodent damage. Requires immediate corrective action.
E	Corrosion, water, insect, or rodent damage or degradation beyond repair.

Table 5-51 – Control & Operating Mechanism Components

Condition	Visual Inspection Criteria – Control & Operating Mechanism Components
A	Control wiring, terminal blocks, relays, contactors, and switches all in good condition. Operating mechanism, trip and close coils, motors, compressors, and springs all in good condition. No sign of overheating or deterioration. Linkages, drive rods, and trip latches are clean, lubricated, free from corrosion or racks, distortion, abrasion, and obstruction. Mechanical integrity of dampers/dashpots and oil levels is acceptable. No visible evidence of poor mechanism settings, looseness, loss of adjustment, excess bearing wear, or other out of tolerance operation.
B	Normal signs of wear with respect to the above characteristics.
C	One or two of the above indicated characteristics are unacceptable.
D	More than two of the above indicated characteristics are unacceptable.
E	Control and mechanism components are damaged or degraded beyond repair.

Table 5-52 – Grading Capacitors

Condition	Visual Inspection Criteria – Grading Capacitors
A	Capacitor housings are not broken and are free of chips, radial cracks, flashover burns. Cementing and fasteners are secure. No oil leaks.
B	Capacitor housings are not broken; however, minor chips and/or cracks, and/or flashover. Cementing and fasteners are secure. No evidence of oil leak.
C	Capacitor housings are not broken; however, major chips and/or cracks, and/or flashover burns or minor oil leak. Cementing and fasteners are secure.
D	Capacitor housings are broken/damaged, or cementing or fasteners are not secure, or significant oil leak.
E	Capacitor housings, cementing, or fasteners are broken/damaged beyond repair, or major oil leak.

Table 5-53 – Foundation, Support Steel, Grounding

Condition	Visual Inspection Criteria – Foundation, Support Steel, Grounding
A	Concrete foundation is level, free from cracks with no evidence of concrete spalling. Support steel and/or anchor bolts are tight and free from corrosion. Ground grid connections to the tank are secure; cabinet supports are free of corrosion.
B	Normal signs of wear with respect to the above characteristics.
C	One of the above characteristics is unacceptable.
D	Two or more of the above characteristics are unacceptable.
E	Foundation, supports, or grounding are damaged/degraded beyond repair.

Table 5-54 – General Condition of Circuit Breaker

Condition	Visual Inspection Criteria – General Condition of Circuit Breaker
A	Breaker/Recloser is externally clean and corrosion free. All connections are in good condition. No external evidence of overheating. Counter readings for number of breaker operations and run timer readings on auxiliary motors are in the below average range for the age of the breaker. Appears to be well maintained with service records readily available.
B	Normal signs of wear with respect to the above characteristics.
C	One or two of the above indicated characteristics are unacceptable.
D	More than two of the above indicated characteristics are unacceptable.
E	The circuit breaker is damaged or degraded beyond repair.

5.4 Circuit Switchers

The following table represents the total health index weighting and scoring:

Table 5-55 - Circuit Switcher Health Index

Circuit Switcher Condition Criteria	W	Condition	Numerical Grade	Max Grade
Timing/Travel Tests	3	A-E	4 - 0	12
Contact Resistance	3	A,B,D,E	4 - 0	12
Infrared (IR) Scans	6	A,C,E	4, 2, 0	24
Insulators/Porcelains	3	A-E	4 - 0	12
Drive Train Assembly	4	A-E	4 - 0	16
Motor Operator and Controls	3	A-E	4 - 0	12
Disconnect Live Parts	3	A-E	4 - 0	12
Connectors and Conductors	3	A-E	4 - 0	12
Foundation/Support Steel/Grounding	3	A-E	4 - 0	12
Total Score				**124**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.4.1. Timing/Travel Tests

Timing/travel tests are performed on the station circuit switchers and the following results are assessed:

- Close travel, wipe, over-travel, rebound, and time are all within specified limits
- Trip time and velocity are within specified limits
- Trip-free time is within specified limits

The following condition ratings are applied in Table 5-56:

Table 5-56 - Time/ Travel Tests

Condition	Time/ Travel tests
A	Close travel and time of interrupter and disconnect blade are all within specified limits. Trip time and velocity, with/without shunt trip, are within specified limits. Inter-pole spreads are within limits.
B	Minor change in time/travel characteristics from the original settings.
C	Significant change in time/travel characteristics from the original settings, but all parameters still within safe operating range.
D	Significant degradation in time travel characteristics, requiring further investigations or repairs/replacement during the next scheduled outage.

E	Major degradation in time /travel characteristics, requiring immediate repairs or replacement of components.

5.4.2. Contact Resistance

The station circuit switchers contact resistance is measured and compared against a specified value. The following condition ratings are applied:

Table 5-57 - Contact Resistance

Condition	Contact Resistance
A	Contact resistance values well within OEM specifications with significant margins (≤80% of OEM Specification).
B	Only minor degradation in contact resistance values from original (new) Conditions (80% to 100% of OEM Specification).
D	Values do not meet specifications, requiring further investigations or component replacement during the next scheduled outage (100% to 120% of OEM Specification).
E	Major degradation in contact resistance values, requiring immediate replacement of components (>120% of OEM Specification).

5.4.3. Infrared Scan

The highest measured hot spot temperature is used to calculate the condition rating.

Table 5-58 - Infrared Scans (IR)

Condition	Infrared Scans (IR)
A	No Hotspots found during Infrared Scan.
C	Hotspots discovered, requiring remedial work during next planned outage.
E	Major hotspots discovered, requiring emergency repairs or replacement.

5.4.4. Visual Inspections

The following fields are inspected and given an appropriate condition score used for the circuit switchers' health index:

- Insulators/Porcelains Bushing condition
- Drive Train Assembly
- Motor Operator and Controls
- Disconnect Live Parts
- Connectors and Conductor Condition
- Foundation/ support steel/ grounding

Table 5-59 – Insulators/Porcelains

Condition	Visual Inspection Criteria – Insulators/Porcelains
A	Insulators' porcelains are not damaged and are free of chips, cracks, flashover burns, copper splash and copper wash. Cementing and fasteners are secure.
B	Insulators' porcelains are not broken or cracked; however, there are some minor surface chips and cracks. No flashover burns or copper splash and copper wash. Cementing and fasteners are secure.
C	Insulators' porcelains are not broken or cracked; however, there are major chips and cracks. Come evidence of flashover burns or copper splash or copper wash. Cementing and fasteners are secure
D	Insulators' porcelains are broken or damaged to a degree that they require replacement during next scheduled outage.
E	Insulators' porcelains are broken or damaged to a degree that they require immediate replacement through emergency repairs.

Table 5-60 – Drive Train Assembly

Condition	Visual Inspection Criteria – Drive Train Assembly
A	Linkages, levers, shafts, pipes, couplers, gearboxes, stops are clean, free from corrosion, cracks, distortion, abrasion or obstruction. All fasteners are tight. No visible evidence of poor settings, stops/toggle, looseness, loss of adjustment, excess bearing wear or other out-of-tolerance operation.
B	Minor signs of wear with respect to the above listed deficiencies.
C	Significant signs of wear with respect to the above listed deficiencies, but the deficiencies are not critical to the safe operation of the circuit switcher.
D	Drive train assembly components performance degraded, requiring replacement/repairs during the next scheduled outage.
E	Drive train assembly components damaged/degraded beyond repair, requiring immediate replacement.

Table 5-61 – Motor Operator and Controls

Condition	Visual Inspection Criteria – Motor Operator and Controls
A	Wiring, Terminal blocks, relays, contactors and switches are all in good condition. Operating motor, coils, relays, shunt trip (if applicable), auxiliary switches, position indicators, and counters are all in good condition. No sign of overheating or deterioration. No evidence of moisture or condensation or insect ingress into control cabinet.
B	Normal Signs of wear of control components, based on above listed characteristics.
C	Significant wear of control components based on the above listed characteristics, but it does not affect safe operation of the circuit switcher.
D	Unacceptable level of degradation of control components, based on the above listed characteristics, requiring component replacement/repairs during the next scheduled outage.

E	Switch operator controls defective, damaged, or degraded, requiring immediate replacement.

Table 5-62 – Disconnect Live Parts

Condition	Visual Inspection Criteria – Disconnect Live Parts
A	Disconnect blades are not misaligned, exhibits no excessive corrosion or erosion, especially at the fault closing (jaw) end. Contact engagement is within tolerance.
B	Minor signs of wear of the insolating disconnect, based on above listed characteristics.
C	Significant degradation of the disconnect blades, but it does not impact safe operation of the isolator.
D	Major degradation of the disconnecting blades, requiring repairs or replacement during the next scheduled outage.
E	Disconnect blades or contacts damaged/degraded to the point where they require immediate replacement.

Table 5-63 – Connectors and Conductor Condition

Condition	Visual Inspection Criteria – Connectors and Conductor Condition
A	All connectors are tight, free from corrosion and show no sign of overheating. Line conductors are adequately supported and impose no excessive loading on switcher during normal or fault interrupting duty.
B	Minor signs of wear with respect to the above characteristics.
C	Significant signs of degradation with respect to the above characteristics, but they do not impact safe operation of the circuit switcher.
D	Major deficiencies with respect to the above listed characteristics requiring repairs during the next scheduled outage.
E	Major deficiencies with respect to the above listed characteristics requiring immediate repairs or replacement.

Table 5-64 – Foundation/ support steel/ grounding

Condition	Visual Inspection Criteria – Foundation/ support steel/ grounding
A	Concrete foundation is level and free from cracks and spalling. Support Steel and/or anchor bolts are tight and free from distortion and corrosion. Ground connections are free of damage and corrosion and are made directly to cabinet and supports without any intervening paint or corrosion.
B	Signs of minor wear with respect to the above characteristics.
C	Signs of significant wear with respect to the above characteristics, but they do not impact safe operation of the switcher.
D	Major concerns with respect to the above listed deficiencies, requiring remedial work during the next scheduled outage.
E	Foundation, supports and grounding damaged/degraded beyond repair, requiring immediate remedial work.

5.5 Metalclad Breakers

The following table represents the total health index weighting and scoring:

Table 5-65 - Metalclad Breaker Health Index

Metalclad Breakers Condition Criteria	Breakers Type	W	Condition	Numerical Grade	Max Grade
Timing Test	All	3	A,B,D,E	4,3,1,0	12
Contact Resistance Test	All	4	A,B,D,E	4,3,1,0	16
Vacuum Bottle Integrity	Vac	5	A-E	4 - 0	20
Oil Analysis	Oil	2	A-E	4 - 0	8
Evidence of Oil leaks	Oil	2	A-E	4 - 0	8
SF6 Gas Tests	SF_6	3	A-E	4 - 0	12
SF6 Coil Signature	SF_6	3	A-E	4 - 0	12
SF6 Leaks	SF_6	2	A-E	4 - 0	8
Arc Chute Condition	Air	3	A-E	4 - 0	12
Metalclad Cubicle and Components	All	3	A-E	4 - 0	12
Breaker Truck Condition	All	3	A-E	4 - 0	12
Operating Mechanism and Controls	All	2	A-E	4 - 0	8
Visual Inspections	All	4	A-E	4 - 0	16
Operating Counter	All	2	A,B,D,E	4,3,1,0	8
Insulation Resistance	All	2	A,E	4,0	8
Service Age	All	1	A-E	4 - 0	4
Total Score			**108-128**		

Note that the total score will based on the criteria associated with the type of breaker being evaluated

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.5.1. Timing/Travel Tests

Breaker timing measurements indicate the proper functionality of a given breaker type and consist of measuring the closing and tripping times. The specification limits for the various types of breakers, with respect to timing test are shown in the tables below:

SF_6 Breaker:

Table 5 -66: Metalclad SF6 Breaker Timing Test Parameters

Timing Test Parameter	Specification Limit (ms)
	U ≤ 69 kV
Closing Time	250
Tripping Time	42

Oil Breaker:

Table 5 -67: Metalclad Oil Breaker Timing Test Parameters

Timing Test Parameter	Specification Limit (ms)
	U ≤ 69 kV
Closing Time	250
Tripping Time	42

Air-Blast Breaker:

Table 5 -68: Metalclad Air Breaker Timing Test Parameters

Timing Test Parameter	Specification Limit (ms)
	U ≤ 230 kV
Closing Time	140
Tripping Time	42

Based on the specification limits outlined in the tables above, the condition grading for breaker timing testing shall be determined based on the table below:

Table 5 -69: Condition Grade of Metalclad Breakers for Timing Test Parameters

Timing Test Measurement (Tm)	Condition Grade
Tm ≤ 80% of Specification Limit	A
80% of Specification Limit < Tm ≤ 100% of Specification Limit	B
100% of Specification Limit < Tm ≤ 120% of Specification Limit	D
Tm > 120% of Specification Limit	E

5.5.2 Contact Resistance

Breaker contact resistance measurement indicates the proper functionality of the various breaker types and is based on measuring the contact resistance value.

The specification limit for all breaker type contact resistance measurements is shown in the table below:

Table 5 -70: Contact Resistance Specification Limits for Metalclad Breakers

Circuit Breaker Type	Specification Limit (μΩ)
	U ≤ 69 kV
Oil	300
SF_6	150
Air-blast	250
Vacuum and Air Magnetic	250

Based on the specification limits outlined in the table above, the condition grading for contact resistance testing of all breaker types shall be determined based on the table below:

Table 5 -71: Condition Grade of Metalclad Breakers for Contact Resistance Test Measurements

Contact Resistance Test Measurement (CRm)	Condition Grade
CRm ≤ 80% of Specification Limit	A
80% of Specification Limit < CRm ≤ 100% of Specification Limit	B
100% of Specification Limit < CRm ≤ 120% of Specification Limit	D
CRm > 120% of Specification Limit	E

5.5.13 Operating Counter

The maximum operating counter specification limit for the different breaker types is shown in the table below:

Table 5 -72: Maximum Operating Counter Limit for Metalclad Breakers

Circuit Breaker Type	Maximum Operating Counter Limit
Oil	2000
Air magnetic	5000
SF_6	10000
Air blast	10000
Vacuum	20000

The condition grading for the operating counter, based on the operating counter limits for the different breaker types is shown in the table below:

Table 5 -73: Operating Counter Reading for Metalclad Breakers

Operating Counter Reading (OCm)	Condition Grade
OCm ≤ 80% of maximum operating counter limit	A
80% of maximum operating counter limit <OCm ≤ 100% of maximum operating	B

counter limit	
100% of maximum operating counter limit < OCm ≤ 120% of maximum operating counter limit	D
OCm > 120% of maximum operating counter limit	E

5.5.14 Insulation Resistance

The minimum insulation resistance limit for the different breaker types is shown in the table below, based on the breaker voltage (based on the NETA MTS – 2019):

Table 5 -74: Minimum Insulation Resistance Limit for Metalclad Breakers

Breaker Rated Voltage (kV)	Minimum Insulation Resistance Limit (MΩ)
5	1500
8	2500
15	5000
25	10000
34	100000
≥ 46	100000

The condition grading for all breakers based on the insulation resistance measured across open contacts is shown in the table below (based on the NETA MTS – 2019):

Table 5 -75: Condition Grade of Metalclad Breakers for Insulation Resistance Measurements

Insulation Resistance Measurement (Ir)	Condition Grade
Ir ≥ Minimum insulation resistance limit	A
Ir < Minimum insulation resistance limit	E

5.5.15 Service Age

The condition grading for metalclad breakers, based on their age is shown in the table below:

Table 5 -76: Condition Grade of Metalclad Breakers for Metalclad Breaker Age

Metalclad Breaker Age (years)	Condition Grade
0 – 19	A
20 – 29	B
30 – 39	C
40 – 59	D
≥ 60	E

5.5.3. Oil Quality Tests

The results of each oil quality test should be interpreted based on the Circuit Breakers' operating voltage and recommendations from the manufacturer for oil quality.

Table 5-77 - Circuit Breaker Oil Condition

Condition	Corresponding condition
A	From assessing dielectric strength, moisture content, acidity, and DGA, Fluid and DGA analysis indicate good condition.
B	Minor deviations from acceptable levels and minor possibility of abnormal conditions.
C	One test beyond acceptable limits and indication of some abnormal conditions.
D	Two or more tests beyond acceptable limits and definite abnormal conditions.
E	Extremely poor insulation condition requiring immediate actions.

5.5.4. SF_6 Gas Tests

IEC 60376 ed2.0 cites the maximum recommended humidity limit for SF_6 gas used in electrical equipment as 200 ppm_v. There is no discussion of intermediate moisture volume concentration values, therefore a pass/fail condition rating is presented in for SF_6 gas analysis.

Table 5-78: Condition ratings based on SF_6 gas analysis

Condition	Corresponding condition
A	No abnormal indications, as per IEC specification.
B	High readings on moisture content, air, or CF4.
C	Probable indication of electrical activity (decomposition by-products).
D	Definite indications of electrical activity (decomposition by-products).
E	High levels of abnormal activity that cannot be brought into normal condition.

5.5.5. SF_6 Coil Signature Tests

The coil signature test plots the time dependent current and voltage profiles of the trip and close coil. Results obtained of an in-service station switchgear should not deviate from the profiles provided by the manufacturer or the profiles obtained during the switchgear's commissioning. The condition scores based on the coil signature test results are summarized in Table 5-79.

Table 5-79: Condition rating based on the SF_6 coil signature test results

Condition	Corresponding condition
A	Coil signature values show no degradation from original values.
B	Values within but close to the maximum tolerance limit, with small margin.
C	Values fall beyond the maximum tolerance limit by a small amount.
D	Values significantly beyond the maximum tolerance limit, but the cause is identified and is repairable without major maintenance.
E	Values significantly beyond the maximum tolerance limit, and the cause cannot be identified or cannot be remedied without major maintenance.

5.5.6. General Condition

The following fields are inspected and given an appropriate condition score used for the circuit breaker's health index:

- Vacuum Bottle Integrity (Vacuum Breakers only)
- Evidence of Oil leaks (Oil Breakers only)
- SF6 Leak (SF6 Breakers only)
- Arc Chute Condition (Air Breakers only)
- Metalclad Cubicle and Components
- Breaker Truck Condition
- Operating Mechanism and Controls
- Connectors and Conductor Condition
- Visual Inspections

Table 5-80 – Evidence of Oil Leaks

Condition	Visual Inspection Criteria – Evidence of Oil Leaks
A	No evidence of leaks; acceptable oil levels
B	Minor oil leaks exist, but moisture ingress unlikely
C	Clear evidence of oil leaks, but low rate of loss
D	Significant oil leakage and probable moisture ingress
E	Major oil leakage and moisture ingress; beyond repair

Table 5-81 – Vacuum Bottle Integrity

Condition	Visual Inspection Criteria – Vacuum Bottle Integrity
A	No sign of contaminants, chips, and cracks, flashover burns, overheating, or PD traces. Cemented elements are secure.
B	Normal signs of wear with respect to the above characteristics.
C	One of the above indicated characteristics is unacceptable.
D	Two or more of the above indicated characteristics are unacceptable.
E	Two or more of the above characteristics are unacceptable and cannot be brought into acceptable condition.

Table 5-82 – SF6 Leaks

Condition	Visual Inspection Criteria – SF6 Leaks
A	No SF_6 leakage at any of the bushing-metal interfaces, tank or piping interfaces, as determined by inspection of SF_6 pressure gauge and SF_6 refill maintenance records.
D	SF_6 leakage of up to 2%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.
E	SF_6 leakage exceeding 2%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.

Table 5-83 – Arc Chute Condition

Condition	Visual Inspection Criteria – Arc Chute Condition
A	Clean and free of chips, cracks, and flashover burns; fasteners are secure
B	Clean, but some minor chips and cracks; no flashovers; fasteners are secure
C	Major chips and cracks; flashovers or tracking; fasteners are secure
D	Broken/damaged or fasteners not secure
E	Broken/damaged beyond repair

Table 5-84 – Metalclad Cubicle and Components

Condition	Visual Inspection Criteria – Metalclad cubicle and components
A	Cubicle doors, hinges, and latches, Bus shutters and interlocks, Installation protected from dust, high humidity, and high temperatures are all in good condition.
B	Normal signs of wear with respect to the above characteristics.
C	One of the above indicated characteristics is unacceptable.
D	Two or more of the above indicated characteristics are unacceptable.
E	Two or more of the above characteristics are unacceptable and cannot be brought into acceptable condition.

Table 5-85 – Breaker Truck

Condition	Visual Inspection Criteria – Breaker Truck
A	Floor is level, Support steel and anchor bolts tight and free from corrosion, Ground connections free of damage and corrosion, Moves freely without obstructions
B	Normal signs of wear with respect to the above characteristics.
C	One of the above indicated characteristics is unacceptable.
D	Two or more of the above indicated characteristics are unacceptable.
E	Two or more of the above characteristics are unacceptable and cannot be brought into acceptable condition.

Table 5-86 – Operating Mechanism and Controls

Condition	Visual Inspection Criteria – Operating Mechanism and Controls
A	Wiring, terminal blocks, relays, contactors, and switches, Trip and close coils, relays, auxiliary switches, motors, and springs, and Linkages, shafts, rods, and trip latches are all in good condition. No visible evidence of poor mechanism settings or other out of tolerance operations. No signs of overheating or deterioration
B	Normal signs of wear with respect to the above characteristics.
C	One of the above indicated characteristics is unacceptable.
D	Two or more of the above indicated characteristics are unacceptable.
E	Two or more of the above characteristics are unacceptable and cannot be brought into acceptable condition.

Table 5-87 – Visual Inspections of Circuit Breaker

Condition	Visual Inspection Criteria – General Condition of Circuit Breaker
A	Breaker is clean and corrosion free, Primary and secondary connections are in good condition. No overheating or restriking. Number of breaker operations is in the below average range for its age. Appears well maintained with service records readily available
B	Normal signs of wear with respect to the above characteristics.
C	One of the above indicated characteristics is unacceptable.
D	Two or more of the above indicated characteristics are unacceptable.
E	Two or more of the above characteristics are unacceptable and cannot be brought into acceptable condition.

5.6 Oil Reclosers

The following table represents the total health index weighting and scoring:

Table 5-88 - Oil Reclosers Health Index

Oil Reclosers Condition Criteria	W	Condition	Numerical Grade	Max Grade
Infrared (IR) Scan	4	A-E	4 - 0	16
Condition of Oil	2	A-E	4 - 0	8
Service Age	3	A-E	4 - 0	12
Oil Leaks	2	A-E	4 - 0	8
Condition of Tank/Enclosure	3	A-E	4 - 0	12
Condition of Terminations	2	A-E	4 - 0	8
Counter Readings	3	A-E	4 - 0	12
Condition of Operating Mechanism and Controls	2	A-E	4 - 0	8
Total Score				**84**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

5.6.1. Infrared (IR) Scan

The highest measured hot spot temperature is used to calculate the condition rating.

Table 5-89 - Infrared Scans (IR)

Condition	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 10-20°C)
D	Major Hotspots detected (temperature difference from ambient of 20-40°C)
E	Major Hotspots detected (temperature difference from ambient >40°C)

5.6.2. Service

The service age is determined based on the manufacturer nameplate.

Table 5-90 - Age of Recloser

Condition	Corresponding condition
A	0 to 10 years
B	11 to 20 years
C	21 to 30 years
D	31 to 40 years
E	41 years or older

5.6.3. Visual Inspections

The following fields are inspected and given an appropriate condition score used for the oil recloser's health index:

- Evidence of Oil Leaks
- Condition of Tank/Enclosure
- Condition of Terminations
- Counter Readings
- Condition of Operating Mechanism and Controls

Table 5-91 – Evidence of Oil Leaks

Condition	Visual Inspection Criteria – Oil Leaks
A	No evidence of oil leakage at any of the bushing-metal interfaces, flanges, manholes, covers, breathers, pipes, or gauges. Oil levels are acceptable.
B	Minor oil leaks exist, but no moisture ingress likely.
C	Clear evidence of oil leaks, but rate of loss is not likely to cause any operational or environmental impacts.
D	Significant oil leakage and probable moisture ingress indicate immediate need for a major reconditioning or replacement.
E	Major oil leakage and moisture ingress resulting in damage/degradation beyond repair.

Table 5-92 – Condition of Tank/Enclosure

Condition	Visual Inspection Criteria – Condition of Tank/Enclosure
A	No rust or corrosion on main tank. No external or internal rust on cabinets. No rust, corrosion or paint peeling on tanks or cabinets. Door sealing very effective – no evidence of moisture or insect ingress or condensation.
B	Minor rust or corrosion on main tank. No evidence of moisture ingress or condensation in mechanism box.
C	Some rust and corrosion on both tank and mechanism box and/or evidence of minor moisture leak or condensation. Requires corrective maintenance within the next several months.
D	Significant corrosion on main tank and on mechanism box. Defective sealing leading to water ingress and insects/rodent damage. Requires immediate corrective action.
E	Corrosion, water, insect, or rodent damage or degradation beyond repair.

Table 5-93 – Condition of Termination

Condition	Visual Inspection Criteria – Condition of Termination
A	Terminations are tight, free from corrosion and show no sign of overheating. Cables are adequately supported and impose no excessive loading on switchgear during normal or fault interrupting duty
B	Minor signs of wear with respect to the above characteristics
C	Significant signs of degradation with respect to the above characteristics, but they do not impact safe operation of the switchgear
D	Major deficiencies with respect to the above listed characteristics requiring repairs during the next scheduled outage
E	Major deficiencies with respect to the above listed characteristics requiring immediate repairs or replacement

Table 5-94– Counter Readings

Condition	Visual Inspection Criteria – Counter Readings
A	Counter readings for number of recloser operations and run timer readings on auxiliary motors are in the below average range for the age of the recloser. Appears to be well maintained with service records readily available.
B	Minor signs of wear with respect to the above characteristics
C	Significant signs of degradation with respect to the above characteristics, but they do not impact safe operation of the switchgear
D	Major deficiencies with respect to the above listed characteristics requiring repairs during the next scheduled outage
E	Major deficiencies with respect to the above listed characteristics requiring immediate repairs or replacement

Table 5-95 – Operating Mechanism and Control

Condition	Visual Inspection Criteria – Operating Mechanism and Controls
A	Control wiring, terminal blocks, relays, contactors, and switches all in good condition. Operating mechanism, trip and close coils, motors, compressors, and springs all in good condition. No sign of overheating or deterioration. Linkages, drive rods, and trip latches are clean, lubricated, free from corrosion or racks, distortion, abrasion, and obstruction. Mechanical integrity of dampers/dashpots and oil levels is acceptable. No visible evidence of poor mechanism settings, looseness, loss of adjustment, excess bearing wear, or other out of tolerance operation.
B	Normal signs of wear with respect to the above characteristics.
C	One or two of the above indicated characteristics are unacceptable.
D	More than two of the above indicated characteristics are unacceptable.
E	Control and mechanism components are damaged or degraded beyond repair.

6 Overhead Assets

6.1. Wood Poles

The following table represents the total health index weighting and scoring:

Table 6-1: Wood Poles Health Index

Wood Pole Condition Criteria	W	Condition	Numerical Grade	Max Grade
Pole Age	5	A - E	4 - 0	20
Remaining Pole Strength	17	(% of Remaining Strength) x 4		68
Crossarm Condition	2	A, C, E	4, 2, 0	8
Insect Infestation	1	A, C	4, 2	4
Pole Top Condition	5	A, C, E	4, 2, 0	20
Shell Condition	5	A, C, E	4, 2, 0	20
Wood Pecker Damage	5	A, C, E	4, 2, 0	20
Total Score				**160**

A sensitivity analysis was performed using a few other combinations of new weights and the weighting outlined in the table above was found to be the optimal one.

Wood poles with reduced estimated remaining strength (<30%) to have their health index score modified to schedule the pole for accelerated replacement, when the health index score is above 50%.

A gating technique shall be applicable to those poles that have been drill tested, with ≤ 30% remaining strength and a HI score above 50% (by dividing the HI result by 2).

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

6.1.1. Pole Age

Assuming an average wood pole life expectancy of 53 years, condition scores shown in Table 6-2 are applied to a wood pole's age.

Table 6-2: Pole age condition score

Condition	Pole Age
A	0 to 9 years
B	10 to 29 years
C	30 to 39 years
D	40 to 49 years
E	Greater than or equal to 50 years

If the pole age is unknown, but the pole has been drill tested, then the remaining pole strength has been used to estimate the age (as an effective age) based on the criteria shown in the table below:

Table 6-3: Effective Pole age Remaining Strength

Remaining Pole Strength (%)	Effective Pole Age (years)
90-100	5
84-89	15
78-83	25
72-77	35
65-71	45
59-64	55
53-58	65
47-52	75
41-46	85
<=40	95

If the pole age is unknown, but the pole has not been drill tested, then a truncated overall HI has been computed by dropping pole age and remaining pole strength while retaining the rest of the condition parameters.

Based on the overall condition assessment coming from the truncated HI approach, the pole age has been estimated as follows:

Table 6-4: Effective Pole age truncated overall condition

Overall Condition - Truncated HI Approach	Effective Pole Age (years)
Very Good	35
Good	
Fair	45
Poor	
Very Poor	55

6.1.2 Remaining Strength

Table 6-5: Remaining Strength

Condition	Corresponding condition
Estimated Remaining Strength (Expressed between 0% and 100%)	4 × (% of Estimated Remaining Strength)

For poles that have not been drill tested and with a known age, the age has been used to estimate the remaining pole strength using the table below:

Table 6-6: Estimated pole strength age

Age	Estimated Pole Strength
0	95.25%
1	94.64%
2	94.03%
3	93.42%
4	92.81%
5	92.20%
6	91.59%
7	90.98%
8	90.37%
9	89.76%
10	89.15%
11	88.54%
12	87.93%
13	87.32%
14	86.71%
15	86.10%
16	85.49%
17	84.88%
18	84.27%
19	83.66%
20	83.05%
21	82.44%
22	81.83%
23	81.22%
24	80.61%
25	80.00%
26	79.39%
27	78.78%
28	78.17%
29	77.56%
30	76.95%
31	76.34%
32	75.73%
33	75.12%
34	74.51%
35	73.90%
36	73.29%
37	72.68%
38	72.07%
39	71.46%

Age	Estimated Pole Strength
40	70.85%
41	70.24%
42	69.63%
43	69.02%
44	68.41%
45	67.80%
46	67.19%
47	66.58%
48	65.97%
49	65.36%
50	64.75%
51	64.14%
52	63.53%
53	62.92%
54	62.31%
55	61.70%
56	61.09%
57	60.48%
58	59.87%
59	59.26%
60	58.65%
61	58.04%
62	57.43%
63	56.82%
64	56.21%
65	55.60%
66	54.99%
67	54.38%
68	53.77%
69	53.16%
70	52.55%
71	51.94%
72	51.33%
73	50.72%
74	50.11%
75	49.50%
76	48.89%
77	48.28%
78	47.67%
79	47.06%
80	46.45%

Age	Estimated Pole Strength
81	45.84%
82	45.23%
83	44.62%
84	44.01%
85	43.40%
86	42.79%
87	42.18%
88	41.57%
89	40.96%
90	40.35%
91	39.74%
92	39.13%
93	38.52%
94	37.91%
95	37.30%
96	36.69%
97	36.08%
98	35.47%
99	34.86%
100	34.25%
101	33.64%
102	33.03%
103	32.42%
104	31.81%
105	31.20%
106	30.59%
107	29.98%
108	29.37%
109	28.76%
110	28.15%
111	27.54%
112	26.93%
113	26.32%
114	25.71%
115	25.10%
116	24.49%
117	23.88%
118	23.27%
119	22.66%
120	22.05%

6.1.3 Visual Inspections

The following fields are inspected and given an appropriate condition score used for the wood poles' health index

- Crossarm Condition
- Insect Infestation
- Pole Top Condition
- Shell Condition
- Wood Pecker Damage

Table 6-7 – Crossarm Condition

Condition	Visual Inspection Criteria – Crossarm Condition
A	Good, normal, no problem / No Crossarm / Unknown
C	Fair, some deterioration
E	Bad, schedule for replacement

Table 6-8 – Insect Infestation

Condition	Visual Inspection Criteria – Insect Infestation
A	No insect infestation detected / Unknown
C	Insect infestation observed

Table 6-9– Pole Top Condition

Condition	Visual Inspection Criteria – Pole Top Condition
A	Good, normal, no problem / Unknown
C	Fair, some deterioration
E	Bad, significant deterioration

Table 6-10 – Shell Condition

Condition	Visual Inspection Criteria – Shell Condition
A	Good, normal, no problem / Unknown
C	Fair, some deterioration
E	Bad, significant deterioration

Table 6-11 – Wood Pecker Damage

Condition	Visual Inspection Criteria – Wood Pecker Damage
A	Good, none visible or minor surface damage / Unknown
C	Fair, moderate repairable damage
E	Bad, severe damage

6.2 Critical Load Break Switches - Manual Controlled

The following table represents the total health index weighting and scoring:

Table 6-12: Manual Controlled Loadbreak Switches Health Index

Manual Controlled Loadbreak Switches Condition Criteria	W	Condition	Numerical Grade	Max Grade
Service Age	4	A - E	4 - 0	16
Infrared (IR) Scan	4	A - E	4 - 0	16
Condition of Insulators	2	A - E	4 - 0	8
Condition of Blades	2	A - E	4 - 0	8
Condition of Operating Mechanism	2	A - E	4 - 0	8
Total Score				**56**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

6.2.1 Service Age

Table 6-13 – Service Age

Condition	Corresponding condition
A	0 to 10 years
B	11 to 20 years
C	21 to 30 years
D	31 to 40 years
E	40 years or over

6.2.2. Infrared Scan

The highest measured hot spot temperature is used to calculate the condition rating.

Table 6-14 - Infrared Scans (IR)

Condition	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 11-20°C)
D	Major Hotspots detected (temperature difference from ambient of 21-40°C)
E	Major Hotspots detected (temperature difference from ambient >40°C)

6.2.3. Visual Inspections

The following fields are inspected and given an appropriate condition score used for the manual

controlled loadbreak switches' health index:

- Condition of Insulators
- Condition of blades
- Condition of operating mechanism

Table 6-15 – Condition of Insulators

Condition	Visual Inspection Criteria – Condition of Insulators
A	Insulators are not broken and are free of chips, radial cracks, flashover burns, copper splash and copper wash. Cementing and fasteners are secure
B	Insulators are not broken, however there are some minor chips and cracks. No flashover burns or copper splash or copper wash. Cementing and fasteners are secure
C	Insulators are not broken, however there are some major chips and cracks. Some evidence of flashover burns or copper splash or copper wash. Cementing and fasteners are secure
D	Insulators are broken/damaged or cementing or fasteners are not secure
E	Insulators, cementing or fasteners are broken/damaged beyond repair

Table 6-16 – Condition of Blades

Condition	Visual Inspection Criteria – Condition of Blades
A	Blades are clean, free from corrosion, cracks, distortion, abrasion or obstruction. All fasteners are tight. No visible evidence of looseness, loss of adjustment, or excess bearing wear
B	Minor signs of wear with respect to the above listed deficiencies.
C	Significant signs of wear with respect to the above listed deficiencies, but the deficiencies are not critical to the safe operation of the switch
D	Blades are degraded requiring replacement during the next scheduled outage
E	Blades are damaged/degraded beyond repair, requiring immediate replacement

Table 6-17 – Condition of Operating Mechanism

Condition	Visual Inspection Criteria – Condition of Operating Mechanism
A	Operating mechanism is in good condition and all parts are moving with adequate speed. No evidence of rust or friction in moving parts
B	Normal signs of wear of operating mechanism with the respect to the above listed characteristics
C	Significant wear of operating mechanism based on the above listed characteristics, but it does not affect safe operation of the disconnect switch
D	Unacceptable level of degradation of operating mechanism based on the above listed characteristics, requiring component replacement/repairs during the next scheduled outage
E	Switch operating mechanism defective, damaged, or degraded, requiring immediate replacement

6.3 Polemounted Transformers

The following table represents the total health index weighting and scoring:

Table 6-18: Polemounted Transformer Health Index

Polemounted Transformer Condition Criteria	W	Condition	Numerical Grade	Max Grade
Service Age	3	A - E	4 - 0	12
Infrared (IR) Scan	4	A - E	4 - 0	16
Visual Inspection	4	A, C, E	4, 2, 0	16
Total Score				**44**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

6.3.1 Service Age

Table 6-19 – Service Age

Condition	Corresponding condition
A	0 to 9 years
B	10 to 19 years
C	20 to 29 years
D	30 to 39 years
E	40 years or older

6.3.2. Infrared Scan

The highest measured hot spot temperature is used to calculate the condition rating.

Table 6-20 – Polemounted Transformer Infrared Scans (IR)

Condition	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 11-20°C)
D	Major Hotspots detected (temperature difference from ambient of 21-40°C)
E	Major Hotspots detected (temperature difference from ambient >40°C)

6.3.3. Visual Inspections

Table 6-21 - Visual Inspection Criteria Polemounted Transformer

Condition	Visual Inspection Criteria
A	No rust on tank, no damage to bushings, no sign of oil leaks

B	Only one of the following defects: Minor rust, or minor cracks in bushings or minor oil leak
C	Two or more of the above indicated defects present but do not impact safe operation
D	Tank badly rusted or major damage to bushing or major oil leak
E	Two or more of the above indicated defects

7 Underground Assets

7.1. PILC Cable

The following table represents the total health index weighting and scoring:

Table 7-1 - Health Index Formulation for PILC Cables

PILC Cable Condition Criteria	W	Condition	Numerical Grade	Max Grade
Service Age	4	A - E	4 - 0	16
Cable Failure Rate	5	A - E	4 - 0	20
Peak Loading History	1	A - E	4 - 0	4
Average Loading History	1	A - E	4 - 0	4
Total Score				**44**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

7.1.1 Service Age

Table 7-2 - PILC Age Criteria Description

Condition	Corresponding condition
A	Under 15 years of service
B	15 to 30 years of service
C	31 to 45 years of service
D	46 to 65 years of service
E	Over 65 years of service

7.1.2 Cable Failure Rates

Table 7-3 - PILC Failure Criteria Description

Condition	Cable Failure Rate
A	No cable segment failures per year
B	1 cable segment failure per year
C	2 cable segment failures per year
D	3 cable segment failures per year
E	More than 3 cable segment failures per year

7.1.3 Peak Loading History

The condition grading for peak loading history, is based on dividing the yearly peak loading with the permissible PILC cable rating, as shown in the table below:

Table 7-4 – Peak Loading Condition

Peak Loading Ratio	Condition Grade
< 0.1	A
0.1 – 0.5	B
0.5 – 0.75	C
0.75 – 1	D
≥ 1	E

7.1.4 Average Loading History

The condition grading for average loading history, is based on dividing the yearly average loading with the permissible PILC cable rating, as shown in the table below:

Table 7-5 – Average Loading Condition

Average Loading Ratio	Condition Grade
< 0.1	A
0.1 – 0.5	B
0.5 – 0.75	C
0.75 – 1	D
≥ 1	E

7.2. Polymeric Cable (XLPE/TRXLPE/EPR)

The following table represents the total health index weighting and scoring:

Table 7-6 - XLPE/TRXLPE/EPR Cable Health Index

XLPE/TRXLPE/EPR Cable Condition Criteria	W	Condition	Numerical Grade	Max. Grade
Service Age	4	A - E	4 - 0	16
Cable Failure Rate	5	A - E	4 - 0	20
Peak Loading History	1	A - E	4 - 0	4
Average Loading History	1	A - E	4 - 0	4
Total Score				**44**

7.2.1 Service Age

Table 7-7 – XLPE/EPR Service Age

Condition	Corresponding condition
A	Under 15 years of service
B	15 to 30 years of service
C	31 to 45 years of service
D	46 to 65 years of service
E	Over 65 years of service

7.2.2 Cable Failure Rates

Table 7-8 – XLPE/TRXLPE Failure

Condition	Cable Failure Rate
A	No cable segment failures per year
B	1 cable segment failures per year
C	2 cable segment failures per year
D	3 cable segment failures per year
E	More than 3 cable segment failures per year

7.2.3 Peak Loading History

The condition grading for peak loading history, is based on dividing the yearly peak loading with the permissible XLPE/TRXLPE/EPR cable rating, as shown in the table below:

Table 7-9 – Peak loading condition

Peak Loading Ratio	Condition Grade
< 0.1	A
0.1 – 0.5	B
0.5 – 0.75	C
0.75 – 1	D
≥ 1	E

7.2.4 Average Loading History

The condition grading for average loading history, is based on dividing the yearly average loading with the permissible XLPE/TRXLPE/EPR cable rating, as shown in the table below:

Table 7-10 – Average loading condition

Average Loading Ratio	Condition Grade
< 0.1	A
0.1 – 0.5	B
0.5 – 0.75	C
0.75 – 1	D

Average Loading Ratio	Condition Grade
≥ 1	E

7.3. Padmount Transformer

The following table represents the total health index weighting and scoring:

Table 7-11 - Padmount Transformer Health Index

Padmounted Transformer Condition Criteria	W	Condition	Numerical Grade	Max Grade
Service Age	3	A - E	4 - 0	12
Infrared (IR) Scans	4	A - E	4 - 0	16
Visual Inspection	4	A - E	4 - 0	16
Condition of Civil Structure	4	A, C, E	4, 2, 0	16
Total Score				**60**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

7.3.1 Service Age

Table 7-12 - Service Age

Condition	Corresponding condition
A	0 to 9 years
B	10 to 19 years
C	20 to 29 years
D	30 to 39 years
E	40 years or older

7.3.2 Infrared Scanning

The highest measured hot spot temperature is used to calculate the condition rating.

Table 7-13 – Infrared (IR) Scans

Condition	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 11-20°C)
D	Major Hotspots detected (temperature difference from ambient of 21-40°C)
E	Major Hotspots detected (temperature difference from ambient >41°C)

7.3.3 Visual Inspections

Table 7-14 - Visual Inspection

Condition	Visual Inspection Criteria
A	No rust on tank/enclosure, no damage to bushings, grounding connections intact, cable elbows in good condition (no hotspots or visual defects), gaskets/seals in good condition, no sign of oil leaks, padlocks in good condition on pad mounted transformers
B	Only one of the following defects: Minor rust, or minor cracks in bushings or minor oil leak
C	Two or more of the above indicated defects present but do not impact safe operation
D	Tank/radiator badly rusted or major damage to bushing or major oil leak
E	Two or more of the above indicated defects

Table 7-15 - Condition of Civil Structure

Condition	Visual Inspection Criteria – Condition of Civil Structure
A	Good condition as new
C	Poor condition, remedial action required
E	Civil structure degraded beyond repairs; Immediate replacement required

7.4. Padmounted Switchgear

The following table represents the total health index weighting and scoring:

Table 7-16 - Padmounted Switchgear Health Index

Padmounted Switchgear Condition Criteria	Switchgear Type	W	Condition	Numerical Grade	Max Grade
Service Age	All	4	A - E	4 - 0	16
Infrared (IR) Scan	Air	8	A - E	4 - 0	32
	SF6	2			8
Condition of Enclosure	All	3	A - E	4 - 0	12
Condition of Pad	All	4	A, C, E	4, 2, 0	16
Condition of Blades	Air	2	A - E	4 - 0	8
Condition of Operating Mechanism	Air	2	A - E	4 - 0	8
SF6 Leak	SF6	8	A, E	4, 0	32
Max Score: Oil - SF6 - Air					**44 – 84 - 92**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

7.4.1 Service Age

Table 7-17 – Service Age

Condition	Corresponding condition
A	Under 15 years
B	15 to 20 years
C	21 to 25 years
D	26 to 30 years
E	30 years or older

7.4.2 Infrared Scan

The highest measured hot spot temperature is used to calculate the condition rating.

Table 7-18 – Infrared (IR) Scan

Condition	Corresponding condition
A	No Hotspots detected
B	Minor Hotspots detected (temperature difference from ambient of 1-10°C)
C	Minor Hotspots detected (temperature difference from ambient of 11-20°C)
D	Major Hotspots detected (temperature difference from ambient of 21-40°C)
E	Major Hotspots detected (temperature difference from ambient >41°C)

7.4.3 Visual Inspections

During a scheduled inspection once every three years the following fields are inspected and given an appropriate condition score used for the switchgear's health index:

- Condition of Enclosure
- Condition of Pad
- Air Switchgear
    - Condition of Blades
    - Condition of Operating Mechanism
- SF6 Leak

Table 7-19 – Condition of Enclosure

Condition	Visual Inspection Criteria – Condition of Enclosure
A	No signs of rust on tank/enclosure, or damage on the enclosure due to corrosion, or dirt/contamination
B	Minor signs of rust on tank/enclosure, or damage on the enclosure due to corrosion, or dirt/contamination

C	Minor to significant signs of rust on tank/enclosure, or damage on the enclosure due to corrosion, or dirt/contamination but do not impact safe operation
D	Major signs of rust on tank/enclosure, or damage on the enclosure due to corrosion, or dirt/contamination
E	Serious signs of rust on tank/enclosure, or damage on the enclosure due to corrosion, or dirt/contamination

Table 7-20 – Condition of Pad

Condition	Visual Inspection Criteria – Condition of Pad
A	Good condition as new
C	Poor condition, remedial action required
E	Immediate replacement required

Table 7-21 – Condition of Blades

Condition	Visual Inspection Criteria – Condition of Blades
A	Blades are clean, free from corrosion, cracks, distortion, abrasion or obstruction. All fasteners are tight. No visible evidence of looseness, loss of adjustment, or excess bearing wear
B	Normal signs of wear with respect to the above listed deficiencies
C	Significant signs of wear with respect to the above listed deficiencies, but the deficiencies are not critical to the safe operation of the switchgear
D	Blades are degraded requiring replacement during the next scheduled outage
E	Blades are damaged/degraded beyond repair, requiring immediate replacement

Table 7-22 – Condition of Operating Mechanism

Condition	Visual Inspection Criteria – Condition of Operating Mechanism
A	Operating mechanism is in good condition. No sign of overheating or deterioration. No evidence of moisture or condensation or insect ingress into control cabinet
B	Normal signs of wear of control components based on the above listed characteristics
C	Significant wear of control components based on the above listed characteristics, but it does not affect safe operation of the switchgear
D	Unacceptable level of degradation of control components based on the above listed characteristics, requiring component replacement/repairs during the next scheduled outage
E	Switch operator controls defective, damaged, or degraded, requiring immediate replacement

Table 7-23 – SF6 Leak

Condition	Visual Inspection Criteria – SF6 Leak
A	No SF6 Leak
E	SF6 Leak Found, Action Needed

7.5. Manholes

The following table represents the total health index weighting and scoring:

Table 7-24 - Manholes Health Index

Manholes Condition Criteria	W	Condition	Numerical Grade	Max Grade
Access	7	A, C, E	4, 2, 0	28
Size	7	A, C, E	4, 2, 0	28
Roof Condition	6	A - E	4 - 0	24
Collar Condition	4	A - E	4 - 0	16
Wall Condition	2	A - E	4 - 0	8
Floor Condition	2	A - E	4 - 0	8
Total Score				**112**

The following sections contain a detailed description of each of the condition criteria that makes up the health index.

7.5.1. Manhole Access

Manhole access will also be factored into its health index and treated as a safety issue. Table 7-25 presents the condition scores based on the manhole size.

Table 7-25 - Condition scores based on manhole access

Condition	Manhole Access Criteria
A	Manhole located in grass, safe to access
C	Manhole located in sidewalk, less safe to access
E	Manhole located in roadway, unsafe to access

7.5.2. Manhole Size

Manhole size will be factored into its health index and treated as a safety issue. This is common practice to increase the refurbishment or replacement priority of legacy manholes that do not meet modern safety standards. Table 7-26 presents the condition scores based on the manhole size.

Table 7-26 - Conditions scores based on the manhole size

Condition	Manhole Size Criteria
A	Adequate ergonomic size and safe access to manhole.
C	Manhole size slightly smaller than ideal, but adequate for safe working and reasonable access to manhole
E	Manhole size or access inadequate for safe working or worker rescue during an accident; immediate repairs/replacement

7.5.3. Visual Inspections

The following fields are inspected and given an appropriate condition score used for the Manhole's health index:

- Roof Condition
- Collar Condition
- Wall Condition
- Floor Condition

Table 7-27 - Visual Inspection Criteria – Roof, Collar, Wall, and Floor Condition

Condition	Visual Inspection Criteria – Roof Condition
A	No damage
B	Minor cracks
C	Large cracks
D	Very large cracks
E	Severe spalling

HOL ACA Methodology Review Workshop



October 18th, 2024

HATCH

Agenda

01 Review Process Overview
- Analysis Process

02 Results Summary
- Preliminary Findings

03 Review of Assets
- Methodology Review
- Calculation Review
- Discussion and Response

04 Final Deliverable Discussion
- Next Steps for the Project

05 Wrap Up
- Final Words

Asset in scope:

+ *Power Transformers*
+ *Tap Changers*
+ *HV SF6 Breakers*
+ *HV Circuit Switcher*
+ *Metalclad Breakers [Vacuum, SF6, Oil, Air]*
+ *Oil Reclosers*
+ *Wood Poles*
+ *Critical Loadbreak Switches*
+ *Polemounted Transformers*
+ *Cables [PILC, Polymeric]*
+ *Padmount Transformer*
+ *Padmount Switchgear*
+ *Manholes*

Review Process Overview

Step	Description
1	Asset Health Index Guidelines Review Analysis starts with thorough readthrough the relevant section(s) to determine criteria and weighting for each Health Index
2	HI Formulation and Condition Weights ACA, ACA Mapping Analysis of the asset spreadsheet begins on the ACA sheet in the HI Formulation and Condition Weights sections. Formulas for each HI Formulation column are verified to match GEG0001. Appropriate score ranges for each category of measurement are checked with GEG0001. Do the final HI grading functions match the Guideline
3	ACA Mapping The data ranges in the ACA Mapping page are verified with GEG0001.
4	Condition Data, Grade, and Score ACA Formulas for Condition Data, Grade, and Scores are verified. Follow Condition Data cell through to Condition Grade and Condition Score using the ACA Mapping tables and ensure the correct Health Index is assigned.
5	Following the data ACA, GIS, IR Scans, Inspection Data: Follow pages referenced in Condition Data formulas to determine where the data comes from. Cross reference with data on other pages when available to ensure no conflicting data exists for any given asset ID.

Results Summary

AHI model, calculation, datasets

Further development of the current datasets, and data manipulation in the existing model is **prone to errors** with **low level of traceability**.

AHI Methodology

HOL's ACA Framework is overall comprehensive, however, Gaps exist for some assets to accurately align with asset management philosophy.

Potential opportunities for improvement include:

1. Enhanced coding/modeling consistency practice (e.g., table naming convention, Vlookup vs Index Match).
2. Avoiding manual data mapping to avoid copy paste the wrong column
3. Integrated Analytics/EAM/APM solution

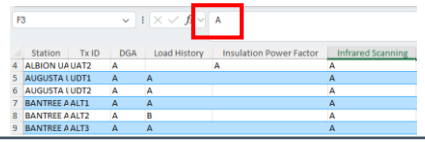
1. Additional criteria can be considered for some asset classes to represent a fuller picture of the overall Health Index
2. Consider non-linear modeling to better reflect asset management philosophy, such as replacement of data type, elimination/binary function for critical features.
3. Consider grouping criteria base on the function of the tests or physical location of the impacted components to avoid double counting.

Majority of asset classes have no or few calculation Gaps with minor impact to the overall asset class health index.

HATCH

Station Assets:
Power Transformers

Power Transformers: Calculation Review [170 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
🟢	**Calculation Sheet:** Summary Sheet **Calculation Section:** Insulation Power Factor **Gap:** Excel formula didn't encounter empty cell from "Insulation + Bushing PF" sheet (Table2) **Impacted Assets:** 11 `=IFERROR(IF(INDEX(Table2[Insulation Power Factor],MATCH($B4,Table2[Org4],0))>=2,"E",IF(INDEX(Table2[Insulation Power Factor],MATCH($B4,Table2[Org4],0))>=1.5,"D",IF(INDEX(Table2[Insulation Power Factor],MATCH($B4,Table2[Org4],0))>=1,"C",IF(INDEX(Table2[Insulation Power Factor],MATCH($B4,Table2[Org4],0))>=0.5,"B","A"))),"")`	HOL has acknowledged the issue and will modify the formula to ensure its resolution.
🟢	**Calculation Sheet:** Summary Sheet **Calculation Section:** Infrared Scanning **Gap:** All value from summary sheet are a direct text input, no link or formula connects to other sheets such as Inspection Records or others, makes it hard to confirm data source. **Impacted Assets:** All 	Limitation of historical inspection records containing only "Problematic" assets.
🟢	**Calculation Sheet:** Tx Oil Quality **Calculation Section:** Oil Quality **Gap:** Excel formula didn't encounter > 230kV transformers **Impacted Assets:** 7 `=IF(C39<69,IF(E39>=0.2,"E",IF(E39>0.05,"C","A")),IF(E39>=0.15,"E",IF(E39>0.04,"C","A")))`	HOL does not have any transformers above 230 KV. Therefore, this finding would not create issue.

🔴 High impact on the Calculation

🟡 Medium impact on the Calculation

🟢 Low Impact/ Needs Clarification

HATCH

Power Transformers: Methodology Review

Impact Area: Overall Health Index Criteria
Missing Parameters:
- Pressure Relief Device Condition. This parameter is critical as a safety check; HOL should confirm with current maintenance set up and consider adding into the methodology

Impact Area: Infrared Scanning
Missing Parameters:
- Connection Point temperature. Connection point temperature above 90C can damage the asset. HOL has winding temperature for most assets, but does not have core temperature for all. Core temperature sensors can be considered in new station transformer spec requirement

Impact Area: Grounding Condition Criteria
“Condition D: Two ground connections are visibly detached/missing.”
It could be an unsafe condition unless there are more than 2 present. HOL can consider rewording to
“At lease one ground connections in good condition otherwise, see E”

Power Transformers: Methodology Review

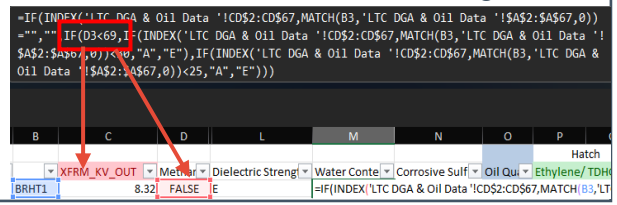
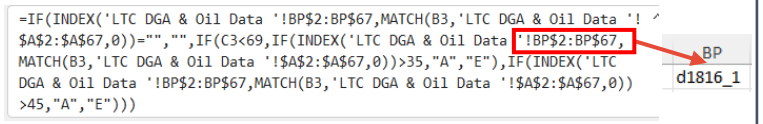
Impact Area: Degree of polymerization
DP is defined as the ratio of gases, which is also present in DGA analysis. HOL uses one criterion as a parameter and the other as an absolute threshold. Hatch recommends adding a comment about their preferred sampling method to clarify their framework.

Impact Area: Overall Health Index Criteria
The Health Index Criteria were not grouped based on the function of the test or the different transformer components, which could lead to double counting gaps. For example, Oil Quality and Insulation Moisture Content are part of STD Oil, and DP is similar to DGA. Hatch suggests grouping these criteria to avoid mistakes and enhance clarity.

Impact Area: HI Philosophy
Oil Level is part of the maintenance criteria; however, it should not be considered an End of Life (EOL) criterion. If the primary goal is to identify EOL, HOL should consider removing or giving less weight to this criterion.

Station Assets:
Tap Changers

Tap Changers: Calculation Review [64 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
🟡	**Calculation Sheet:** LTC DGA & Oil Scores **Calculation Section:** Water Content **Gap:** Formula references methane content when it should reference voltage. Will change Water Content grade **Impacted Assets:** All 	HOL has acknowledged the issue and will modify the formula to ensure its resolution.
🟢	**Calculation Sheet**: LTC DGA & Oil Scores **Calculation Section**: Dielectric Strength **Gap**: The formula is linked to an uninterpretable column, can't confirm if data source is linked correctly **Impacted Assets:** 63 	HOL confirmed this cell is a reference the right column.

🔴 High impact on the Calculation

🟡 Medium impact on the Calculation

🟢 Low Impact/ Needs Clarification

HATCH

Tap Changers: Methodology Review

Impact Area: Asset Characterization
Tap changers can either be in their own compartment or share oil with the transformer. HOL has a combination of both types. Hatch recommends distinguishing between the two, as the shared oil type will degrade faster. This distinction will add clarity to targeted maintenance and EOL conclusions

Impact Area: Overall Health Index Criteria
Missing Parameters:
Operation Count can be an indicator of EOL. Hatch suggest HOL to look into gathering data from manufacturers of assets and maintenance crews

Impact Area: Overall Health Index Criteria
Mechanism type: mechanical or vacuum interrupter-based. Different algorithms can be considered if HOL is looking to transition the whole portfolio to vacuum-based tap changers.

Tap Changers: Methodology Review

Impact Area: Dissolved Gas Analysis

Table 5-29 (based on IEEE standard C57.139) only considers the Caution range from the permissible concentration limits for dissolved gases in Arcing-type LTCs. Hatch suggests an additional gating approach using spreadsheets or macros, such as multiplying the score by a factor if the warning level is reached instead of the caution level

Table C.1—Derived statistical norms for Example 1 & 2 LTCs

Variable	Caution (2)	Warning (3)
Ethylene/Acetylene	0.63	0.87
TDHG/Acetylene	1.51	2.33
Methane (CH_4)	237 µL/L (ppm_v)	
Ethylene (C_2H_4)	653 µL/L (ppm_v)	
Acetylene (C_2H_2)	1773 µL/L (ppm_v)	
Heating gas (TDHG)	1213 µL/L (ppm_v)	

Station Assets:
HV SF6 Breakers

HATCH

HV SF6 Breakers: Calculation Review [39 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
🟢	**Calculation Sheet:** HVSF6(New) **Calculation Section:** Validity Check **Gap:** Air/Hydraulic/Spring Recharge Time was not included in the methodology; however, it is in the calculation model. Even though it has minimum impact for the Final Condition Assessment, it does affect the validity check for the asset. **Impacted Assets:** 7	HOL is validating with the station containing these assets to determine if this criterion can be used in the Health Index and will update the guideline to reflect their current calculations.
🟡	**Calculation Sheet:** HV SF6 Data **Calculation Section:** SF6 Gas Analysis **Gap:** Analysis done in the calculation model doesn't match the methodology **Impacted Assets:** 22 `=IF(O3="","",IF(O3<97,"E","A"))` VS *IEC 60376 ed2.0* cites the maximum recommended humidity limit for SF_6 gas used in electrical equipment as 200 ppm$_v$. There is no discussion of intermediate moisture volume concentration values, therefore a pass/fail condition rating is presented in for SF_6 gas analysis. Table 5-36 - Condition ratings based on SF6 gas analysis A: No abnormal indications, as per IEC specification. B: High readings on moisture content, air, or CF4. C: Probable indication of electrical activity (decomposition by-products). D: Definite indications of electrical activity (decomposition by-products). E: High levels of abnormal activity that cannot be brought into normal condition.	HOL commented that the level of granularity referenced in the guideline is currently not available, which is why the formula does not match the guideline. HOL will update the criteria when more data becomes available.
🟢	**Calculation Sheet:** HV SF6 Data **Calculation Section**: Coil Signature Test, Infrared Scan (IR),Timing & Travel **Gap:** Unable to verify data source **Impacted Assets:** All	This could be a limitation of HOL's current data infatuation (since Excel is the only available solution for ACA calculation, all the data transferring has to be done manually).

🔴 High impact on the Calculation

🟡 Medium impact on the Calculation

🟢 Low Impact/ Needs Clarification

HATCH

HV SF6 Breakers: Calculation Review [39 Assets]

Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
Calculation Sheet: HV SF6 Data **Calculation Section:** Visual Inspections Bushing, SF6 Leaks, Tanks & Mechanism Box, **Gap:** Unsure if model calculation method matches the methodology **Impacted Assets:** 14 `=IF(Z3="","",IF(Z3=0,"E",IF(Z3=1,"D",IF(Z3=2,"C",IF(Z3=3,"B",IF(Z3=4,"A",""))))))` **Table 5-48 – SF6 Leaks** Condition / Visual Inspection Criteria – SF6 Leaks A: No SF_6 leakage at any of the bushing-metal interfaces, tank or piping interfaces, as determined by inspection of SF_6 pressure gauge and SF_6 refill maintenance records. B: SF_6 leakage of up to 0.5%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records. C: SF_6 leakage exceeding 1%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records. D: SF_6 leakage exceeding 1.5%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records. E: SF_6 leakage exceeding 2%, per year, by weight, of the total quantity of SF_6 in the breaker, as determined by inspection of SF_6 pressure gauge and refill maintenance records.	HOL confirmed this is the right data mapping. All the numbers correspond to values are from PowerDB. Qualitative grading for each number is defined in the inspection form.

High impact on the Calculation

Medium impact on the Calculation

Low Impact/ Needs Clarification

HV SF6 Breakers: Methodology Review

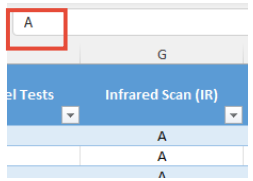
Impact Area: Fault Operations Count
A circuit breaker has different operation limits for no-load operations, full load operations, and fault amp operations. Several fault amp operations may quickly force the circuit breaker to reach its end of life. HOL should consider to check if current system have the ability to track the operation counts using EAM software would be recommended.

Impact Area: Overall Health Index, Available Fault Current
Over time, with the addition of generation and interconnections on the transmission grid, the available fault current may increase. If it exceeds the circuit breaker rating, the circuit breaker will reach its end of life. HOL has confirmed that this is not an issue since they use higher-rated breakers than required. However, it would be beneficial for HOL to start monitoring this criterion

Impact Area: Overall Health Index, Operating Counter
Weight of 2 (8 out of 184) might not be enough for the importance of Operating Counter.

Station Assets:
HV Circuit Switcher

HV Circuit Switcher: Calculation Review [18 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
○ ○ ●	**Calculation Sheet:** HV Circuit Switcher Data **Calculation Section:** Infrared Scan (IR), Insulators/Porcelains, Drive Train Assembly, Motor Operator and Controls, Disconnect Live Parts, Connectors and Conductors, Foundation/Support Steel/Grounding **Gap:** All value from HV Circuit Switcher Data are a direct text input, no link or formula connects to other sheets such as Inspection Records or others, makes it hard to confirm data source. **Impacted Assets:** All 	HOL confirmed that this is due to the old data recording tradition of only documenting ‘problematic’ assets.

● High impact on the Calculation
● Medium impact on the Calculation
● Low Impact/ Needs Clarification

HV Circuit Switcher: Methodology Review

Impact Area: Overall Health Index Criteria
Missing Parameters:

- Operation Count
- Last Operated Date (over or under 12 months. The last operated data should be able to drawn from SCADA)

Impact Area: Overall Health Index Criteria
Missing Parameters:

- Fault operations count, Available systems fault level

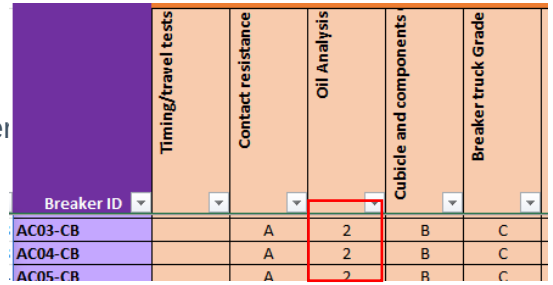
(Please refer to the discussion with HV SF6 Breakers)

Station Assets:
Metalclad Breakers

HATCH

Metalclad Breakers [Oil]: Calculation Review [51 Assets]

Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
Calculation Sheet: Met Oil Data **Calculation Section:** Oil Analysis **Gap:** Formula direct transfer numbers grade for the oil analysis, instead of letter grade, which leads to health index formula not recognize this criteria. **Impacted Assets:** 36	HOL has acknowledged the issue and will modify the formula to ensure its resolution.



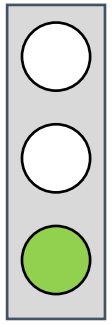
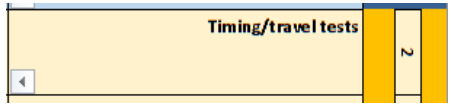
Breaker ID	Timing/travel tests	Contact resistance	Oil Analysis	Cubicle and components	Breaker truck Grade
AC03-CB		A	2	B	C
AC04-CB		A	2	B	C
AC05-CB		A	2	B	C

High impact on the Calculation

Medium impact on the Calculation

Low Impact/ Needs Clarification

Metalclad Breakers [SF6]: Calculation Review [122 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
	**Calculation Sheet:** MetSF6(New) **Calculation Section:** Timing/Travel Test Weighting **Gap:** should be 3 but it is 2 **Impacted Assets:** Doesn't impact any asset, since there is no Timing data. But suggest fixing it to avoid mistake when Timing data become available 	HOL has acknowledged the issue and will modify the formula to ensure its resolution.

Metalclad Breakers [Vacuum] : Calculation Review [318 Assets]

- There is no Gap or clarification founded in the calculation model.

Metalclad Breakers [Air]: Calculation Review [521 Assets]

- There is no Gap or clarification founded in the calculation model.

Metalclad Breakers: Methodology Review

Impact Area: Oil Analysis Criteria, SF6 Gas test, Arc Chute Condition
The Oil analysis have a weight of 2 when the SF6 Gas test and Arc Chute Condition have weight of 3 from a recommendation from consultants. Hatch recommends a higher rating for both criteria.

Impact Area: fault operations
Switching no-load, load and fault currents results in different remaining life
(Please refer to the discussion with HV SF6 Breakers)

Impact Area: one operation (open/close) every 12 months
Mechanical and control functionality test
(Please refer to the discussion with HV Circuit Switcher)

Impact Area: system fault level relative equipment fault rating
Fault level tends to increase with time, and may exceed CB rating
(Please refer to the discussion with HV SF6 Breakers)

Station Assets:
Oil Reclosers

Oil Reclosers: Calculation Review [54 Assets]

- There is no inspection information available at the moment for ACA Calculation. HOL has updated the inspection form to capture required ACA parameters for the next maintenance cycle.
- Hatch has checked the empty ACA calculation model and confirm the model has the right parameter and weights.

Oil Reclosers: Methodology Review

Impact Area: Operating Mechanism Condition Criteria
Mechanical reclosers with springs and dashpots and electrical reclosers would have different mechanism criteria to check. Different algorithm can be considered to accelerate the transition towards electronic controlled reclosers.

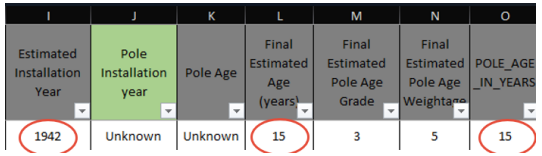
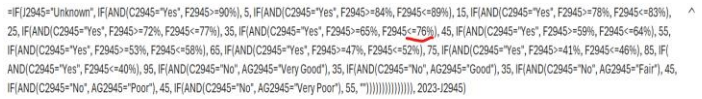
Impact Area: Operating Counter Readings
Counter readings do not have reference to the type of operation: fault, full load, no load.
(Please refer to the discussion with Tap Changers)

Impact Area: System Fault Level
System fault levels tend to increase over time. If equipment ratings exceeded, equipment is at end of life.
(Please refer to the discussion with HV SF6 Breakers)

Overhead Assets:
Wood Poles

HATCH

Wood Poles: Calculation Review [31,483 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
○	**Calculation Sheet**: Health Index **Calculation Section**: Pole Age **Gap**: Pole age does not consider estimated installation year and only estimated age (based on %str remaining) **Impacted Assets**: All 	It is confirmed by HOL that estimated installation date was found not align with remaining strength base on previous study. HOL can consider using PA grouping on neighbor poles to get a more accurate age estimate
○	**Calculation Sheet**: Health Index **Calculation Section**: % Str Remaining **Gap**:When drill test can't be performed, % str is based on age. When age is unknown, it is based on the truncated health index. For poles where drill test is not performed and age is unknown, the final health index double counts all aspects of the truncated approach. **Impacted Assets**: N/A	HOL has performed a recent study that the Effective Pole age truncated overall condition which is used for the calculation. With the limitation of available data, Hatch believe this approach is appropriate for this stage, however it would be beneficial for HOL to gather more data.
○	**Calculation Sheet**: Health Index **Calculation Section**: Remaining pole strength formula **Gap**:The remaining pole strength formula has one error where a 76% should be 71%. This does not affect the result and has no impact **Impacted Assets**: N/A 	Hatch recommend to fix the coding, to ensure the model is consistent with the methodology, although it doesn't affect the current results.

I	J	K	L	M	N	O
Estimated Installation Year	Pole Installation year	Pole Age	Final Estimated Age (years)	Final Estimated Pole Age Grade	Final Estimated Pole Age Weightage	POLE_AGE_IN_YEARS
1942	Unknown	Unknown	15	3	5	15

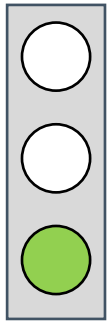
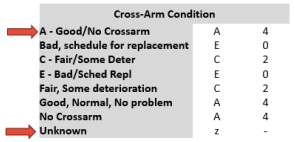
○ High impact on the Calculation

○ Medium impact on the Calculation

○ Low Impact/ Needs Clarification

HATCH

Wood Poles: Calculation Review [31,483 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
	**Calculation Sheet**: ACA Mapping **Calculation Section**: Cross-arm condition **Gap**: Poles with no cross-arm are given a grade of A for their crossarm condition. Should they not be removed from this grading category **Impacted Assets**: All 	It was confirmed through formula examination, that this gap does not effect the final result. For the purpose of model consistency, it is acceptable to leave it as is.

Cross-Arm Condition		
A - Good/No Crossarm	A	4
Bad, schedule for replacement	E	0
C - Fair/Some Deter	C	2
E - Bad/Sched Repl	E	0
Fair, Some deterioration	C	2
Good, Normal, No problem	A	4
No Crossarm	A	4
Unknown	z	-

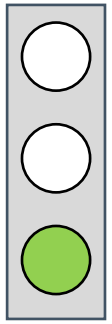
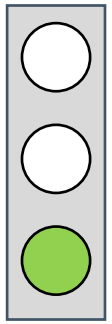
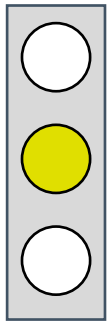
Wood Poles: Methodology Review

Impact Area: Criteria Measurement
According to CSA 22.3 Poles are at EOL at 60% str remaining. Current calculation of grade (%str rem*4) does not have a cutoff at 60%.
HOL has confirmed that poles will be replaced as corrective replacement when %str remaining <30%, from replacement perspective, it is ok, but the methodology doesn't reflect it. Hatch recommends they accelerate the HI to 0 ad the %str remaining < 60%.

Impact Area: Criteria Measurement
Remaining pole strength estimation based on age: Wood poles have different EOL age estimates based on where they are installed.
(Please refer to discussion in Wood Pols Calculation section)

Overhead Assets:
Critical Loadbreak Switches

Critical Loadbreak Switches: Calculation Review [5636 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
	**Calculation Sheet**: Tableau **Calculation Section**: Asset type **Gap**: Spreadsheet contains both overhead and underground assets **Impacted Assets**: All	HOL confirmed that both assets are shown in the page due to data imports from a compinged file. Underground assets would not show as valid due to grading criteria. Hatch recommend to remove underground assets to avoid confusion.
	**Calculation Sheet**: GIS Extract **Calculation Section**: Age **Gap**: Age formula only considers installation date and disregards the estimated age. **Impacted Assets**: 2584	HOL has confirmed because of the importance of critical switches are being evaluated; only actual age would be reliable.
	**Calculation Sheet**: ACA Mapping **Calculation Section**: IR Scans **Gap**: Unknown IR scans are given grade A **Impacted Assets**: All without IR scans	HOL current doesn't have IR result scan, it will be included in future maintenance activities. HOL confirmed that this is due to the old data recording tradition of only documenting 'problematic' assets.

 High impact on the Calculation

 Medium impact on the Calculation

 Low Impact/ Needs Clarification

HATCH

Critical Loadbreak Switches: Methodology Review

Impact Area: Overall Health Index Criteria
Missing Parameters:

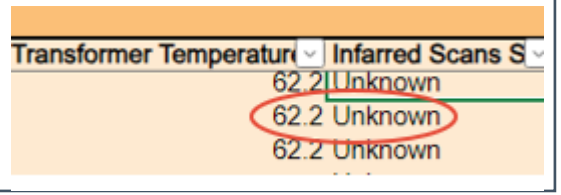
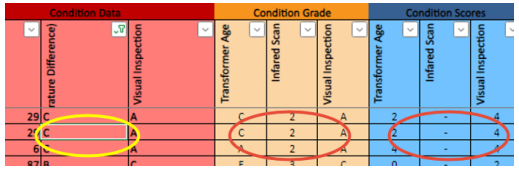
- Operation count (no load, full load, fault operations)
- Timing Test
- Arc interuptors (if present)
- Conductivity and insulation Test
- Lightning Arrester Condition (if present)
- Operated in the last year binary check

Impact Area: IR Scan
If an IR scan result is unknown, it should be graded very low or not graded at all from a reliability and safety viewpoint

Impact Area: system fault level
If fault level increases above switch rating, switch is at end of life

Overhead Assets:
Polemounted Transformers

Polemounted Transformers: Calculation Review [15,350 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
🟢	**Calculation Sheet**: GIS Extract **Calculation Section**: Infrared Scan Score **Gap**: Excel formula Gap. Decimal temperature difference will give “unknown” IR Scan grade **Impacted Assets**: 36 	HOL has acknowledged the issue and will modify the formula to ensure its resolution.
🟢	**Calculation Sheet**: ACA **Calculation Section**: IR Scan **Gap**:Temp Diff has grade value, Condition Grade has Score value, and score and weights are empty **Impacted Assets**: 27 	HOL has acknowledged the issue and will modify the formula to ensure its resolution.
🟢	**Calculation Sheet**: ACA **Calculation Section**: Validity **Gap**: Validity formula first check if the transformer is under 10 years old. If it is, it automatically marks it valid. Does not match with GEG0001. Adherence to the methodology raises invalidity from 36% to 45% **Impacted Assets**:	HOL confirmed that because of the maintenance cycle, transformers under 10 years old were not inspected. Because of the nature of young asset, it was assumed relative healthy.

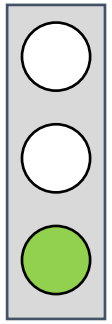
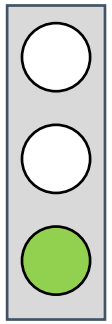
🔴 High impact on the Calculation

🟡 Medium impact on the Calculation

🟢 Low Impact/ Needs Clarification

HATCH

Polemounted Transformers: Calculation Review [15,350 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
	**Calculation Sheet**: ACA **Calculation Section**: Infrared Scan **Gap**: Unknown IR Scans get given a grade of A. Also counts as a completed test for validity. Excluding uncompleted IR scans increases invalidity from 36% to 82% **Impacted Assets**: all	HOL confirmed that there were other visual test done on the assets to confirm it is in good condition.
	**Calculation Sheet**: ACA Mapping **Calculation Section**: Visual Condition **Gap**: Visual condition does not match inspection data. GEG is much more detailed **Impacted Assets**: all	HOL confirmed this is a limitation of the inspection data recording tool, tools that inspection teams use have limited number of character entry fields and can't provide detailed description of the assets. This issue doesn't effect the accuracy of the calculation model.

 High impact on the Calculation

 Medium impact on the Calculation

 Low Impact/ Needs Clarification

HATCH

Polemounted Transformers: Methodology Review

Impact Area: Overall Health Index Criteria
Missing Parameters:

- Loading History
- TTR
- PI Test
- Enclosure condition

Impact Area: Overall Health Index Criteria
IR Scan Test Use. IR scans only give momentary temperature data and would not reveal possible gaps occurring at different grid usage times.

Underground Assets:
Cables

PILC Cable: Calculation Review [7,422 Assets]

- No Gaps found in the calculations. Model is consistent with the methodology

High impact on the Calculation

Medium impact on the Calculation

Low Impact/ Needs Clarification

HATCH

Polymeric (XLPE, TRXLPE) Cable: Calculation Review [56,517 Assets]

- No Gaps found in the calculations. Model is consistent with the methodology

Cables: Methodology Review

Impact Area: Overall Health Index Criteria
Cable Failure Rate is a lagging indicator, which would not provide proper grounds to base the health index on.
(Hatch recommends replacing cable failure rate with number of splices/km)

Impact Area: Overall Health Index Criteria
Missing Parameters:
- PI / Insulation test

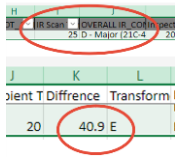
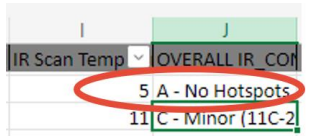
(Hatch recommends doing a PI test for these cables.While Mega test is good as pass or failure, but it doesn't replace as PI test for oil quality.)

Impact Area: Overall Health Index Criteria
Missing Parameters:
- Emergency rating usage (0ver 90 deg C, under 130 deg C)

(HOL confirmed they have started more testing this year, this issue could be resolved if relevant testing has been done)

Underground Assets:
Padmount Transformer

Padmount Transformer: Calculation Review [18,880 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
🟡	**Calculation Sheet**: ACA Mapping **Calculation Section**: IR Scan Grade **Gap**:Temp diff to grade table only goes to 100, but ID 1650876 has a temp diff of 114. Does not get a grade as result **Impacted Assets**: 1	HOL has acknowledged the issue and will modify the formula to ensure its resolution.
🟢	**Calculation Sheet**: Additional Information, IR Scan Gaps **Calculation Section**: IR Scan Temp diff and Grade **Gap**:Transformers in IR Scan Gaps have different Temp differences than in the other sheets 	Hatch has confirmed that all data used for ACA calculation come from the same source (“Additional Information”). It would be beneficial to remove the second data source to avoid confusion in the future,
🟢	**Calculation Sheet**: Additional Information, Inspection Information **Calculation Section**: Overall IR Condition **Gap**:Overall IR Condition frequently reads no hotspots when there is a low temperature hotspot 	In previous grading schemes, temp diffs under 10C were not considered hotspots.

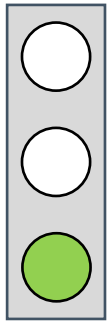
🔴 High impact on the Calculation

🟡 Medium impact on the Calculation

🟢 Low Impact/ Needs Clarification

HATCH

Padmount Transformer: Calculation Review [18,880 Assets]



Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
Calculation Sheet: ACA Mapping **Calculation Section**: Visual Condition **Gap**:Visual condition table not matching GEG which is much more detailed **Impacted Assets**: All	HOL confirmed this is a limitation of the inspection data recording tools. Tools that inspection teams used have limited number of character entry fields and can't provide detailed description of the assets.

High impact on the Calculation

Medium impact on the Calculation

Low Impact/ Needs Clarification

HATCH

Padmount Transformer: Methodology Review

Impact Area: Overall Health Index Criteria

Missing Parameters:

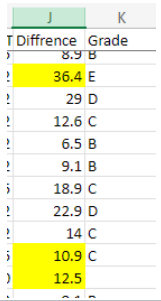
- Loading History
- TTR
- PI test
- Enclosure condition

Impact Area: Overall Health Index Criteria

IR Scan Test Use: IR scans only give momentary temperature data and would not reveal possible Gaps occurring at different grid usage times.

Underground Assets:
Padmount Switchgear

Padmount Switchgear: Calculation Review [976 Assets]

Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
Calculation Sheet: IR Scan Gaps **Calculation Section**: Temp Difference and Grade **Gap**: The temperature difference does not grade properly in this sheet. Ex. Temp diff shown is 36.4C and is graded as E, but should be graded D according to GEG **Impacted Assets**: 5 	HOL has acknowledged the issue and will modify the formula to ensure its resolution.

High impact on the Calculation

Medium impact on the Calculation

Low Impact/ Needs Clarification

Padmount Switchgear: Methodology Review

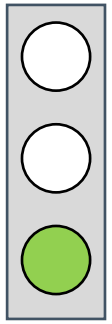
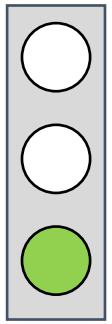
Impact Area: Overall Health Index Criteria

Missing Parameters:

- PI test
- Insulation test
- Conductance test
- Condition of fuses (if present)
- System Fault current less than equipment fault rating

Underground Assets:
Manholes

Manholes: Calculation Review [3975 Assets]

	Calculation Gap/Clarification	Hatch Recommendation/HOL Clarification
	**Calculation Sheet**: ACA Mapping **Calculation Section**: Access Grading **Gap**: Location “Other” are graded the same as sidewalk, what is the rationale behind it? What would be an example of other? **Impacted Assets**: All	“Other” criteria is a small of past grading scheme that did not define each location as the current scheme does. HOL will look over the inspection data.
	**Calculation Sheet**: GEG Health Index Guideline **Calculation Section**: Manholes **Gap**: Table 7.5.3 title only mentions roof condition. Is this grading criteria the same for the other aspects of the asset? **Impacted Assets**: N/A	HOL Confirms it’s the same grading criteria. Hatch recommendd rewording the document to prevent future confusion.

 High impact on the Calculation

 Medium impact on the Calculation

 Low Impact/ Needs Clarification

Manholes: Methodology Review

Impact Area: Overall Health Index Criteria
Missing Parameters:

- Grounding
- Drainage
- Labelling / unique ID tag exists (readable)

Impact Area: Manhole Access Criteria
How does the Manhole Location change the remaining life of the asset? Why should it impact Health Index?
(Location is a criticality and is typically not be included in HI. HOL has included location for maintenance cost and risk purposes. HOL should consider removing it from HI calculations.)

Thank you.

For more information,
please visit www.hatch.com

HATCH

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-40

EVIDENCE REFERENCE:

[Ex.2-5-4] With respect to Hydro Ottawa's Asset Risk Assessment (ARA) Framework:

QUESTION(S):

a. [p.63] Please provide a copy of any internal guides explaining Hydro Ottawa's Asset Risk Assessment (ARA) Framework.
b. [p.68-69, p.105] Please explain in detail, and provide where available any internal guides or similar documentation, the risk assessment scoring matrix (e.g. how likelihood and consequences are scored) and corresponding value measures calculations. Please explain the basis for each risk value score and how it was derived.
c. [p.105] Please explain in detail, any internal guides or similar documentation, explain the calculation of each benefit value measure and how it was derived.

RESPONSE(S):

a) The guideline specifications document for Hydro Ottawa's ARA framework is provided in Attachment 2-SEC-40(A) - Hydro Ottawa Risk Framework - REDACTED. Please note that certain sections of the guideline have been redacted. The rationale for these redactions is outlined in Hydro Ottawa's confidentiality submission.

b) In Copperleaf Predictive Analytics (PA), risk is calculated as Risk = Consequence * Likelihood. The system uses various inputs to determine the consequences and likelihoods for different risk categories. Here's how likelihood and consequences are scored and the basis for each risk value score:

a) **Consequences:** The risk consequences are based on relevant inputs for each category. For example, reliability risk consequences consider factors such as outage duration, number and type of customers, worst-performing feeder, peak load, and duration/frequency costs.

b) **Likelihood:** Three asset failure types, derived from the CNAIM methodology, are used to determine risk likelihoods:

   i) **Catastrophic Failure:** A sudden and total functional failure from which recovery is impossible.

   ii) **Degraded Failure:** A functional failure from which the asset can be restored, but it may not be cost-effective to do so.

   iii) **Incipient Failure:** A functional failure that, if unaddressed, could lead to a degraded or catastrophic failure.

The percentage of each failure type is established for all asset classes, adding up to 100%. These percentages are then multiplied by the probability of failure (POF) curve based on asset condition to drive the risk likelihoods. The Copperleaf PA distribution asset model then utilizes five risk value measures (reliability, safety, environmental, financial and compliance) to calculate the overall value of asset interventions, as compared to the replacement cost. More information regarding Hydro Ottawa's risk assessment framework using Copperleaf PA is presented in Section 5.1.4 of Schedule 2.5.4 - Asset Management Process. For more details on how each risk value measure is calculated and an example of an individual asset value calculation, refer to the interrogatory response 2-Staff-59 part c).

c) Hydro Ottawa's asset risk framework assessed through Copperleaf's Predictive Analytics (PA) relies on risk value measures and does not have benefit value measures. However, Hydro Ottawa's project-level investment planning process assessed through Cooperleaf Portfolio ensures that projects are scored based on a variety of risk and benefit value measures. More information regarding the project evaluation process is provided in Section 5.3.2.2 of Schedule 2-5-4: Asset Management Process. For an example project value calculation please refer to the interrogatory response 2-Staff-59 part c).

The guideline specifications document for risk and benefit values measures in Copperleaf Portfolio is provided in Attachment 2-SEC-40(B) - Hydro Ottawa Value Framework Definition Document - REDACTED. Please note that certain sections of the guideline have been redacted. The rationale for these redactions is outlined in Hydro Ottawa's confidentiality submission.



Hydro Ottawa Distribution Asset Model

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Document Control

Version	Date	Description	Originator
1	07-02-2023	Initial Draft	JP Sun
2	13-02-2023	Updated after workshop #3	JP Sun
3	17-02-2023	Updated after workshop #6	JP Sun
4	22-02-2023	Updated after workshop #7	JP Sun
5	24-02-2023	Changed Safety component to use CNAIM consequences	JP Sun
6	01-03-2023	Created NumberOfCircuits field	JP Sun
7	02-03-2023	Removed ProtectionDeviceCustomers data table and moved columns to asset fields	JP Sun
8	03-03-2023	Changed Location to Asset Location	JP Sun
9	03-25-2023	Updated configurable field codes	JP Sun
10	03-30-2023	Made changes to the Reliability and Safety components as per discussion on 03-30-2023	JP Sun
11	05-25-2023	Added Replacement Override data table	JP Sun

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Financial constraints are tightening
Technical experts are retiring
Performance expectations are increasing
Core infrastructure and assets are aging



1 Introduction

The following document describes the Distribution Asset Model developed for Hydro Ottawa to be used with Predictive Analytics for the purpose of planning distribution asset replacements.

2 Distribution Asset Model Description

The Distribution Asset Model takes inputs from data repositories (asset data, asset type data, system fields and data tables), questionnaires (to override inputs upon replacement) and value measures (Condition Score). A diagram of the inputs and output value measures calculated by the Distribution Asset Model is shown in Figure 1.

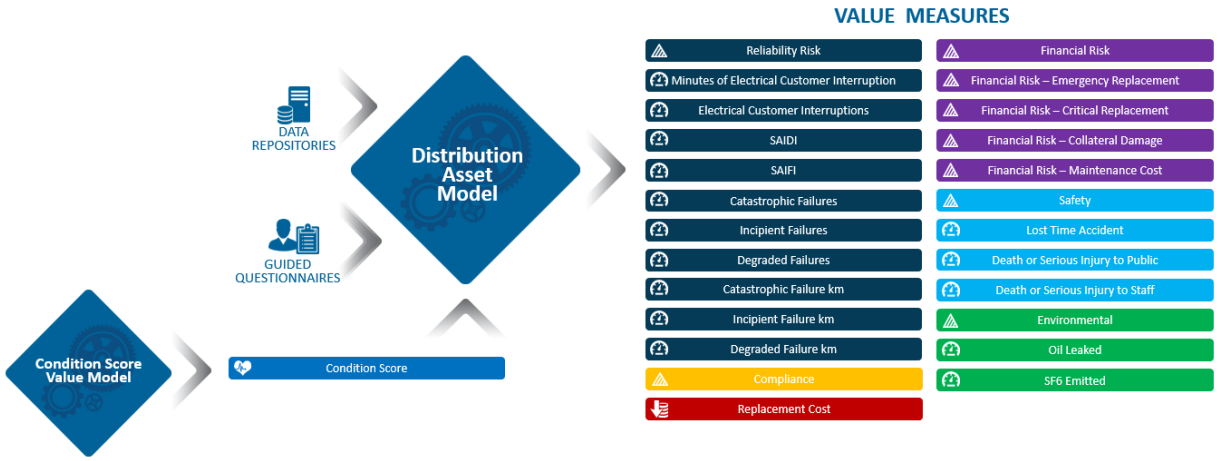


Figure 1. Distribution Asset Model Inputs and Outputs

Not all the value measures calculated by the Distribution Asset Model will contribute to the overall value of the asset replacement. Some value measures will be used solely to calculate performance metrics (service measures). Other value measures will be aggregated into a single measure before contributing to the overall value. Figure 2 shows the weighting factors that will be applied to the eight value measures that will contribute to the value function. Note that the default value function "HOL Value Function" has been configured to include Replacement Cost. This default value function can be used by both Predictive Analytics as well as Copperleaf Portfolio.

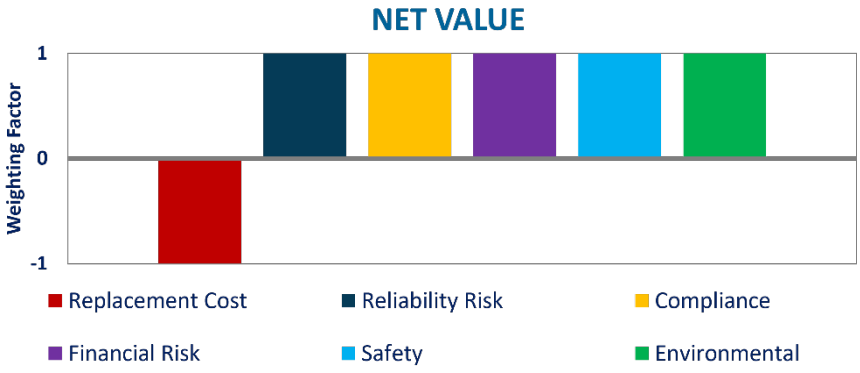


Figure 2. Weighting Factors of Value Measures that Contribute to the Value Function

2.1 Model Inputs

The following inputs will be used by the Distribution Asset Model:

Table 1: Asset Fields Used as Inputs

Field Code	Field Name	Field Type	Units
[redacted]			

[redacted]

Table 2: Asset Type Fields Used as Inputs

Field Code	Field Name	Field Type	Units
[redacted]			

Field Code	Field Name	Field Type	Units
[redacted]			

Table 3: System Fields Used as Inputs

Field Code	Field Name	Field Type	Units
[redacted]			

Table 4: Value Measures Used as Inputs

Field Code	Field Name	Field Type	Units
[redacted]			

Table 5: CustomerTypeCosts Data Table Used as Input

[redacted]

Table 6: FeederPerformance Data Table Used as Input

Feeder	WorstPerformer
[redacted]	

Table 7: LocationSafetyFactor Data Table Used as Input

[redacted]

[redacted]

[redacted]

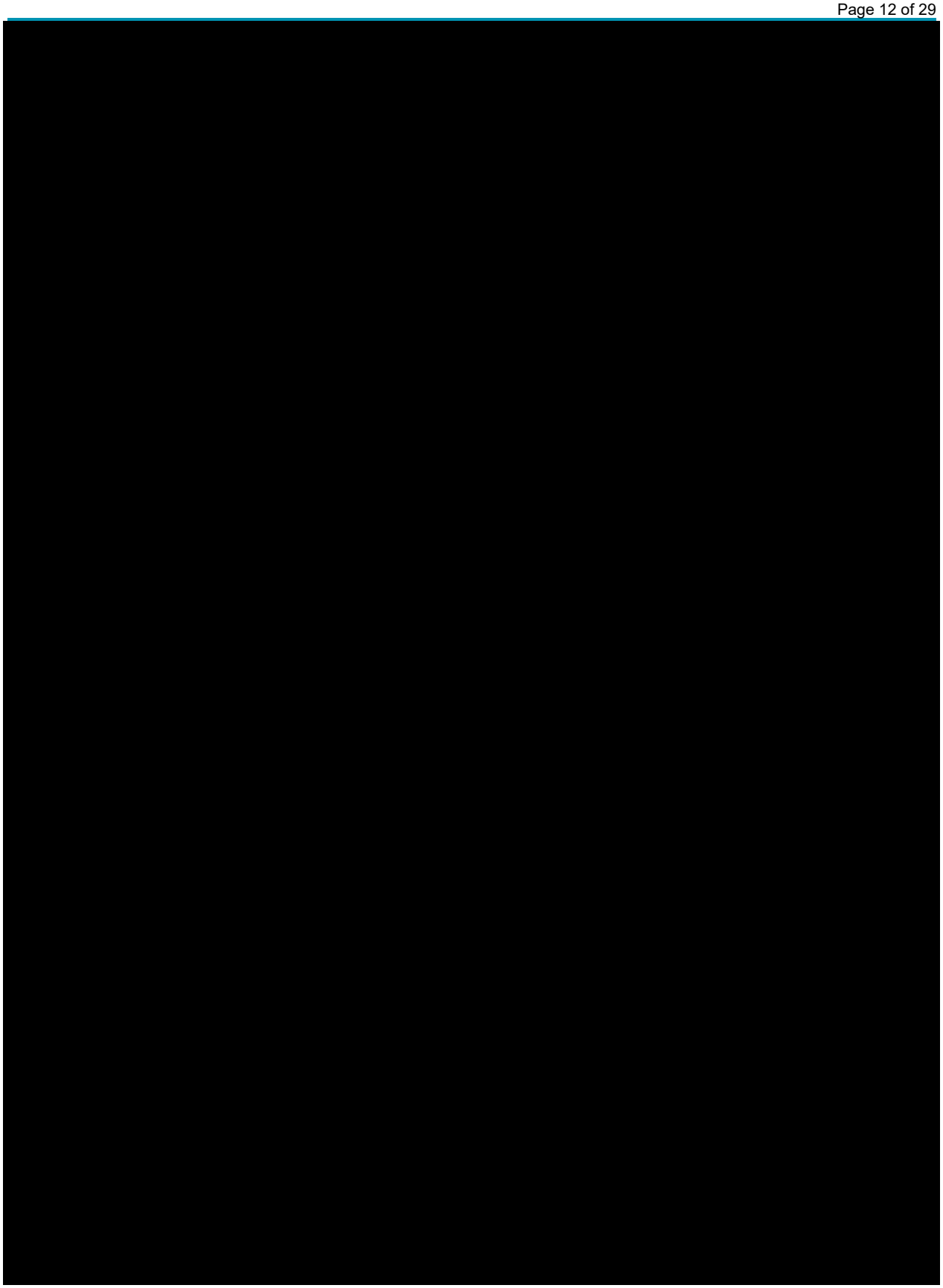
Table 8: MaintenanceCosts Data Table Used as Input

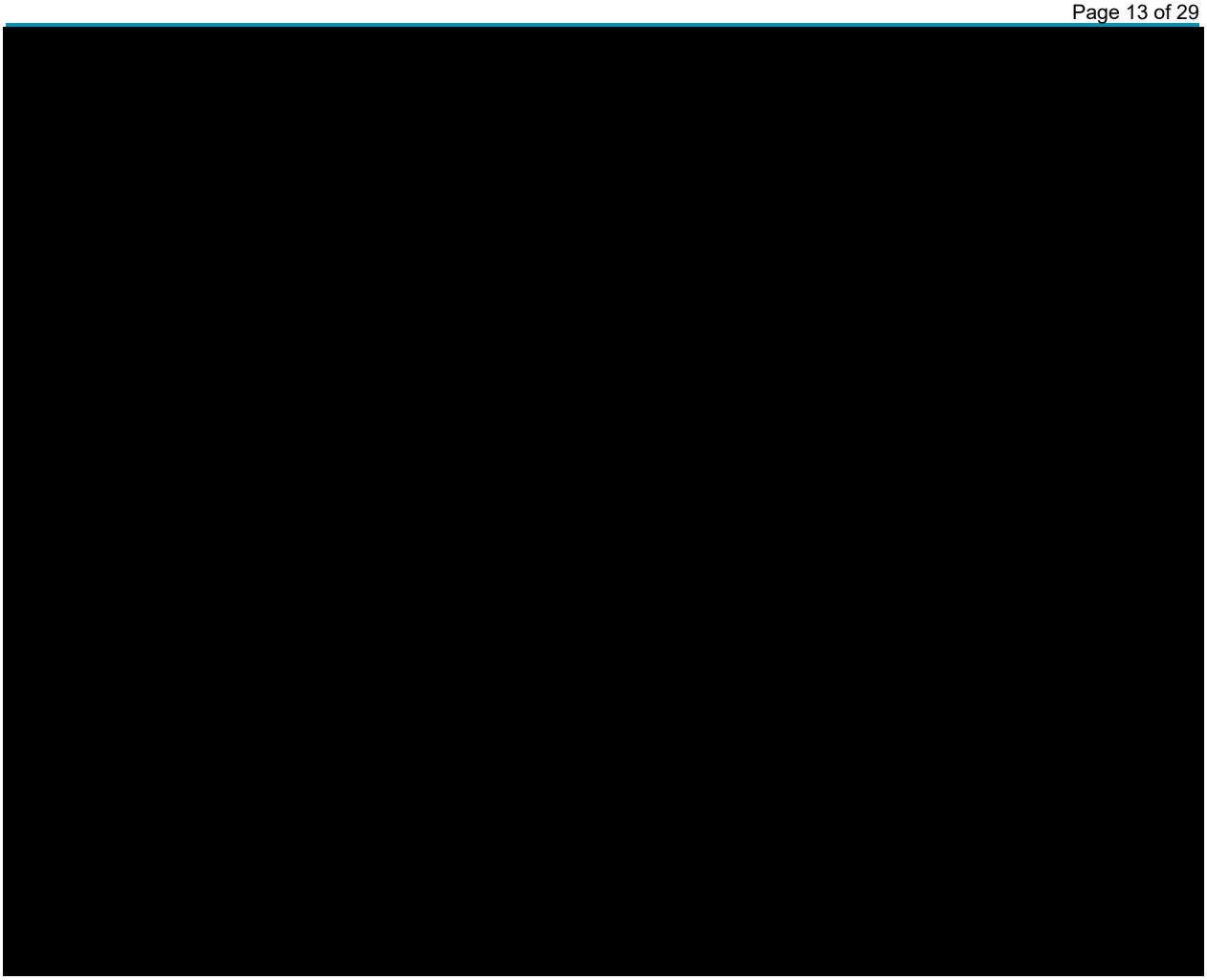
[redacted]

[redacted]

Table 9: ReplacementOverride Data Table Used as Input

[redacted]





Note: this data table can be configured to use up to two configurable fields on the asset details record to use as override values after the asset has been replaced. Only configurable fields of type dropdown have been enabled for this table since they have discrete values.

2.2 Outcome Questionnaire

An outcome questionnaire will be used on the Condition Score Model to capture changes in model inputs upon replacement of the asset. The Condition Score Model will pass these parameters to the Distribution Asset Model. The questionnaire prompts will be non-time varying and not required. If they are answered, the value provided will be used for the new asset upon replacement. This will affect outcome value measures.

Table 10: Outcome Questionnaire Prompts



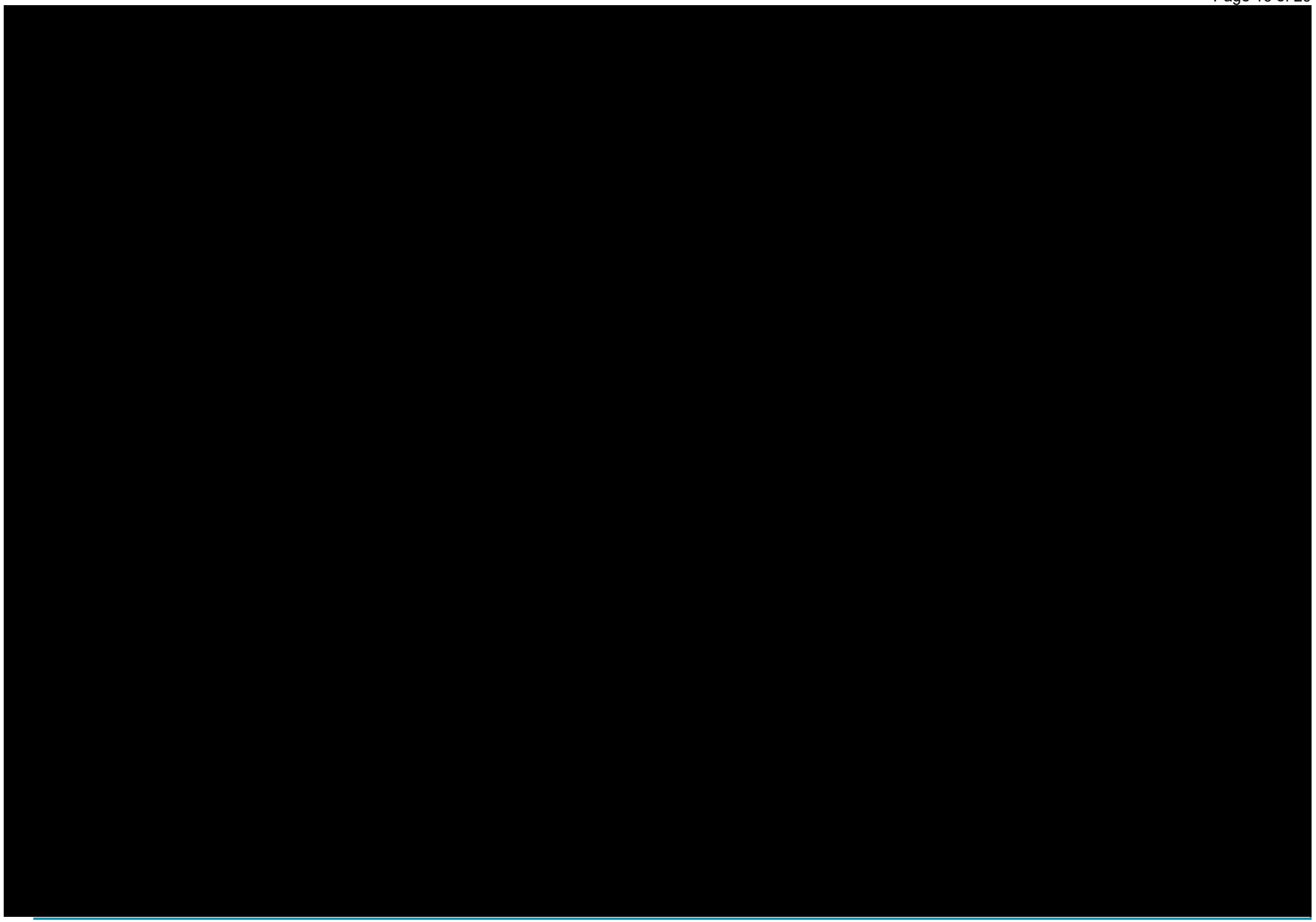


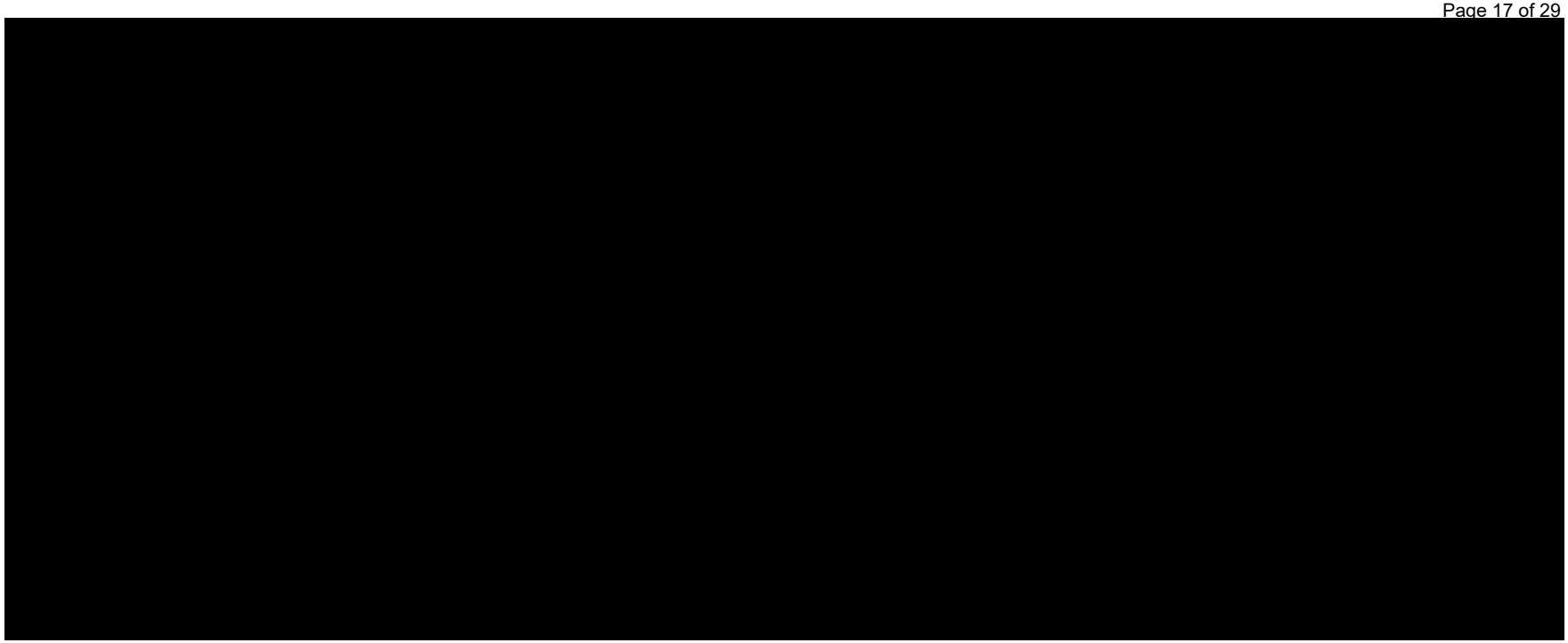


2.3 Model Outputs

Table 11: Value Measures Calculated by the Distribution Asset Model







3 Model Calculation Details

The following formulas will be used to calculate outputs of the Distribution Asset Model. Asset fields are indicated by Red text; asset type fields are indicated by Blue text, system fields are indicated by Green text; data table inputs are indicated by Purple text; constants are indicated by Brown text; calculated quantities are indicated by **Bold Black** text.

3.1 Reliability Component

The Reliability component of the Distribution Asset Model calculates the following value measures:

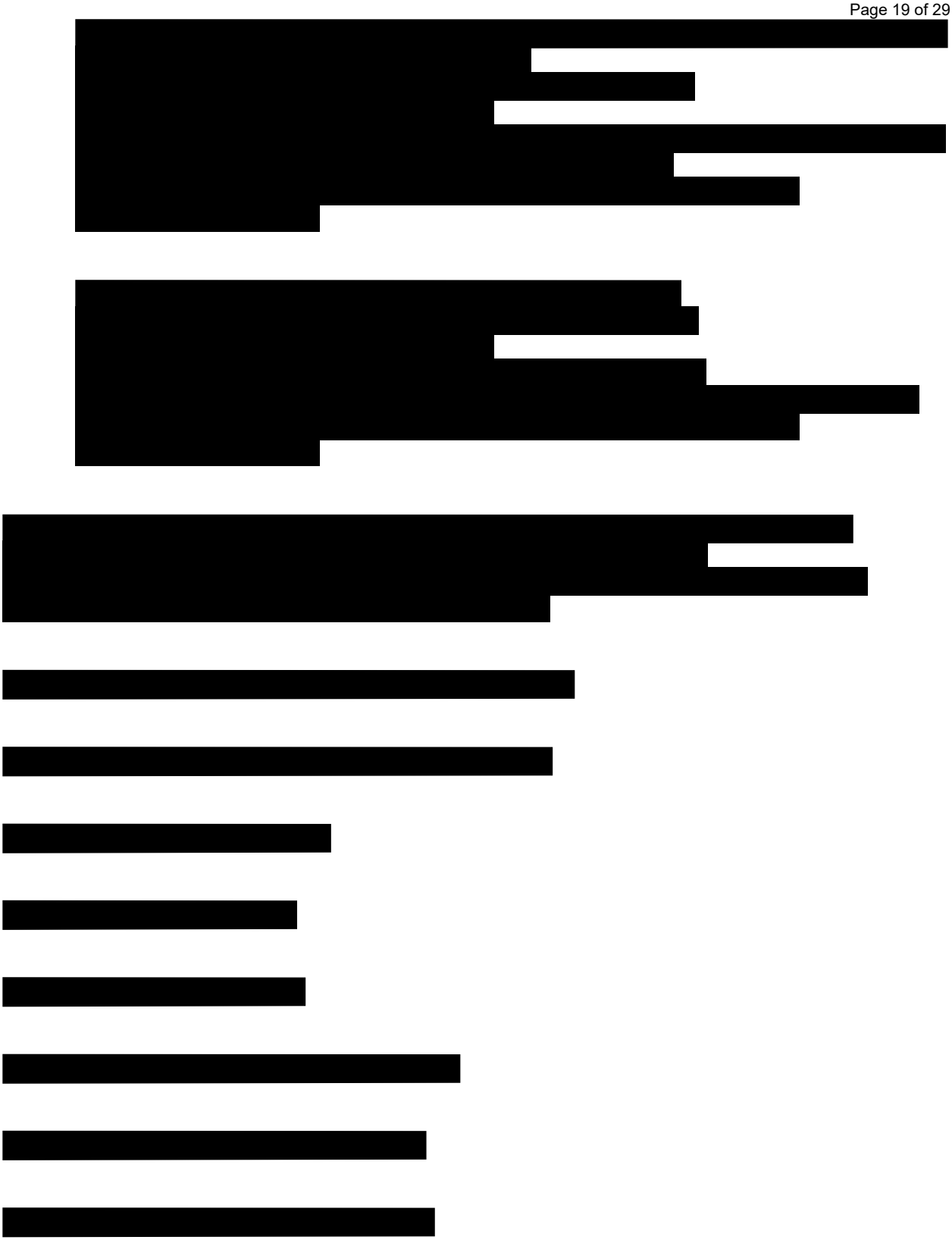
- ReliabilityRisk
- ElectricalCMI
- ElectricalCI
- SAIDI
- SAIFI
- CatastrophicFailures
- IncipientFailures
- DegradedFailures
- CatastrophicFailureKm
- IncipientFailureKm
- DegradedFailureKm

3.1.1 Consequence Formulas

[redacted]

[redacted]

[redacted]



[redacted]

3.1.2 Likelihood Formulas



3.2 Safety Component

The Safety component of the Distribution Asset Model calculates the following value measures:

- SafetyRisk

- LostTimeAccident
- DeathOrSeriousInjuryToPublic
- DeathOrSeriousInjuryToStaff

3.2.1 Consequence Formulas

[redacted]

3.2.2 Likelihood Formulas

[redacted]







3.3 Compliance Component

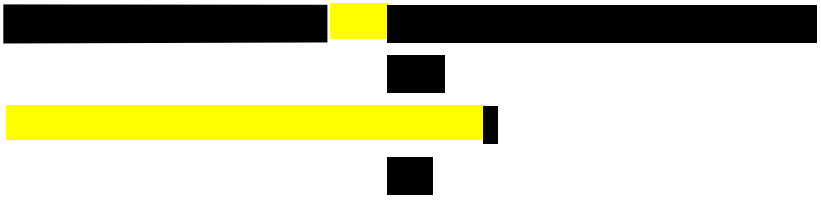
The Compliance component of the Distribution Asset Model calculates the following value measures:

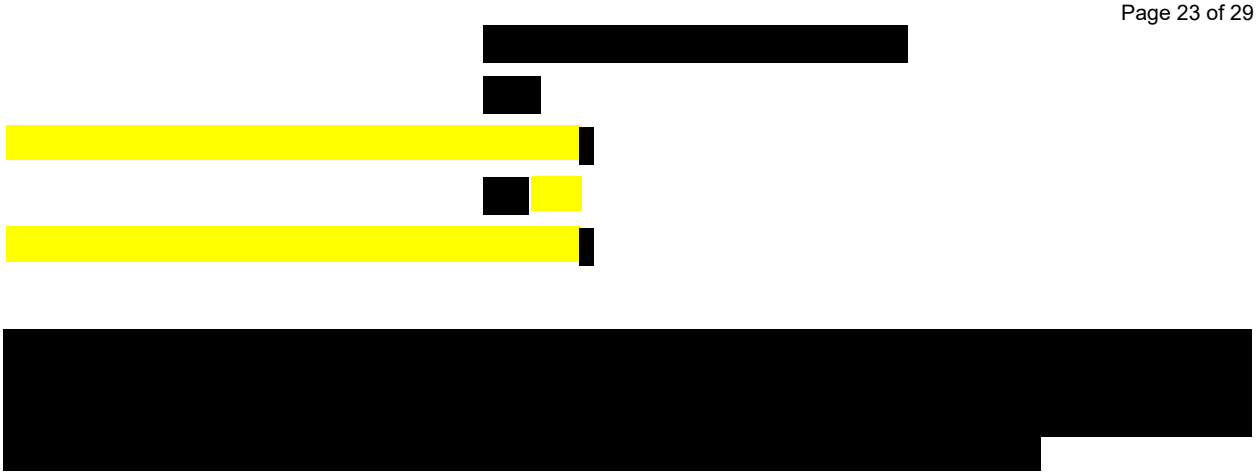
- ComplianceRisk

3.3.1 Consequence Formulas



3.3.2 Likelihood Formulas



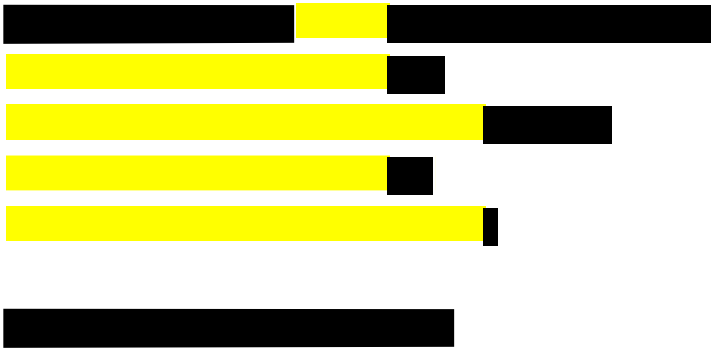


3.4 Environmental Component

The Environmental component of the Distribution Asset Model calculates the following value measures:

- EnvironmentalRisk
- OilLeaked
- SF6Emitted

3.4.1 Consequence Formulas





3.4.2 Likelihood Formulas

[redacted]

[redacted]

3.5 Financial Component

The Financial component of the Distribution Asset Model calculates the following value measures:

- FinancialRisk
- FinancialRiskEmergencyReplacement
- FinancialRiskCriticalReplacement
- FinancialRiskCollateralDamage
- FinancialRiskMaintenanceCost

3.5.1 Consequence Formulas

[redacted]





[redacted]

3.5.2 Likelihood Formulas

[redacted]

[redacted]

3.6 Cost Component

The Cost component of the Distribution Asset Model calculates the following value measures:

- ReplacementCost

3.6.1 Consequence Formulas

[redacted]

3.6.2 Likelihood Formulas

[redacted]

4 About Copperleaf Decision Analytics

The **Copperleaf Decision Analytics** software suite helps asset-intensive organizations decide where and when to invest in their businesses to optimize performance and manage risk. It will empower your organization to achieve optimal asset performance and business outcomes, including:

Higher-value decisions

- Create an investment strategy that delivers greater value to your organization more effectively
- Align investment decisions to your strategic objectives, including risk and service level targets

Staff efficiency improvements

- Improve the efficiency and effectiveness of your planning processes
- Reduce the time and effort needed for justifications and approvals

Integrated strategic & budgetary plans

- Proactively manage risk in your aging infrastructure
- Compare investment scenarios for both short- and long-term planning to optimize the use of scarce resources

Superior business performance

- Track progress and update assumptions to continuously improve

Copperleaf's Decision Analytics solution can be used collaboratively across your entire enterprise as the system of record for asset investment planning. It integrates seamlessly into your IT environment, to connect disjointed systems and data, and bring rigor, discipline, and transparency to the decision-making process.

Transforming how the world sees value

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Copperleaf (TSX:CPLF) provides enterprise decision analytics software solutions to companies managing critical infrastructure. We leverage operational and financial data to empower our clients to make investment decisions that deliver the highest business value. What sets us apart is our commitment to providing extraordinary experiences, shaped by people who care deeply, products that deliver exceptional value, and partnerships that stand the test of time. Copperleaf is a patron of The Institute of Asset Management and actively participates in shaping the future of asset management standards, including ISO 55000. Headquartered in Vancouver, Canada, our solutions are distributed and supported by regional staff and partners worldwide. Together, we are transforming how the world sees value.



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May 2022

Value Framework Definition Document (VFDD) – v2

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Document Control

Version	Date	Description	Originator
1	21-04-2021	Initial Draft	Alexa Margorian
2	06-05-2022	Minor formatting, nomenclature update, and content updates	Alicia O’Sullivan

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1 Introduction

The following Value Framework Definition Document is intended to capture the information needed to specify the risk mitigation and benefit values associated with Projects in Hydro Ottawa's Value Framework. This document also captures the relevant processes, methodologies and key assumptions that were used to develop the Value Framework. This document will also, briefly, review how the Value Framework is used to evaluate Projects and arrive at optimized recommendations.

2 Value-Based Decision-Making

2.1 Introduction to Value-Based Decision-Making

For an organization to optimize the use of its limited resources, it must have a mechanism to determine the relative value of each Project. The following elements can contribute to the overall value of a Project:

- Risks mitigated by a Project
- Consequences of a given risk if not mitigated
- Financial impacts, such as cost savings
- Overall cost of the Project
- Impacts to Key Performance Indicators (KPIs)
- Service measures
- Overall organizational value adds

A Project's net value is then used to determine both its independent merit and its standing among other Projects competing for resources in a constrained Optimization process. The process used to generate the Value Framework captured in this document is called Value-Based Decision-Making (VDM) and is an implementation of Multi-Criteria Decision Analysis (MCDA). The VDM approach (Figure 1. Value-Based Decision-Making Approach) is a best practice in Asset Project Planning and Management (AIPM) and encourages organizations to:

- Use a value-based approach to guide the development of the decision criteria and the relative weighting of the criteria to one another.
- Use a rational economic approach calibrated to a common scale so that dissimilar Projects can be compared based on a wide range of criteria.
- Align these criteria to the objectives and values of the organization to ensure that higher value translates into more success for the organization sooner.
- Use a quantitative, consistent, and repeatable approach to assess all benefits.
- Use a risk-informed approach, made by constructing an appropriate Risk Matrix to align the mitigation of risk to the common scale, ensuring risk is factored into decision-making.
- Ensure that both financial and non-financial benefits are included, and that their contributions are aligned to the common scale.

The VDM approach can be simplified into two primary activities:

- Develop a unique Value Framework that captures the organization`s key Value Measures, financial parameters, and Risk Matrix, and is aligned with the overall organizational goals.
- Use the Value Framework to evaluate and optimize potential Projects.

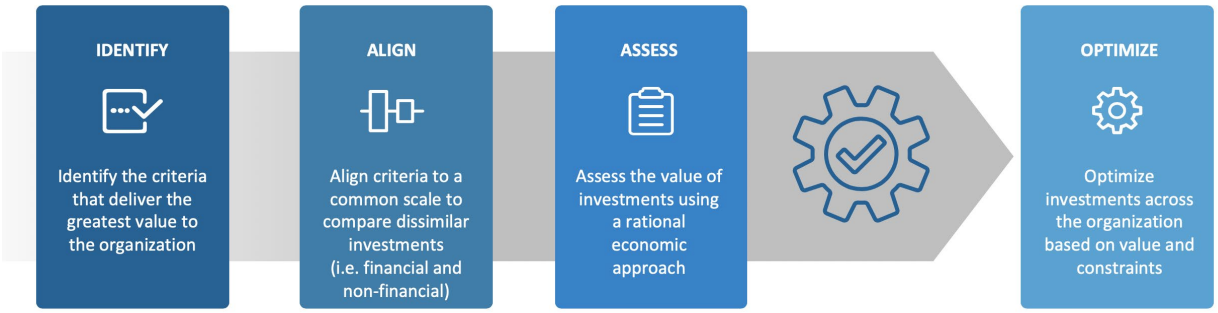


Figure 1: Value-Based Decision-Making Approach

The Copperleaf Value Framework (Figure 2: Copperleaf Value Framework) begins with the organization's strategic objectives and the scope of the Projects being considered. These guide the definition of Value Measures, Risk Matrix, and, ultimately, Value Function. It also defines and documents the financial parameters to be used in evaluating Projects, as well as any detailed supporting calculations, supporting processes, and related assumptions.

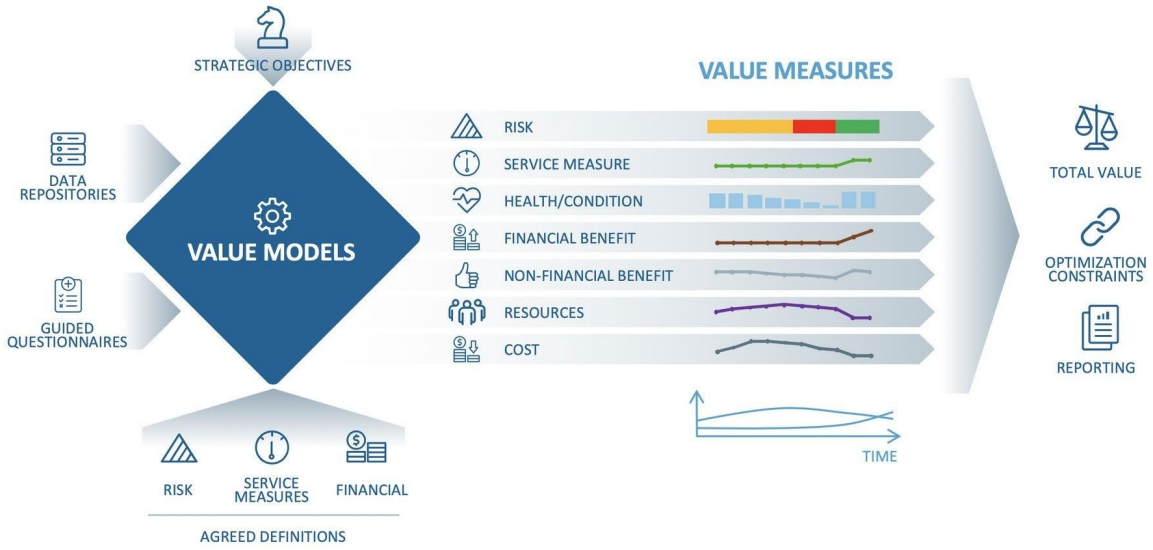


Figure 2: Copperleaf Value Framework

2.2 Value Measure Types and Criteria

Value Measures used at Hydro Ottawa can be classified into four main types:

- **Condition Value Measures** are used to capture the health of an Asset and are typically used as inputs to other Value Measures (for example, to calculate the probability of failure of an Asset) and for reporting.
- **Risk Value Measures** are typically configured with a baseline and an outcome calculation and are mainly used to capture the value of a Project in avoiding undesirable events. For example, a Project might be targeted to reduce safety and reliability consequences linked to the in-service failure of an Asset. Risk mitigation is typically included in the Value Function as a positive contributor to Project Value.

- **Benefits** capture desirable outcomes that are created by a Project, such as improvements in revenue or Client service. As with all Value Measures, Benefits may be configured to have both a baseline and an outcome, but it is typical for a Benefit Value Measure to have only an outcome. Benefits are typically included in the Value Function as a positive contributor to Project Value.
- **Cost Value Measures** represent the money that must be spent to execute the Project. There is a Project Cost Value Measure that is used as a negative contributor to Project Value. Then there are Value Measures that represent the breakdown of the Project Cost into individual Account Types that can be used as Constraints, and for reporting (Capital Spend or O&M Spend). These measures are not typically included in the Value Function as they would duplicate the Value expressed by the Total Cost Value Measure.

2.3 Assessing and Optimizing Projects

The Value Function combines all the required Value Measures to assess and compute the overall value that each Project is bringing to the organization, considering its financial and non-financial benefits, Risk Mitigation, and cost. All Projects are then optimized automatically by selecting the combination of start dates and Project Alternatives that will bring the highest total value to the organization while satisfying financial, resource, service measure, and timing constraints.

While each Project may bring value to the organization, it's not until the Projects are compared to one another, and financial constraints are applied, that it is known whether a specific Project will be funded or not, and in what timeframe. A lower value Project may be delayed in lieu of other, more urgent Projects, or it may ultimately be deemed unnecessary. Conversely, a lower value Project may be expedited if it is the only feasible option remaining, after most funds have been allocated to higher value projects.

Decisions about which Projects should be funded and when, are made using Copperleaf Portfolio's Optimization module. A full description of its functionality is beyond the scope of this document. For further details, consult the resources relating to the Optimization module, or contact Copperleaf directly.

Independent of the role that value plays within Optimization, it is often useful to see the value of a Project. This is represented by various financial metrics, which can be attached to portfolios or included in reports. The following are some of the most useful metrics to help determine the relative value of Projects:

- **Value**: The net value of the Project, as well as the breakdown of components making up that value is visible to the Project owner. A Project with a net value less than zero is a Project in which all the benefits specified for the Project have a present value less than the present value of the cost. Projects with a net value less than zero should be reconsidered (for example, if this Project is required for compliance reasons but has a negative value, that may indicate that the Compliance Risk has been misestimated) and/or re-evaluated for other value opportunities.
- **Value/$**: A Project with a larger net value is bringing more value to the organization; however, larger Projects typically bring more value than smaller Projects. Therefore, Value/$, (that is, net value/cost of the Project) can help to compare the effectiveness of Projects of different sizes.

For more details on financial metrics and reporting, consult the documentation on those topics, or contact Copperleaf directly.

3 Organizational Objectives

This section outlines the organizational objectives for Hydro Ottawa.

3.1 Scope of Work

The scope for development of the Hydro Ottawa Value Framework primarily covers the Distribution line of business.

3.2 Value Measures

Several Value Measures have been identified. These measures represent the categories or areas where value can be created by Projects.

- Capacity (Risk)
- Compliance (Risk)
- Distributed Generation (Benefit)
- Environmental (Risk)
- Financial Benefits and Costs (Benefit)
- Financial Risk (Risk)
- Program Effects (Benefit)
- Reliability (Benefit)
- Safety (Risk)
- Technological Innovation (Benefit)
- Total Investment Cost
- Reliability Risk (Risk)

Value Measures are the specific attributes of a Project that will be evaluated to objectively determine how it delivers value to Hydro Ottawa and to place that value on a common economic scale. The Value Function determines how the Value Measures are combined. The Value Function can be seen in Figure 3

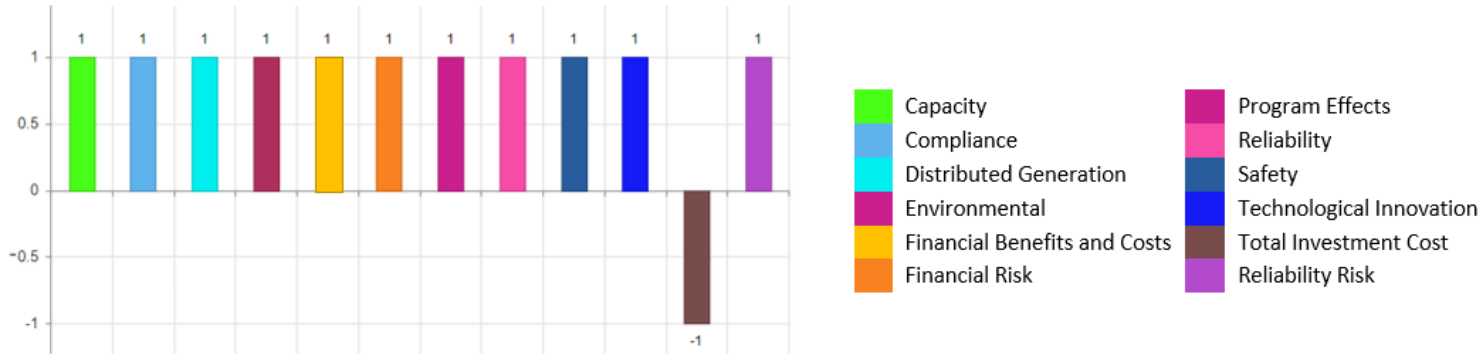


Figure 3: Hydro Ottawa Value Function

4 Risk Matrix

As described above, Risk is defined as the probability of an event occurring multiplied by the Consequence of that event. The Risk Matrix is built around the risk types that are important to the organization (that is, safety, environmental, lost production, etc.) and the associated Consequences by severity level. It is essential that the Consequence levels are aligned across the different risk types.

The Project owner specifies:

- Baseline Risk: The risk present if the Project is not completed.
- Residual Risk: The risk present after the Project is completed.

Value of Risk Mitigated is computed as: Mitigated Risk = Baseline Risk – Residual

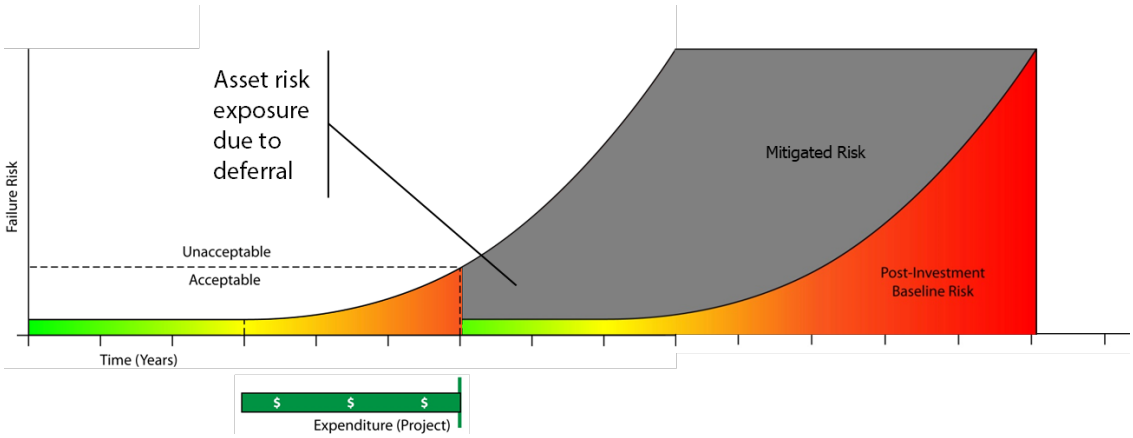


Figure 4: Mitigated Risk Over Time

Risks may be calculated automatically based on a combination of user entered data and Asset Attributes or may be specified based on the Likelihood and Consequence levels defined in the Risk Matrix. When risks are specified using the Risk Matrix, the value of each risk is evaluated based on the definitions provided in Consequence Definition and Likelihood Definition sections of this document.

4.1 Consequence Definition

The definition of the Consequence levels was developed by first looking at the overall range of Consequences (usually starting with financial consequences). Once the range was established, Consequence levels are created such that each level increases non-linearly (usually between 3x to 10x increase per level). This provides a clear progression between levels where changing a Consequence level results in a meaningful, conclusive change.

Existing Hydro Ottawa risk Consequences were aligned with the more granular Consequence levels to provide flexibility for Project risk evaluation.

4.1.1 Consequence Levels

Attributes	None	Very Negligible	Negligible	Very Minor	Minor	Moderate	Major	Catastrophic
Default Description	[redacted]							
Maximum Value								
Average Value								

Table 1: Consequence Levels

Consequence	None	Very Negligible	Negligible	Very Minor	Minor	Moderate	Major	Catastrophic
[redacted]								

Consequence	None	Very Negligible	Negligible	Very Minor	Minor	Moderate	Major	Catastrophic
[redacted]								

Table 2: Consequence Definitions

4.2 Likelihood Definition

The definition of Likelihood levels follows a similar principle to Consequence in order to get adequate differentiation between levels; however, the range doesn't need to be determined as it is between 0 and 100%. Again, an increase of 3x to 10x between levels is the norm. The types of risk events that are being considered may also impact the definitions of Likelihood levels.

	None	Very Rare	Rare	Unlikely	Somewhat Likely	Likely	Very Likely	Almost Certain
Description	[redacted]							

Table 3: Likelihood Definitions

4.3 Risk Matrix

The Hydro Ottawa risk matrix can be seen below in Figure 5.

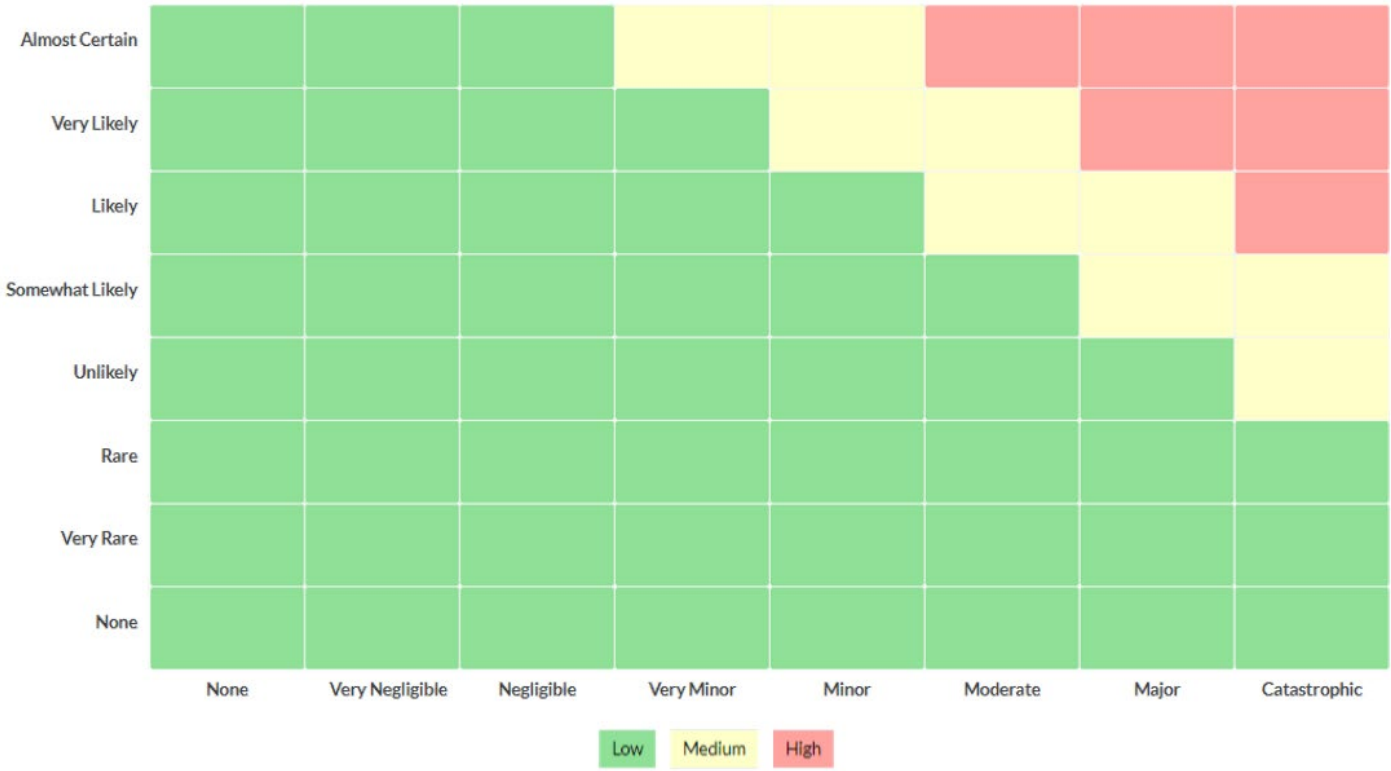


Figure 5: Risk Matrix

4.4 Risk Levels

Hydro Ottawa's Value Framework has three risk levels: Low, Medium, and High.

4.5 Using the Risk Matrix for Calculation of Value Measure Output

For Value Models that calculate Value Measure Outputs using a probability and consequence value from the Risk Matrix, a specific questionnaire has been created. This questionnaire is a **Manual Risk questionnaire** (named accordingly for each Risk Matrix Value Model) e.g. Compliance Risk Questionnaire for Compliance Risk.

The user is prompted to answer the following questions in the **Manual Risk** questionnaire:

Variable Prompt	Description	Time Varying?	Selection Options
[redacted]			

Table 4: Manual Risk Questionnaire

The user chooses the appropriate probability, consequence levels and frequency based on the definitions shown in the Consequence Definitions section of this document.

The Project is expected to reduce either the probability of the event, the consequence of the event, or both. This risk is calculated directly in value units using the Risk Matrix model described in the Risk Matrix section.

For both the baseline and the outcome values, risk is calculated as:

[redacted]

By default, the system will assume the risk is fully mitigated to a value of zero from the month following the last month of the Project with spend. This behavior uses a default **Automated Risk Mitigation** questionnaire selection which has no user inputs.

If the user wishes to override this default behavior and specify an outcome risk profile or a non-default impact date, they may use the questionnaire described above.

The Mitigated Risk value generated for the measure annually is equal to:

[redacted]



Figure 6: Manual Risk Questionnaire



Figure 7: Manual Risk Rationale

5 Value Models and Value Measures

Whereas Value Measures cover the different types of value that a given Project can bring to the organization, Value Models capture the way in which these Measures are calculated.

A Value Model can be used to calculate one or more Value Measures as shown in the figure below:



Figure 8: Value Models and Value Measures

As displayed above, some Value Models are driven by pre-existing data in the system, while others require manual data entry into a Questionnaire. Some Questionnaires may ask for inputs relating to the matrix, while others may include a more complex set of questions that feeds a calculation. All approaches are discussed in the following sections. The following tables provide a summary of the Value Models and their corresponding Value Measure outputs.

5.1 Value Model Groups

5.1.1 Asset Models

Value Model	Project Usage	Output Value Measures
[redacted]		

Value Model	Project Usage	Output Value Measures
[redacted]		

Table 5: Summary of Value Models in the Asset Models Group and their Output Value Measures

5.1.2 Benefits

Value Model	Project Usage	Output Value Measures
[redacted]		

Table 6: Summary of Value Models in the Benefits Group and their Output Value Measures

Note: The Reliability Model has been set to 'Not Applicable' due to its replacement with the Reliability Risk Model listed in section 5.1.4 but remains in the system for legacy purposes.

5.1.3 Costs

Value Model	Project Usage	Output Value Measures
[redacted]		

Table 7: Summary of Value Models in the Costs Group and their Output Value Measures

5.1.4 Risks

Value Model	Usage	Output Value Measures
[redacted]		

Value Model	Usage	Output Value Measures
[redacted]		

Table 8: Summary of Value Models in the Risks Group and their Output Value Measures

5.2 Value Measure and Value Model Types

5.2.1 Value Measures and Units

Value Measures may be calculated in any unit. For Value Measures to be included in a Value Function, a conversion is made between the units used for the Value Measure and the standard Value Units that are used in the Risk Matrix and in all Value calculations.

[redacted]

5.2.2 Baselines and Outcomes

Value Measures may be configured either to measure a change in Value created by a Project, or the absolute Value that exists after the Project has been completed.

For example, risk mitigation is typically measured as the delta between the risk without the Project (baseline risk) and the outcome or residual risk after the Project is completed. For Value Measures such as Project Cost, only the outcome after Project completion is relevant as there is no baseline to be considered.

5.2.3 Use of Value Models

As described above, Value Models can be designated as either “mandatory” or “optional” for Assets or Projects, or both. This allows the system to automatically add certain Value Models such as Project Cost or Asset Risk to all Projects, or to all Assets of a given Asset Type.

5.2.4 Time Varying Values

All Value Measures are calculated as streams of value over time. The System and Questionnaire inputs used in calculation may be defined as either fixed or varying over the time period. For example, the Asset Type of an Asset is a value that does not change over time, while the Probability of Failure of that same Asset may be specified to increase over time as the Asset ages.

5.3 Project Models

The Value Models discussed in this section are models that are not mandatory for, and therefore not automatically added to, either Assets or Projects.

A user may add any of the Value Models in this section to a Project. Additionally, a user may add any of the Value Models in this section to an asset, except the Avoided Future Asset Replacement which is tied to project spend.

5.3.1 Benefits

5.3.1.1 Distributed Generation

Distributed Generation measures the impact of whether a project enables distributed generation. Projects that enable distributed generation are given an additional 30 value units.

5.3.1.1.1 Value Model Inputs

Takes Inputs from:

- User Questionnaires
- System Configurable Fields

Distributed Generation User Questionnaires

The user is prompted to answer the following Questionnaires for the Distributed Generation Value Model.

Distributed Generation - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 9: Distributed Generation - Outcome Time Varying Questionnaire

Dropdown List Detail

Measure Prompt	Dropdown (Value)
[redacted]	

Table 10: Distributed Generation Questionnaires Dropdown List Details

Distributed Generation System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Type
[redacted]	[redacted]	[redacted]

Table 11: Distributed Generation System Configurable Fields

5.3.1.1.2 VALUE MODEL OUTPUTS

The **Distributed Generation** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 12: Distributed Generation Output Value Measures

5.3.1.1.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Distributed Generation Model.

Distributed Generation

Measure Description

Distributed Generation measures the impact of whether a project enables distributed generation. Projects that enable distributed generation yield a value of 30 value units for this measure.

Measure Calculation

[redacted]

5.3.1.2 Financial Benefits And Costs

Financial Benefits And Costs measures the financial benefits or costs to the organization in the form of Annual CAPEX and OPEX Cost savings/increases, cost avoidance or revenue increase (i.e. would result in a budget decrease/increase).

5.3.1.2.1 VALUE MODEL INPUTS

Takes Inputs from:

- User Questionnaires
- System Configurable Fields

Financial Benefits And Costs User Questionnaires

The user is prompted to answer the following Questionnaires for the Financial Benefits And Costs Value Model.

Financial Benefits And Costs - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 13: Financial Benefits And Costs - Outcome Time Varying Questionnaire

Financial Benefits And Costs System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]			

Table 14: Financial Benefits And Costs System Configurable Fields

5.3.1.2.2 VALUE MODEL OUTPUTS

The **Financial Benefits And Costs** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 15: Financial Benefits And Costs Output Value Measures

5.3.1.2.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Financial Benefits And Costs Model.

Financial Benefits And Costs

Measure Description

Financial Benefits and Costs identifies all additional financial benefits and costs relative to not undertaking this project.

Measure Calculation

[redacted]

5.3.1.3 Program Effects

Program Effects measures the annual program effects.

5.3.1.3.1 VALUE MODEL INPUTS

Takes Inputs from:

- User Questionnaires
- System Configurable Fields

Program Effects User Questionnaires

The user is prompted to answer the following Questionnaires for the Program Effects Value Model.

Program Effects - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]	[redacted]	[redacted]	[redacted]

Table 16: Program Effects - Outcome Time Varying Questionnaire

Program Effects System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]	[redacted]	[redacted]	[redacted]

Table 17: Program Effects System Configurable Fields

5.3.1.3.2 VALUE MODEL OUTPUTS

The **Program Effects** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 18: Program Effects Output Value Measures

5.3.1.3.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Program Effects Model.

Program Effects

Measure Description

Program Effects measures the annual program effects.

Measure Calculation

[redacted]

[redacted]

[redacted]

5.3.1.4 Technological Innovation

Technological Innovation measures the impact of whether a project introduces technological innovation to the corporation. Projects that introduce technological innovation are given an additional 10 value units.

5.3.1.4.1 VALUE MODEL INPUTS

Takes Inputs from:

- User Questionnaires
- System Configurable Fields

Technological Innovation User Questionnaires

The user is prompted to answer the following Questionnaires for the Technological Innovation Value Model.

Technological Innovation - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]	[redacted]	[redacted]	[redacted]

Table 19: Technological Innovation - Outcome Time Varying Questionnaire

Dropdown List Detail

Measure Prompt	Dropdown (Value)
[redacted]	[redacted]

Table 20: Technological Innovation Questionnaires Dropdown List Details

Technological Innovation System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]	[redacted]	[redacted]	[redacted]

Table 21: Technological Innovation System Configurable Fields

5.3.1.4.2 VALUE MODEL OUTPUTS

The **Technological Innovation** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 22: Technological Innovation Output Value Measures

5.3.1.4.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Technological Innovation Model.

Technological Innovation

Measure Description

Technological Innovation measures the impact of whether a project introduces technological innovation to the corporation. Projects that include technological innovation yield a value of 30 value units for this measure.

Measure Calculation

[redacted]

5.3.2 Costs

5.3.2.1 Project Cost

Project Cost captures the execution cost of a project for all of the projected fiscal years. The Project Value model is mandatory for all Projects and cannot be selected or removed by the user.

5.3.2.1.1 VALUE MODEL INPUTS

Takes Inputs from:

- System Configurable Fields
- System Core Fields

Project Cost System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Type
[redacted]		

Table 23: Project Cost System Configurable Fields

Project Cost Core Fields

[redacted]

5.3.2.1.2 VALUE MODEL OUTPUTS

The **Project Cost** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]		

Table 24: Project Cost Output Value Measures

5.3.2.1.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Project Cost Model.

CAPEX Cost

Measure Description

CAPEX Cost measures the CAPEX spending from year to year for a given project alternative.

Measure Calculation

[redacted]

[redacted]

OPEX Cost

Measure Description

Operating (OPEX) Cost measures the OPEX spending from year to year for a given project alternative.

Measure Calculation

[redacted]

Total Project Cost

Measure Description

Total Project Cost measures the total spending from year to year on proposed projects.

Total Project Cost value measure is equal to the total monthly spend for the Project/Project Alternative in all project accounts.

Measure Calculation

[redacted]

ForecastResource Overhead

Measure Description

ForecastResource Overhead measures the Overhead Resource spend from year to year for a given project alternative.

Measure Calculation

[redacted]

[redacted]

ForecastResource Station Electrician

Measure Description

ForecastResource Station Electrician measures the Station Electrician Resource spend from year to year for a given project alternative.

Measure Calculation

[redacted]

ForecastResource Station Technician

Measure Description

ForecastResource Station Technician measures the Station Technician Resource spend from year to year for a given project alternative.

Measure Calculation

[redacted]

ForecastResource Underground

Measure Description

ForecastResource Underground measures the Underground Resource spend from year to year for a given project alternative.

Measure Calculation

[redacted]

[redacted]

ForecastResource Metering

Measure Description

ForecastResource Metering measures the Metering Resource spend from year to year for a given project alternative.

Measure Calculation

[redacted]

5.3.3 Risks

5.3.3.1 Capacity Risk

Capacity Risk measures the societal cost associated with an interrupted electrical supply and assigns a positive value to projects which help mitigated a proportion of this risk.

5.3.3.1.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Capacity Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Capacity Risk Value Model.

Capacity Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 25: Capacity Risk - Baseline Time Varying Questionnaire

Capacity Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 26: Capacity Risk - Outcome Time Varying Questionnaire

Capacity Risk Core Fields

[redacted]

5.3.3.1.2 VALUE MODEL OUTPUTS

The **Capacity Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 27: Capacity Risk Output Value Measures

5.3.3.1.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Capacity Risk Model.

Capacity Risk

Measure Description

Capacity Risk measures the societal cost associated with an interrupted electrical supply and assigns a positive value to projects which help mitigated a proportion of this risk.

This Measure is calculated using the standard approach for all Risk Matrix Measures.

[redacted]

Measure Calculation

[redacted]

[redacted]

5.3.3.2 Compliance Risk

Compliance Risk (Risk Matrix) measures the mitigation of the risk of non-compliance with federal regulations, namely the risk of annual fines, additional compliance costs, or the subsequent cost of operating restrictions.

This Model takes questionnaire inputs to define the consequence and likelihood of a compliance risk aligned to the Value Framework Risk Matrix.

5.3.3.2.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Compliance Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Compliance Risk Value Model.

Compliance Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 28: Compliance Risk - Baseline Time Varying Questionnaire

Compliance Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 29: Compliance Risk - Outcome Time Varying Questionnaire

Compliance Risk Core Fields

[redacted]

5.3.3.2.2 VALUE MODEL OUTPUTS

The **Compliance Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 30: Compliance Risk Output Value Measures

5.3.3.2.3 Measure Calculation Details

This section details the calculation of each of the Value Measure Output for the Compliance Risk Model.

Compliance Risk

Measure Description

Compliance Risk measures the mitigation of the risk of non-compliance with federal regulations, namely the risk of annual fines, additional compliance costs, or the subsequent cost of operating restrictions.

This Measure is calculated using the standard approach for all Risk Matrix Measures.

[redacted]

Measure Calculation

[redacted]

5.3.3.3 Environmental Risk

Environmental Risk measures the mitigation of incidents that can lead to environmental damage.

5.3.3.3.1 Value Model Inputs

Takes Inputs from:

[redacted]

Environmental Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Environmental Risk Value Model.

Environmental Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 31: Environmental Risk - Baseline Time Varying Questionnaire

Environmental Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 32: Environmental Risk - Outcome Time Varying Questionnaire

Environmental Risk Core Fields

[redacted]

5.3.3.3.2 VALUE MODEL OUTPUTS

The **Environmental Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 33: Environmental Risk Output Value Measures

5.3.3.3.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Environmental Risk Model.

Environmental Risk

Measure Description

Environmental Risk measures the mitigation of incidents that can lead to environmental damage. This risk is intended for use in a Value Function and the avoided risk is a positive contributor to project value.

This Measure is calculated using the standard approach for all Risk Matrix Measures.

[redacted]

Measure Calculation

[redacted]

5.3.3.4 Financial Risk

Financial Risk Matrix measures the mitigation of financial risk to due to damage to equipment, loss of company assets, financial errors, or other factors resulting in monetary loss.

5.3.3.4.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Financial Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Financial Risk Value Model.

Financial Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 34: Financial Risk - Baseline Time Varying Questionnaire

Financial Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 35: Financial Risk - Outcome Time Varying Questionnaire

Financial Risk Core Fields

- CurrentMeasureBaselineUnits

[redacted]

5.3.3.4.2 VALUE MODEL OUTPUTS

The **Financial Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 36: Financial Risk Output Value Measures

5.3.3.4.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Financial Risk Model.

Financial Risk

Measure Description

Financial Risk measures the mitigation of potential financial risks such as financial losses due to damage to equipment or company assets if the Project is not completed.

This Measure is calculated using the standard approach for all Risk Matrix Measures.

[redacted]

Measure Calculation

[redacted]

5.3.3.5 Reliability Risk

Reliability Risk measures the mitigation of risk due to customer outages on the distribution system. The reliability value is based on the maximum of three computations: cost of outage duration, cost of outage frequency, and customer minutes of interruption. This Value Model also differentiates between residential, commercial, industrial, & mixed customers and between redundant & non-redundant equipment.

5.3.3.5.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Reliability Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Reliability Risk Value Model.

Reliability Risk - Baseline - Time Invariant

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 37: Reliability Risk - Baseline Time Invariant Questionnaire

Reliability Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 38: Reliability Risk - Baseline Time Varying Questionnaire

Reliability Risk - Outcome - Time Invariant

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 39: Reliability Risk - Outcome Time Invariant Questionnaire

Reliability Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 40: Reliability Risk - Outcome Time Varying Questionnaire

Dropdown List Detail

Measure Prompt	Dropdown (Value)
[redacted]	

Table 41: Reliability Risk Questionnaires Dropdown List Details

Reliability Risk System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]			

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]			

Table 42: Reliability Risk System Configurable Fields

Reliability Risk Core Fields

[redacted]

Reliability Risk Measure Inputs

- Minutes of Electric Customer Interruption

5.3.3.5.2 VALUE MODEL OUTPUTS

The **Reliability Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]		

Table 43: Reliability Risk Output Value Measures

5.3.3.5.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Reliability Risk Model.

Reliability Risk

Measure Description

Reliability Risk followed by a short (1-2 sentence) description of the measure.

Measure Calculation

[redacted]

[redacted]

In addition, Frequency Cost and Duration Cost are configured according to the selected Customer Type

CustomerType	FrequencyCost	DurationCost
[redacted]		

The benefit generated for this Measure is equal to:

[redacted]

Minutes of Electric Customer Interruption

Measure Description

Minutes of Electric Customer Interruption tracks the reduction in number of customer-minutes of service disruption.

Measure Calculation

[redacted]

[redacted]

5.3.3.6 Safety Risk

Safety Risk measures the mitigation of the risk of public safety incidents. This risk is intended for use in a Value Function and the avoided risk is a positive contributor to project value.

5.3.3.6.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Safety Risk User Questionnaires

The user is prompted to answer the following Questionnaires for the Safety Risk Value Model.

Safety Risk - Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 44: Safety Risk - Baseline Time Varying Questionnaire

Safety Risk - Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 45: Safety Risk - Outcome Time Varying Questionnaire

Safety Risk Core Fields

[redacted]

5.3.3.6.2 VALUE MODEL OUTPUTS

The **Safety Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]	[redacted]	[redacted]

Table 46: Safety Risk Output Value Measures

5.3.3.6.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Safety Risk Model.

Safety Risk

Measure Description

Safety Risk measures the mitigation of the risk of employee contractor and public safety incidents. This risk is intended for use in a Value Function and the avoided risk is a positive contributor to project value.

This Measure is calculated using the standard approach for all Risk Matrix Measures.

[redacted]

Measure Calculation

[redacted]

5.4 Asset Models

5.4.1 Asset Models

5.4.1.1 Condition Score Value Model

Condition Score tracks the condition of an asset over time. This condition degrades according to Condition Decay curves associated with assets or projects. It is used as an input to Probability of Failure calculations.

This Value Measure is a service measure calculated on a scale from 10 (brand-new) to 0 (failed).

5.4.1.1.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Condition Score Value Model User Questionnaires

The user is prompted to answer the following Questionnaires for the Condition Score Value Model Value Model.

Asset Risk Condition Score Baseline - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 47: Condition Score Value Model - Baseline Time Varying Questionnaire

Asset Risk Condition Score Outcome - Time Invariant

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 48: Condition Score Value Model - Outcome Time Invariant Questionnaire

Asset Risk Condition Score Outcome - Time Varying

Measure Prompt	Type	Required	Measure Prompt Code
[redacted]			

Table 49: Condition Score Value Model - Outcome Time Varying Questionnaire

Condition Score Value Model Core Fields

[redacted]

5.4.1.1.2 VALUE MODEL OUTPUTS

The **Condition Score Value Model** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]		

Table 50: Condition Score Value Model Output Value Measures

5.4.1.1.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Condition Score Value Model Model.

[redacted]

5.4.1.2 Simple Asset Risk

The **Simple Asset Risk** Value Model measures the risk exposure caused by the degradation over time of an asset. Investing against the asset mitigates this risk according to a preset formula based on the asset type. The project may also have other benefits.

5.4.1.2.1 VALUE MODEL INPUTS

Takes Inputs from:

[redacted]

Simple Asset Risk System Configurable Fields

The following values are stored as System Parameters and are applied to all Projects. These values may be updated by an administrator.

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]			

Configurable Field Name	Configurable Field Code	Description	Type
[redacted]			

Table 51: Simple Asset Risk System Configurable Fields

Simple Asset Risk Core Fields

[redacted]

Simple Asset Risk Measure Inputs

[redacted]

5.4.1.2.2 VALUE MODEL OUTPUTS

The **Simple Asset Risk** Value Model outputs the Value Measures as shown below:

Value Model	Usage	Output Value Measures
[redacted]		

Value Model	Usage	Output Value Measures
[redacted]		

Table 52: Simple Asset Risk Output Value Measures

5.4.1.2.3 MEASURE CALCULATION DETAILS

This section details the calculation of each of the Value Measure Output for the Simple Asset Risk Model.

Safety Risk

Measure Description

Safety Risk measures the mitigation of safety risk incurred by asset failure. This measure is used exclusively in Predictive Analytics.

Measure Calculation

[redacted]

Financial Risk

Measure Description

Financial Risk measures the mitigation of financial risk incurred by asset failure. This measure is used exclusively in Predictive Analytics.

Measure Calculation

[redacted]

[redacted]

Avoided Future Asset Replacement

Measure Description

Avoided Future Asset Replacement is used to capture costs associated with reactive asset replacement.

Measure Calculation

[redacted]

Environmental Risk

Measure Description

Environmental Risk measures the mitigation of environmental risk incurred by asset failure. This measure is used exclusively in Predictive Analytics.

Measure Calculation

[redacted]

[redacted]

Proactive Replacement Cost Base (PDF)

Measure Description

Proactive Replacement Cost Base (PDF) is used to capture costs associated with proactive asset replacement.

Measure Calculation

[redacted]

Direct Cost Risk (PDF)

Measure Description

Direct Cost Risk (PDF) represents the mitigation of societal and/or reactive replacement risks incurred by asset failure. This measure is used exclusively in Predictive Analytics.

Measure Calculation

[redacted]

Proactive Replacement Cost (PDF)

Measure Description

Proactive Replacement Cost (PDF) is used to capture costs associated with proactive asset replacement.

Measure Calculation

[redacted]

Direct Cost Risk (Legacy)

Measure Description

Direct Cost Risk (Legacy) represents the mitigation of societal and/or reactive replacement risks incurred by asset failure. This is a legacy measure for use in Asset Analytics, and is not typically used in a Project context.

Measure Calculation

[redacted]

Replacement Cost Normal

Measure Description

Replacement Cost Normal represents the cost of replacing the asset, spread over the asset's lifetime. It is intended to simulate a project spend in the context of Predictive Analytics. It is not typically used in a Project context.

Measure Calculation

[redacted]

6 Contact Copperleaf

Copperleaf (TSX:CPLF) provides enterprise decision analytics software solutions to companies managing critical infrastructure. We leverage operational and financial data to empower our clients to make project decisions that deliver the highest business value. What sets us apart is our commitment to providing extraordinary experiences, shaped by people who care deeply, products that deliver exceptional value, and partnerships that stand the test of time. Copperleaf is a patron of The Institute of Asset Management and actively participates in shaping the future of asset management standards, including ISO 55000. Headquartered in Vancouver, Canada, our solutions are distributed and supported by regional staff and partners worldwide. Together, we are transforming how the world sees value.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-41

EVIDENCE REFERENCE:

[Ex.2-5-4, p.74, 88, p.122] With respect to Hydro Ottawa's capital planning process:

QUESTION(S):

a. Please provide the total costs of the proposed expenditures for each year between 2026 and 2030, for each category of expenditures (System Access, Renewal, Service, and General Plant). at each stage of the planning process (e.g. plan, preliminary list, and second phase of optimization).
b. As part of any stage of the capital planning process, did Hydro Ottawa set an overall annual or plan budget amount that could not be exceeded set by senior management or others. If so, please provide the overall Hydro Ottawa set an overall annual or plan budget amount at each stage.

RESPONSE(S):

The reference to p.122 in Schedule 2-5-4 (6.3 Geographic Planning Considerations) appears to be inaccurate as it is unrelated to the questions posed.

a) Hydro Ottawa's Capital Expenditure Plan was the outcome of the Business Planning Process described in Section 3.1 of Schedule 2-5-4 - Asset Management Process and involved two main stages. The first stage, a comprehensive needs analysis, resulted in a preliminary capital expenditure plan of nearly $2B over the five-year period. Table A below shows the original needs analysis for each year. The second stage involved a reprioritization and optimization process, which established a new capital target of approximately $1.2 billion, representing a

40% reduction from the initial plan. Table B below compares the needs analysis (labelled as original budget in the table) to the final proposed plan submitted (labelled as reduced budget). Also refer to interrogatory response 2-Staff-73 part (b) for additional information.

Table A – 2026-2030 Original Capital Budgets (Needs Analysis) ($'000s)

Investment Category	Test Years				
	2026	2027	2028	2029	2030
System Access	$ 34,011	$ 33,479	$ 26,664	$ 32,900	$ 26,756
System Renewal	$ 145,372	$ 149,718	$ 161,781	$ 141,426	$ 128,977
System Service	$ 172,783	$ 210,318	$ 163,061	$ 173,498	$ 195,377
General Plant	$ 56,066	$ 32,462	$ 49,319	$ 39,629	$ 16,198
NET CAPITAL EXPENDITURES	**$ 408,231**	**$ 425,977**	**$ 400,826**	**$ 387,453**	**$ 367,308**

Table B – 2026-2030 Original vs. Reduced Capital Budgets ($'000s)

Investment Category	Original Budget	Reduced Budget	Reduction	Reduction %
	2026-2030	2026-2030		
System Access	$ 153,811	$ 173,228	$ 19,417	13%
System Renewal	$ 727,274	$ 431,704	$ (295,570)	-41%
System Service	$ 915,037	$ 469,139	$ (445,898)	-49%
General Plant	$ 193,674	$ 121,201	$ (72,473)	-37%
NET CAPITAL EXPENDITURES	**$ 1,989,795**	**$ 1,195,271**	**$ (794,524)**	**-40%**

b) Yes, as outlined in the response to interrogatory 2-Staff-73 part b), once the original needs analysis was determined, management and the Board of Directors did set a high-level capital target of $1.2B. Refer to the materials from the June 2024 Board of Directors meeting available in Attachment 1-CCC-13(A) - Rate Application Material Provided to the Hydro Ottawa Limited Board of Directors.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-42

EVIDENCE REFERENCE:

[Ex.2-5-4, p.112] With respect to the portfolio optimization process:

QUESTION(S):

a. Please provide in an Excel spreadsheet, all key outputs of the final Copperleaf prioritization process. The information should include at a minimum, the specific project/program, OEB category, project cost, year to be completed, total value score, value score across each value measure, any flags related to the program/project being mandatory or discretionary, and if the project/program is to be included in the plan.
b. Please detail all constraints, flags, or any similar added rules Hydro Ottawa included in the optimization process.

RESPONSE(S):

a) The provided reference pertains to the annual optimization process, which is not yet available for the Test period. The Capital Expenditure Plan for System Renewal and System Service (Schedules 2-5-7 and 2-5-8) is completed at the program level, with the exception of large, discrete projects such as stations.

Hydro Ottawa is currently finalizing the portfolio optimization process for 2026, as detailed in Section 5.3.2.4 of Schedule 2-5-4 - Asset Management Process. Annually, selected System Renewal and System Service projects are ranked in Copperleaf Portfolio after undergoing Project Evaluation and assessment via the Value Framework Model (Section 5.3.2.2). This system generates a prioritization based on each project's value score.

The initial list is then reviewed to refine project scope and cost estimates before being re-run through the portfolio optimization process. However, in an attempt to be responsive to the initial request, the 2025 output of the Copperleaf Portfolio Optimization Process is provided in Excel Attachment 2-SEC-42(A) - Copperleaf Key Outputs 2025.

a) The constraints used during the 2025 Copperleaf Portfolio Optimization process included the board-approved budget and individual program targets (for example annual pole replacement targets). Carry-over projects from the previous year were also automatically included as a constraint.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-43

EVIDENCE REFERENCE:

[Ex.2-5-4, p.113]

QUESTION(S):

Please explain how Hydro Ottawa internally reports and measures on capital project and program execution. Please provide a copy of the latest version of all significant capital programs and project execution reporting documents that are regulatory produced (i.e. monthly, annually, etc.).

RESPONSE(S):

Hydro Ottawa employs a multi-tiered reporting structure to ensure the strategic execution and robust oversight of its capital projects and programs. The process begins with monthly capital project reviews by Project Managers, followed by a comprehensive review at the program level during dedicated Program Meetings, which bring together key stakeholders from engineering, design, operations, and scheduling to assess project and program status, schedule, trade availability for completion, and risks.

Following program-level assessments, a monthly portfolio-level review is conducted, encompassing all programs with a broader forum of stakeholders who review and discuss the overall program status and identify potential risks across the entire portfolio.

The collective insights derived from the Program and Portfolio meetings serve as input for the monthly Business Alignment Meeting, attended by Managers and Directors. Here, the overarching scope, schedule, and financial health of projects are reviewed and discussed, ensuring top-level

awareness and decision-making. This process then feeds into monthly and quarterly capital portfolio status updates to the Hydro Ottawa Executive Management team, and quarterly such updates to the Board of Directors.

Hydro Ottawa respectfully declines to provide examples of the documents that are reviewed at these meetings because without the context of the presentations and detailed discussions that occur at these meetings between the stakeholders, these materials are not probative to deciding the issues in this proceeding. The process is described above and Hydro Ottawa witnesses who have experience with this process are available to answer further questions at the Technical Conference.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-44

EVIDENCE REFERENCE:

[Ex.2-5-4, p.145-183] With respect to asset condition demographics:

QUESTION(S):

a. In a single table, for each major asset type, please provide the total number of assets, and the number and percentage of assets in very good, good, fair, poor, and very poor condition. Please provide in Excel format.
b. In a single table, for each major asset type, please provide the total number of assets, and the number and percentage of assets in very good, good, fair, poor, and very poor condition, forecast in 2030, based on the proposed investment plan included in the application. Please provide in Excel format.

RESPONSE(S):

a) Please see Excel Attachment 2-SEC-44(A) - 2024 Asset Condition Count and Percentage.

b) Please see the attachment 2-SEC-44(B) - 2030 Asset Condition Count and Percentage.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-45

EVIDENCE REFERENCE:

[Ex.2-5-4, Attachment E] With respect to the 1898 & Co, Resilience Investment Business Case Report:

QUESTION(S):

a. [p.75] As part of the analysis, 1898 & Co. calculated the Value of Lost Load (VOLL) using the ICE Calculator based on New York State. As part of the OEB's VASH consultation, its consultant, Guidehouse, has proposed an appropriate VOLL using composite values from New York, Michigan, Ohio and Iowa.1 If 1898 & Co. had used the same VOLL methodology, how would that have changed the number of economic projects?
b. [p.100] Please identify each of the 26 economic projects, please provide the project costs, high-level scope, individual life-cycle benefits NPV, BCR. Please also identify if Hydro Ottawa proposes to complete the project during the plan term, and if so, part of what program.

RESPONSE(S):

a) As per Section 6.2 of Attachment 2-5-4(E) - Resilience Investment Business Case Report, 1898 & Co. completed the Value of Lost Load (VOLL) calculation using the ICE Calculator based on New York State because it is the closest U.S. State to Ottawa. This study was completed prior to the engagement of Guidehouse for the OEB's Vulnerability Assessment for System Hardening (VASH) consultation, which subsequently proposed a composite VOLL using values from New York, Michigan, Ohio, and Iowa.

Since this updated VOLL methodology was not applied in Hydro Ottawa's original assessment, the exact change in the number of economic projects cannot be definitively determined or commented upon.

b) Hydro Ottawa's 2026-2030 investment plan for grid resilience against severe weather was informed by the 1898 & Co. Resilience Investment Business Case Report. This report employed a data-driven model to identify and prioritize strategic undergrounding of vulnerable overhead distribution sections. The analysis identified 26 initial economic undergrounding projects with a total estimated cost of $57 million, all demonstrating a Benefit-Cost Ratio (BCR) greater than or equal to 1. For comprehensive details on these 26 initial undergrounding projects please refer to Table A below.

It is crucial to understand that Hydro Ottawa utilized the information in these 26 projects as a starting point for developing its System Resilience Budget Program, as outlined in Section 3 of Schedule 2-5-8 - System Service Investments. Based on internal system knowledge, operational experience, and other contributing factors, Hydro Ottawa made some suggested adjustments to the scope of these initial projects to optimize their effectiveness and integration within the broader distribution system.

The insights gained from this analysis initiated broader discussions and planning around Hydro Ottawa's comprehensive resilience strategies. These strategies encompass a multi-faceted approach, including strategic undergrounding, storm hardening, feeder reconfiguration, station egress undergrounding and line relocation.

Table A – Undergrounding Projects BCR ≥1

Circuit	Voltage (kV)	Configuration	Project Cost	BCR
5408	13.2	Lateral	$1,637,706	4.8
LTM02	28	Lateral	$1,376,401	3.9
TB07	13.2	Lateral	$650,429	2.7
LTM02	28	Lateral	$1,442,108	2.2
624F5	28	Backbone	$1,402,457	1.9
EPWF5	8.32	Lateral	$1,554,539	1.9
EPWF2	8.32	Lateral	$756,159	1.7
200F2	8.32	Lateral	$551,809	1.6
FAL01	28	Lateral	$607,297	1.6
CYRF2	28	Lateral	$785,124	1.4
TO3AC	13.2	Subtransmission	$4,569,425	1.4
MERF4	8.32	Backbone	$2,466,317	1.3
TD16	13.2	Lateral	$925,427	1.3
MERF2	8.32	Lateral	$625,908	1.3
8F1	28	Backbone	$2,720,777	1.3
22M27	44	Subtransmission	$18,329,074	1.2
TL1UF	13.2	Subtransmission	$591,068	1.2
EPWF4	8.32	Lateral	$528,597	1.2
TK2AC	13.2	Lateral	$1,016,182	1.2
TR2FB	13.2	Subtransmission	$1,289,343	1.2
TA3AF	13.2	Lateral	$4,427,329	1.2
CAS-F1	8.32	Lateral	$2,549,166	1.2
MERF2	8.32	Lateral	$470,476	1.1
200F3	8.32	Lateral	$979,417	1.1
TM1UC	13.2	Subtransmission	$3,931,617	1.1
TA3AF	13.2	Lateral	$1,095,596	1.0

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-46

EVIDENCE REFERENCE:

[Ex.2-5-5]

QUESTION(S):

In a single table, please provide for each asset type, the number of assets replaced each year between 2020 and 2024, and the number forecast to be replaced between 2025-2030. Please provide in Excel format.

RESPONSE(S):

Please see Excel Attachment 2-SEC-46(A) - System Renewal Asset Quantities, which shows each asset type, the number of assets replaced each year between 2020 and 2024, and the number forecasted to be replaced between 2025 and 2030.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-47

EVIDENCE REFERENCE:

[Ex.2-5-5, p.74]

QUESTION(S):

Hydro Ottawa says: “The 2021-2025 unit rate for Hydro Ottawa's cable renewal program was developed using a limited project subset, which proved inadequate to capture the technical complexity of the Ottawa region.” Please provide further details regarding the nature of the limited project subset used and how it did not reflect the technical complexity of Ottawa, and the work that ultimately was completed.

RESPONSE(S):

The program was relatively new during this period, and the small subset of cable renewal projects undertaken from 2017-2019 were less complex, both in terms of kilometers and subsurface challenges, than the projects from 2021-2025. At the time of the 2021-2025 rate application submission, this unit rate would also not have taken into account the update to Hydro Ottawa’s Underground Residential Transformer and Service Wire Sizes Guideline (USK0171), which governs the installation and upgrading of underground residential infrastructure to accommodate anticipated future electric vehicle loads; this factor alone underestimates the 2021-2025 unit rate by approximately 15%.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-48

EVIDENCE REFERENCE:

[Ex.2-5-6, p.52] With respect to System Expansion costs:

QUESTION(S):

a. Please provide the difference in capital contributions for each year as a result of the implementing of changes to the Appendix B of the DSC meant to facilitate the connection of housing developments
b. What is the annual revenue requirement impact of the changed referred to in part (a)?

RESPONSE(S):

a) Please refer to the response to interrogatory 2-Staff-78.

b) Please refer to the response to interrogatory 2-Staff-78.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-49

EVIDENCE REFERENCE:

[Ex.2-5-7, p.28-29]

QUESTION(S):

Please explain how in 2028, Hydro Ottawa proposes to replace 2 station switchgears as part of the replacement program, at a cost of $0.6M, and in 2029 replace 14 switchgears at the same cost.

RESPONSE(S):

In reference to Schedule 2-5-7 - System Renewal Investments, Hydro Ottawa would like to clarify that one switchgear unit as referenced in Table 4 of Section 2.5 is equal to one station breaker as noted Section 2.5.2. Furthermore, a switchgear is often composed of multiple breakers or unit replacements. There are four planned switchgear projects from 2026-2030, which will result in the replacement of 38 units during the Test Years. Hydro Ottawa notes that on page 29, Table 4 of Schedule 2-5-7 - System Renewal Investments, the Station Switchgear (Replacement) units for 2029 and 2030 should be ”-” and “21” respectively, not "14" and “14”, as noted in Hydro Ottawa’s response to 2-Staff-90.

Switchgear renewal projects are typically multi-year initiatives, and the replacement quantity is recorded as a unit upon energization and capitalization. Additionally, the scope of switchgear projects may vary, and will affect the project costs. Notably items affecting scope and cost are:

- Type of switchgear renewal (entire switchgear replacement versus roll in replacement)
- Building modifications
- Outage availability
- Feeder cutover sequencing

- Connection to transmission facilities

Consequently, project expenditures are often forecasted across different fiscal years, with most expenditures occurring prior to capitalization. Please see Table A below showcasing capital expenditure, Table B showing additions for switchgear renewal, and Table C showing station switchgear units.

Table A - Test Years Expenditure per Station Switchgear Renewal Budget Program ($000,000)

Budget Program	Test Years				
	2026	2027	2028	2029	2030
Station Switchgear Renewal	$ 6.0	$ 7.0	$ 0.6	$ 0.6	$ 9.3

Table B - Test Years Capital Additions per Station Switchgear Renewal Budget Program ($000,000)

Budget Program	Test Years				
	2026	2027	2028	2029	2030
Station Switchgear Renewal	$ 1.7	$ 6.0	$ 5.9	$ -	$ 9.8

Table C - Test Years Station Switchgear Unit Replacements

sStation Asset Class	Test Years				
	2026	2027	2028	2029	2030
Station Switchgear (Replacement)	7	8	2	-	21

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-50

EVIDENCE REFERENCE:

[Ex.2-5-7]

QUESTION(S):

For each program, where the costs of replacement are determined by a unit cost calculation, please provide the unit cost and details of how it was derived.

RESPONSE(S):

Table A below outlines the System Renewal budget programs with unit costs involved, and the determination basis for the same.

Table A - Unit Costs and Determination Basis per System Renewal Program 2026-2030

Asset Type	Unit Cost	Determination Basis
Station Switchgear Renewal	$620,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.

Asset Type	Unit Cost	Determination Basis
Station P&C Renewal	Relays $28,000 RTU $1,100,000 Transfer Trip $700,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
Station Battery Renewal	$73,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
Pole Renewal	Pole: $27,500 Undergrounding: $60,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
OH Switch / Recloser Renewal	Manual Switches $10,000 Scadamate $128,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
UG Switchgear Renewal	Manual Switches $163,000 Motorized $218,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.

Asset Type	Unit Cost	Determination Basis
Cable Renewal	$1,400,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
Civil Renewal	$197,000	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.
Vault Renewal	$117,000 per 3-phase bank	Projection is based on an analysis of historical spending. To account for unforeseen challenges and cost escalations, a risk factor has been included in all programs. Additionally, an average annual increase has been incorporated to address the rising future costs of equipment and materials.

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

22-SEC-51

EVIDENCE REFERENCE:

[Ex.2-5-7]

QUESTION(S):

With respect to metering renewal:

a. [p.130] Please provide a revised version of Figure 73, showing the demographic profile of residential and small commercial meters based on the proposed investment plan.
b. Please provide a table that shows the number of failures over the last 5 years by meter age, broken down by type of meter.
c. Has Hydro Ottawa completed a competitive procurement for its AMI 2.0 project and entered into a contract with a vendor? If so, is that the basis for the cost estimate? If not, what is the status of the process and what is the basis for the cost forecast?
d. [p.138] What is included in the OM&A costs included in Table 21?

RESPONSE(S):

a) Hydro Ottawa is unable to provide a revised version of Figure 73 based on the proposed investment plan. At this time, given that a detailed implementation plan for the AMI 2.0 is not completed, Hydro Ottawa cannot identify the exact timing of the specific meters replaced. The meter age and meter seal date, geographic location, critical infrastructure, grid modernization initiatives, and customer density are all factors considered during the implementation (refer to Section 5.7.1 of Schedule 2-5-7 - System Renewal Investments).

b) Hydro Ottawa does not track meter failures to this level of granularity and cannot provide the data. For a list of failure types by field activity from 2021-2024, please see Table 20 on page 132 of Schedule 2-5-7 - System Renewal Investments.

c) No, Hydro Ottawa has not yet completed a competitive procurement for its AMI 2.0 project and has not entered into a contract with a vendor. Hydro Ottawa is currently in the process of procuring an external technical partner to aid in the competitive selection process for a vendor. The selected vendor will be responsible for supporting the proposed 10-year AMI 2.0 deployment.

The basis of the cost forecast for the rate period was developed with internal and external support, including historical spend and internal estimates of foundational capital and operating expenses to achieve the proposed 10-year deployment. The forecast period cost basis estimates include (but are not limited to) existing unit meter, IT/OT systems installation/maintenance, and labour costs.

d) For the Test years, Software and Integration Maintenance, Data Services, and Enterprise Integrations, and mobile phone costs are included in OM&A costs in Table 21 of Schedule 2-5-7 - System Renewal Investments.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

22-SEC-52

EVIDENCE REFERENCE:

[Ex.2-5-8]

QUESTION(S):

With respect to station and distribution capacity upgrades:

a. Hydro Ottawa has identified a number of large loads driving capacity need that is being addressed through new and upgraded stations. Are these large loads paying capital contributions towards these new and upgrades stations? If, so please provide details including specific amounts for each specific investment and how it interprets expansion vs. enhancement project. If not, please explain why not.

b. [p.50-52] Please provide a table that shows for each station where work is being proposed during the plan term, the capital expenditures proposed have been, or to be, spent each year between 2021 and 2030.

RESPONSE(S):

a) Yes, large load customers will contribute capital to new station upgrades included under System Service, as detailed in Table 2 of Schedule 2-5-8 - System Service Investments. This includes contributions to Greenbank MTS, which have been forecasted for 2026-2030. For definitions of system expansion and enhancement projects, refer to part (a) of Hydro Ottawa's response to interrogatory 2-CCC-29.

b) To accommodate this request, two tables have been created below: Table A for Station Capacity Upgrades and Table B for Distribution Capacity Upgrades. There is no 2021-2025 spending for distribution upgrades related to the new stations under System Service.

Table A – Station Capacity Upgrades Program Spend 2021-2030 ($'000 000s)

Station	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Piperville MTS	-	$ 0.1	$ 1.1	$ 13.6	$ 23.9	$ 3.6	-	-	-	-
Riverdale Switchgear Upgrade	-	-	$ 0.2	$ 3.6	$ 9.3	$ 0.8	-	-	-	-
Mer Bleue MTS	-	-	-	$ 4.0	$ 9.8	$ 24.7	$ 9.3	-	-	-
New Kanata North station	-	-	-	-	-	$ 14.4	$ 26.4	$ 4.1	-	-
Greenbank MTS	-	-	-	-	-	$ 11.3	$ 23.6	$ 3.6	-	-
Cyrville Capacity Upgrade	-	-	-	-	-	-	$ 0.1	$ 1.4	$ 13.4	$ 20.4
Bronson Upgrade	-	-	-	-	-	-	$ 0.1	$ 1.4	$ 13.4	$ 20.2

Table B – Distribution Capacity Upgrades Program Spend 2026-2030 ($'000 000s)

Distribution Upgrade	Test Years				
	2026	2027	2028	2029	2030
Piperville MTS distribution upgrades	$ 3.5	$ 2.5	-	-	-
Mer Bleue MTS distribution upgrades	$ 5.5	$ 3.5	$ 3.9	$ 3.7	-
New Kanata North distribution upgrades	$ 6.7	$ 13.0	$ 1.0	-	-
Greenbank MTS distribution upgrades	$ 2.0	$ 2.0	$ 8.0	$ 4.0	$ 4.0
Cyrville Capacity distribution upgrades	-	-	-	$ 2.0	$ 2.5
Bronson distribution upgrades	-	-	$ 5.0	$ 5.0	$ 5.0

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-53

EVIDENCE REFERENCE:

[Ex.2-5-8, p.52]

QUESTION(S):

With respect to non-wires solutions:

a) Hydro Ottawa states that for its NWS program includes an “an additional $10M of costs included in Other Income and Deductions - Services to Third Parties.” Please provide details regarding these costs and why they are included as a part of ‘Other Revenue’.

b) For each specific NWS project, please provide a breakdown of the total cost, by category, for each year between 2026 and 2030.

c) Please provide further details regarding the Non-Wires Customer Solutions Program and how the budget was determined.

d) The OEB’s BCA Framework for Addressing Electricity System Needs states that: “Distributors filing rate applications in 2024 or 2025 are strongly encouraged to use the BCA Framework, particularly for applications requesting funding for an NWS.” (page 8):

   i) Did Hydro Ottawa use BCA to assess any of its proposal capital spending? If so, please provide a copy.

   ii) Please complete the OEB’s BCA Framework template (or any more advanced set of calculations) for the NWS spending proposed as part of the application.

RESPONSE(S):

a) The $10M funding request is Hydro Ottawa's budget for customer incentives to be provided within Hydro Ottawa's Non-Wires Customer Solutions Program (NWCSP). Please refer to Section 9.2.2.1 of Schedule 2-5-4 - Asset Management Process as well as the response to interrogatory 2-Staff-67 for more details on the NWCSP.

The incentives for third parties and any margin on payments were included in Other Revenue for several reasons. This approach anticipates funding from the IESO to support Non-Wires Alternatives along with the possibility of receiving external funding, such as revenues from the IESO markets related to BESS, please see interrogatory responses 1-ED-6. It also aligns with historical practice, as Conservation and Demand Management (CDM) incentive payments were also recorded under Other Revenue. Additionally, because the incentives are not intended to fluctuate, they do not align with the nature of Operations, Maintenance, and Administration (OM&A) expenses. This placement within the revenue requirement also makes them a more visible line item as part of the rate structure.

b) Refer to Hydro Ottawa's response to interrogatory 2-Staff-67 part (a), (iii) for details regarding Hydro Ottawa's NWCSP and the portfolio of programs within it, and to the response to interrogatory 2-Staff-111 part (c), (iii) for details about Hydro Ottawa's BESS investments.

c) The budget for the NWCSP, which is attributed primarily to customer incentives to encourage participation, is ultimately an outcome of the selection of individual programs within the portfolio and the result of analysis that was completed using the BCA Framework. Further details on the NWCSP, including the associated Benefit Cost Analysis (BCA) please refer to 2-Staff-67 (a) and (b).

d)

i) Please refer to interrogatory 2-ED-8.

ii) Please refer to interrogatory 2-ED-8.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

22-SEC-54

EVIDENCE REFERENCE:

[Ex.2-5-8, p.98]

QUESTION(S):

With respect to the ODERA project:

a) Please provide the project's full internal business case and project plan.
b) Please provide a detailed cost estimate.
c) Please provide the status of the project to date.
d) Please provide a completed OEB BCA.
e) The project is more fully discussed as part of the Distribution Enhancements program. Is the project the same project as that which Hydro Ottawa addresses as part of its System Capacity project, where it discusses the deployment of Non-Wires Customer Solutions to acquire 10 to 15MW in the Kanata North region (2-5-8, p.33)? If so, is the project included in the Distribution Enhancements program or the Non-Wires upgrade portion of the Capacity Upgrade program?

RESPONSE(S):

a) For Hydro Ottawa's project justification please refer to Section 3 of Schedule 2-5-8 - System Service Investments.

The ODERA project plan is provided in Table A below.

Table A - ODERA Project Plan

Task	Timing
Project Initiation	2024 - 2025
Preliminary Design	2025 - 2026
Detailed Design & Development	2026
Design Verification & Test	2026 - 2027
Technology Deployment	2027 - 2028
Project Close Out	2028

b) The ODERA project's total cost is estimated to be $14.6M. Of this amount, $3.1M will be contributed by the AMI 2.0 Meter Renewal project. The detailed cost estimate for the ODERA project is included in Table B below. As outlined in parts (a) and (b) of Hydro Ottawa's response to interrogatory 2-Staff-69, the total amount being requested in rates is $5.1M with the contribution of $6M in federal funding.

Table B - ODERA Detailed Cost Estimate ($'000s)

	Cost Estimate					
	2024	**2025**	**2026**	**2027**	**2028**	**Total**
Distribution Enhancements						
Labour	$ 24	$ 838	$ 3,381	$ 1,426	$ 399	$ 6,067
Material	-	$ 161	$ 1,539	$ 2,474	$ 76	$ 4,250
Outside Services	-	$ 1,137	$ 2,032	$ 916	$ 236	$ 4,321
SUBTOTAL - DISTRIBUTION ENHANCEMENTS	$ 24	$ 2,136	$ 6,952	$ 4,816	$ 711	$ 14,638
Contributions						
In-Kind Contributions	-	-	$ (244)	$ (55)	$ (63)	$ (361)
Natural Resources Canada (NRCan) Contributions	-	$ (2,000)	$ (2,500)	$ (1,500)	-	$ (6,000)
AMI 2.0 (Metering Renewal) Contributions	-	-	$ (976)	$ (2,174)	-	$ (3,150)
TOTAL	$ 24	$ 136	$ 3,232	$ 1,087	$ 649	$ 5,128

c) As per Table A above, the project is currently in the preliminary design phase and on track for completion by the target date.

d) Please refer to part (a)(iii) of Hydro Ottawa's response to interrogatory 2-Staff-69.

e) The ODERA project is separate from Hydro Ottawa's Non-Wires Customer Solutions Program referenced in page 33 of Schedule 2-5-8 - System Service Investments.

The rate funding request for the ODERA project is contained within Distribution Enhancements, described further in Section 3 of Schedule 2-5-8 - System Service Investments. The rate funding request for the Non-Wires Customer Solutions Program is described within section 2.5.3 of Schedule 2-5-8 - System Service Investments as "Other Income and Deductions", and a cost by Budget Program is outlined in Table 2 of Schedule 2-5-8 - System Service Investments.

Despite being distinct programs, both ODERA and the Non-Wires Customer Solutions Program are strategically aligned in that ODERA provides the foundational technology for enabling NWS solutions. For additional information regarding the Non-Wires Customer Solutions Program, refer to Section 9.2.2.1 of Schedule 2-5-4 - Asset Management Process as well as the response to interrogatory 2-Staff-67.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-55

EVIDENCE REFERENCE:

[Ex.2-5-8, p.122; HOL Letter, July 4th]

QUESTION(S):

Please provide a copy of the comprehensive review of the ADMS program.

RESPONSE(S):

Please see the response to interrogatory 2-CCC-15, part f).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-56

EVIDENCE REFERENCE:

[Ex.2-5-9]

QUESTION(S):

Please provide a breakdown of Table 22 that shows CCRA payment by underlying assets that Hydro Ottawa is providing a capital contribution towards.

RESPONSE(S):

Please see Table A below. Please note that amounts less than $50k will appear as zeroes due to rounding.

Table A - 2021 - 2030 CCRA Payments ($'000 000s)

CCRA Payments	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Richmond South DS	-	-	-	-	-	-	-	-	-	-
Cambrian MTS	$ 16.1	$ 0.1	$ (5.7)	-	-	-	-	-	-	-
A6R Upgrade	-	$ (2.0)	-	$ 0.7	-	-	-	-	-	-
Merivale MTS Rebuild	$ (0.2)	-	-	-	-	-	-	-	-	-
Slater T1 Emergency	-	-	$ 0.5	-	-	-	-	-	-	-
Limebank MS T4	-	-	-	-	-	-	-	-	-	-
Overbook TO Switchgear Upgrade	$ 0.3	$ 0.3	-	-	-	-	-	-	-	-
Riverdale TR	-	-	-	-	$ 0.4	-	-	-	-	-
Piperville MTS	-	-	$ 0.7	$ 1.0	$ 3.0	-	-	-	-	-

CCRA Payments	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Uplands MTS Rebuild	-	$ 0.1	-	-	-	-	-	-	-	-
Hawthorne 115 kV	$ 0.7	$ (0.9)	-	-	-	-	-	-	-	-
Lincoln Heights B2 Bus	-	$ 0.1	-	-	-	-	-	-	-	-
Woodroffe TW Metering	-	-	-	-	-	-	-	-	-	-
Mer Bleue Station	-	-	-	-	$ 1.0	$ 5.3	-	-	-	-
Terry Fox MTS	-	-	$ 0.7	-	-	-	-	-	-	-
Hydro Rd Station	-	-	-	-	-	-	$ 0.8	-	-	-
Greenbank Station	-	-	-	-	-	$ 4.7	-	-	-	-
New Kanata Station	-	-	-	-	-	$ 5.3	-	-	-	-
New Bronson Station	-	-	-	-	-	-	-	$ 5.7	-	-
New Moulton Station	-	-	-	-	-	-	-	$ 2.3	-	-
King Edward Cable Upgrade	-	-	-	-	-	-	-	-	$ 16.4	-
Carling (secondary cable)	-	-	-	-	-	$ 2.1	-	-	-	-
Russell TB SWG Renewal	-	-	-	-	-	-	-	-	$ 0.1	$ 0.3
Carling TM Relay Replace	-	-	-	-	-	$ 0.2	-	-	-	-
Hinchey TH Relay Replace	-	-	-	-	-	$ 0.2	-	-	-	-
King Edward TK Relay	-	-	-	-	-	$ 0.2	-	-	-	-
Bridlewood Line	-	-	-	-	-	-	$ 0.6	$ 0.6	$ 0.6	$ 0.6
TOTAL	**$ 16.9**	**$ (2.3)**	**$ (3.8)**	**$ 1.7**	**$ 4.4**	**$ 18.0**	**$ 1.3**	**$ 8.5**	**$ 17.1**	**$ 0.9**

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-57

EVIDENCE REFERENCE:

[Ex.2-5-9, p.115]

QUESTION(S):

Hydro Ottawa is proposing to purchase a number of new vehicles to support its growth in employees. Please explain the specific basis for determining both the number and type of vehicles required to support the proposed new employees.

RESPONSE(S):

When determining the number and type of vehicles Hydro Ottawa needs for its new employees, a two-pronged approach was applied. First, the operational roles of the new hires were analyzed. For instance, trade staff such as power line technicians, power cable technicians, station electricians and meter technicians required specialized vehicles like bucket trucks, digger derricks, or service vans equipped with specific tools and storage. Safety staff or supervisory staff, on the other hand, might only need smaller light duty vehicles for safety inspections and site visits. This role-based assessment informed the types of vehicles needed, ensuring each employee would have the appropriate vehicles to perform their duties efficiently and safely.

Second, projected utilization rates and geographic distribution of these new employees were considered. This involved assessing factors such as the number of employees sharing a vehicle, the frequency of site visits, the distances traveled, and the specific service areas they would cover. For example, if new employees primarily worked within a concentrated urban area, a mix of smaller, more fuel-efficient vehicles might be suitable. If they would be working across a wider rural territory, all-wheel-drive vehicles might be necessary. Furthermore, as noted in Section 3.12 - Fleet Pooling

of Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement, Hydro Ottawa has decided to expand its vehicle pooling program, which had been under evaluation since the move to new facilities in 2019. This program minimized fleet additions, resulting in the avoidance of purchasing 17 new light-duty vehicles in 2026 and 4 new heavy-duty vehicles in 2028, totaling 21 fewer vehicles than would otherwise have been needed for workforce growth.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-58

EVIDENCE REFERENCE:

[Ex.2-5-9.9, p.118]

QUESTION(S):

The evidence states, “Hydro Ottawa continues to ensure that the utilization of all fleet vehicles is optimized and does not plan on adding new vehicles without assessing the overall need and usage.”

a. Please explain how Hydro Ottawa measures fleet utilization and provide any analysis undertaken regarding fleet utilization rates over the past 5 years.
b. Please explain ways in which Hydro Ottawa has increased its fleet utilization.

RESPONSE(S):

a) Hydro Ottawa uses live telematics technology to monitor fleet utilization, tracking metrics like departure/return times, mileage, engine/Power Take-Off (PTO) hours, and idle time. Front-line supervisors and managers have direct access to these dashboards for daily monitoring and decision-making. Hydro Ottawa also uses this technology for a safety dashboard, tracking behaviors like speeding and harsh braking; these monitoring efforts are key performance objectives for the utility’s front-line management team.

Hydro Ottawa hasn’t conducted formal historical analysis of fleet utilization over the past five years, as its focus has been on providing real-time dashboards to our supervisors. This is also primarily because while the current telematics system offers live views, it lacks the full

consolidated and robust analytical reporting across the fleet. However, Hydro Ottawa recently created a dedicated Fleet Asset Administrator role to analyze telematics data across the entire fleet. This new position will ensure data quality and develop comprehensive reporting functionality, potentially through integration with another tool, to enable a fleet utilization analysis. This analysis will include setting appropriate, differentiated benchmarks for specialized vehicles that naturally have lower utilization, and carefully considering optimal utilization rates by vehicle type to avoid over-utilization, which could lead to increased downtime for repairs and reduced vehicle lifespan.

b) Hydro Ottawa has actively increased fleet utilization by empowering front-line supervisors and managers with direct access to our live telematics dashboards. This real-time data visibility allows them to identify and redeploy underutilized vehicles to other areas, departments, or groups as operational needs arise. This dynamic approach, coupled with the implementation of route optimization tools, ensures vehicles are efficiently utilized and assigned to the most appropriate tasks.

Furthermore, these tools have been instrumental in fostering asset sharing and pooling opportunities across different groups. This includes grouping specialized vehicles, such as dump trucks, backyard units, and other unique equipment, into a shared pool. This proactive approach to managing and sharing assets, which will be further enhanced by future capabilities allowing crews to reserve and book these units, sets the foundation for Hydro Ottawa's new fleet pooling initiatives planned for 2026-2030. These initiatives, as detailed in Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement will allow for even greater overall fleet utilization by significantly increasing the utilization across the fleet and reducing the overall number required.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-59

EVIDENCE REFERENCE:

QUESTION(S):

Hydro Ottawa states that it has made no changes to its capitalization policy since its last Custom IR application. Has Hydro Ottawa made any changes to the interpretation or application of its capitalization policy since the last rebasing application? If so, please provide details.

RESPONSE(S):

No, Hydro Ottawa has not made any changes to the interpretation or application of its capitalization policy since the last rebasing application. However, the policy has been recently amended to include directives for cloud computing arrangements and associated implementation costs. Please refer to Attachment 2-SEC-59(A) - Hydro Ottawa Capitalization Policy for an updated version of the capitalization policy.

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HYDRO OTTAWA CORPORATE POLICY

Subject: Capitalization		
Category: Finance	**Policy Number**: POL-Fi-013.02	
Administrator: Director, Finance	**Owner:** Chief Financial Officer	**Approver:** President and Chief Executive Officer

1. PURPOSE

The purpose of this policy is to define the criteria for acquisition, capitalization, transfer and retirement of Hydro Ottawa capital assets.

2. SCOPE

This policy applies to Hydro Ottawa.

3. DEFINITIONS

Capital assets include tangible and intangible assets, exclusive of goodwill

Commissioned or energized, in the context of this policy, is when a capital asset is placed into service or when the enhancement or betterment to an existing capital asset is complete

Configuration costs, typically involve tailoring existing functionality in the cloud solution to meet user specific requirements

Customization costs, generally involves modifying the software code to change or create additional functionalities

Directly Attributable Costs are costs that bring the asset to the location and condition intended for use, and include direct labour, inventory, outside services, non-stock materials and specific burdens

Enhancement or Betterment is an expenditure that contributes towards improving an asset's productivity or output or useful life

Goodwill, as defined by IAS 38, is the difference between the purchase price of an asset and the net amount of the acquired asset and assumed liability

Grouped Assets are asset purchases that are pooled into a single capital asset category as, by their nature, it would be impractical to identify individual units. These grouped assets are managed as a single asset for the purposes of depreciation

Hydro Ottawa refers to Hydro Ottawa Holding Inc. and its affiliates

IAS refers to International Accounting Standards

IAS 16 refers to the International Accounting Standard titled Property, Plant and Equipment

IAS 23 refers to the International Accounting Standard titled Borrowing Costs

IAS 38 refers to the International Accounting Standard titled Intangible Assets **IASB** refers to the International Accounting Standards Board

IFRS refers to International Financial Reporting Standards

Infrastructure-as-a-Service (IaaS) - is a type of cloud computing service that offers essential compute, storage, and networking resources on demand, over the internet

Intangible Assets, as defined by IAS 38, are identifiable non-monetary assets without physical substance

OM&A refers to operating, maintenance and administrative expenses

PP&E refers to Property, Plant and Equipment or Tangible Assets

Platform-as-a-Service (PaaS) - is a cloud computing model where a third-party provider delivers hardware and software tools to users over the internet

Readily Identifiable Assets are discrete capital assets that are easily identifiable, so the asset can be individually recorded and depreciated

Residual Value is the estimated amount that an entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its useful life

Software-as-a-Service (SaaS) - is a software distribution model in which access to the software is provided on a subscription basis, over the internet

Tangible Assets, as defined by IAS 16, include PP&E that are used on a continuing basis in the production or supply of goods and services and are not intended for sale in the ordinary course of business

4. POLICY DIRECTIVES

a) Hydro Ottawa will capitalize assets based on the standards established by the IASB under IAS 16 and IAS 38 whereby qualifying expenditures have to meet the following criteria:
   i. It is probable that further economic benefits associated with the item, for more than one year, will flow to the entity; and
   ii. the cost of the item can be measured reliably.

b) Capital asset are recorded using the cost method, whereby the cost of a capital asset comprises:
   i. its purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates.
   ii. any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. This shall include borrowing costs, in accordance with IAS 23, to finance capital projects with a duration greater than six months and accumulated cost is in excess of $100,000.
   iii. the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located, the obligation for which an entity incurs when the item is acquired or as a consequence of having used the item during a particular period for purposes other than to produce inventories during that period.

c) Contributed plant that meets the definition of a capital asset is measured at fair value.

d) The following cost allocation rates included in directly attributable costs are based on management's best estimates of the applicable cost allocation determinants:
   i. Direct Labour - The hourly rate recovers direct labour and benefits costs. It will be applied to all direct labour hours through timesheet reporting.
   ii. Vehicle and Equipment - Vehicle and equipment hourly rates capture the directly attributable costs associated with fleet usage. Individual rates are developed for major vehicle classifications based on expected utilization. Charges will be accomplished through vehicles timesheet reporting.
   iii. Supervision Burden - The supervision burden rate recovers the directly attributable costs associated with the supervision of internal labour and outside services.
   iv. Engineering Burden - The engineering burden rate recovers the directly attributable engineering costs. It will be applied to Distribution Capital projects where applicable.
   v. Supply Chain Burden - The supply chain burden rate recovers the directly attributable procurement and warehouse costs.
   vi. These rates are reviewed and monitored on an annual basis. Material adjustments for over or under recoveries will also be recorded at the end of the fiscal year.

e) Subsequent enhancement or betterment costs which are incurred after the original asset is available for use will be capitalized based on the same criteria as the initial capital investment.

f) The materiality value for capitalizing newly acquired readily identifiable assets or additions to existing assets will be $500.

g) The materiality value for capitalizing grouped assets will be $1,000.

h) Equipment such as switchgear, transformers and meters that are reserved for emergency (capital spares) should be accounted as capital assets otherwise these items will be accounted for as inventory.

i) Depreciation of capital assets is based on the straight-line method in accordance with IAS 16 and 38. The useful lives of assets are reviewed annually.

j) Costs that are incurred to maintain the existing service potential of capital assets should be considered repairs and will be recognized in the profit or loss in the period in which they occur.

k) Hydro Ottawa may incur expenditures for amounts paid to other distributors or transmitters for capital projects. These expenditures, once available for use, should be recorded as Intangible Assets – Capital Contributions Paid.

l) Customer contributions associated with capital projects will be treated as deferred revenue and amortized to income over the life of the assets to which they relate.

m) When assets are retired from service, the capital cost and accumulated depreciation will be removed from Hydro Ottawa's financial statements with any gain or loss (after salvage proceeds, if applicable) charged to OM&A in the period in which the decommissioning occurs.

n) Cloud computing arrangements, which includes SaaS, PaaS and IaaS should be evaluated against the capitalization criteria outlined in IAS 38. If the cloud arrangement solely grants the right to access the asset over the contract term, it is classified as a service contract, and costs are expensed.

o) Implementation costs related to the cloud arrangement must also be assessed separately, depending on whether the cloud arrangement is considered a software intangible asset or a service contract. When the underlying cloud computing arrangement is classified as a service contract, its implementation costs are generally unlikely to be capitalizable as an intangible asset. The accounting treatment for implementation costs for a service contract of cloud computing arrangements:
    i. Configuration costs are considered operating expenses.
    ii. Customization costs - If the service is performed by the cloud vendor, and is not considered distinct from the access to the software, the expenditures should be recorded as a deferred asset (if paid in advance) and expensed over the period of the access to the software. Otherwise, the costs should be expensed as a service fee.
    iii. In limited cases, Hydro Ottawa may incur costs to develop a customized user interface housed on its premises to access the cloud computing arrangement. Development costs related to the user interface or other implementation costs should be assessed using the capitalization criteria outlined in IAS 38.

5. RELATED POLICIES, PROCEDURES AND REFERENCE DOCUMENTS

Hydro Ottawa Code of Business Conduct

6. EXCLUSIONS

There are no exclusions from this policy

7. ADDITIONAL POLICY ELEMENTS

There are no additional policy elements

8. COMPLIANCE

Employees must report incidents of non-compliance relating to this policy in a timely manner to the Policy Owner.

All instances of non-compliance shall be addressed immediately and may result in progressive disciplinary action. All members of the work group who had prior knowledge of the non-compliance may also be subject to progressive discipline. Repeat instances of non-compliance, or those that appear to be of a serious nature, must be immediately reported directly to the Director, Finance.

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9. APPROVAL HISTORY

Revision	Effective Date	Description of Changes	Policy Owner:	Approved by:
.00	January 2015	Supersedes Policy FIN5- 001-02 published on January 1, 2009	G. Simpson, Chief Financial Officer	B. Conrad, President and CEO
.01	October 2019	Minor updates to wording to match IFRS Standards and clause added regarding CCRA payments	DocuSigned by: Geoff Simpson 43DC885CF33E43F... G. Simpson, Chief Financial Officer	DocuSigned by: Bryce Conrad 8EDB4595749C4E3... B. Conrad, President and CEO
.02	May 2025	Minor updates to wording to capture cloud computing arrangements and associated policy directives	Signed by: Geoff Simpson 43DC885CF33E43F... G. Simpson, Chief Financial Officer	DocuSigned by: Bryce Conrad 8EDB4595749C4E3... B. Conrad, President and CEO
Scheduled Re-affirmation Date: **May 2028**			Responsibility: **Chief Financial Officer**	
Signatures on original only; original retained by Chief Financial Officer Division				

10. POLICY EXCEPTIONS

Exceptions to the above directives and/or changes to this policy must receive written pre-authorization from the President and CEO. For clarification on any aspect of this policy, contact the Director of Finance.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-60

EVIDENCE REFERENCE:

[Ex.2-7-1, p.5]

QUESTION(S):

Please provide the weighted average depreciation rate for the proposed in-service additions during the rate term, by OEB category (System Access, Renewal, Service, and General Plant)?

RESPONSE(S):

Table A below provides the weighted average depreciation rate for the proposed in-service additions during the rate term, by OEB category (System Access, Renewal, Service, and General Plant). The calculation is based on the balances provided in the response to interrogatory 1-Staff-1.

Table A – Weighted Average Depreciation Rate by OEB Category During the Rate Term

OEB Category	Depreciation Rate
System Access	2.56%
System Renewal	2.85%
System Service	2.83%
General Plant	4.40%

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

2-SEC-61

EVIDENCE REFERENCE:

[Ex.2-7-1, p.6, Appendix 2-BB; 2-5-4, Attachment D, p.16, 21]

QUESTION(S):

With respect to depreciation rates:

a. Please provide a comparison between the Typical Use (TUL) Life Hatch recommended as part of its Distribution Asset Failure Curves study, and the TUL that Hydro Ottawa has used for the purposes of determination.
b. Please explain why Hydro Ottawa did not update its depreciation rates to reflect the results of Hatch's Distribution Asset Failure Curves study.
c. If Hydro Ottawa depreciation rates were based on the TUL in the Hatch Distribution Asset Failure Curves study, what would they be for each USoA account?

RESPONSE(S):

a. Table A provides a comparison between the Typical Useful Life (TUL) Hatch recommended as part of its Distribution Asset Failure Curves study, and the TUL that Hydro Ottawa has used for the purposes of depreciation referred to as IFRS Life in the table.

Table A - Comparison Between TUL from Hatch Study and Hydro Ottawa's TUL

Asset	Typical Useful Life (years) - Hatch Study	IFRS Life (years)
Station Equipment >50kV Other	15 (VRLA batteries),17 (VLA batteries)	25
Station Switchgear >50kV	45 (HV SF_6)	40
Station Transformers >50kV	55	45
Station Equipment <50kV Other	15 (VRLA batteries),17 (VLA batteries)	25
Station Switchgear <50kV	42 (Air), 55 (Oil), 46 (Vacuum) and 51 (SF6)	40
Station Transformers <50kV	55	45
SCADA RTU, Relays, Communication Equipment	40 (electromechanical relays), 30 (electronic relays) and 25 (microprocessor relays)	15
U/G Polymer Insulated Cable	45	35
U/G Switchgear & Reclosers	25	25
Vault Switchgear & Reclosers	25	30
U/G PILC Cable	62	60
U/G Conduit & Cable Chambers	54	40
Line Transformers O/H & U/G	53 (O/H) 41 (U/G)	35
Line Transformers Vault	53	35
O/H Switchgear & Reclosers	25	25
Poles, Towers, Fixtures	53	45

b. The useful lives calculated in Hatch's Distribution Asset Failure Curves Study are based on failure curves, which represent the operational useful life of the asset. The useful lives Hydro Ottawa uses for depreciation purposes are based on assets' accounting useful life, which is different from the operational useful life. The core distinction lies in what each "life" accounts for:

- Accounting Useful Life: Encompasses all causes of asset retirement, including physical wear-and-tear, economic obsolescence, technological change, changes in legislation, and external events (e.g., accidents, natural disasters).

- Operational Useful Life (based on Failure Curves): If calculated based on physical failure data, this would theoretically result in an expected life that is generally longer than the accounting useful life. This is because a failure curve isolates only physical breakdown, excluding other reasons for retirement that shorten an asset's depreciable life (e.g., economic or legislative factors).

The findings of the Hatch study did not result in significant changes to HOL's existing underlying assumptions and overall risk assessments as detailed in Section 8.1 of Schedule 2-5-4 - Asset Management Process. Section 4 of Schedule 2-7-1 - Depreciation, Amortization Disposal notes that the useful lives of Hydro Ottawa's assets have been approved in prior rate applications, so no adjustments to its existing accounting useful lives were warranted. Hydro Ottawa's accounting depreciation for all assets included in the Hatch study fall within the Kinectrics Report[1] ranges.

c. Table B below shows the depreciation rate for each USoA account if Hydro Ottawa depreciation rates were based on the TUL in the Hatch Distribution Asset Failure Curves study. Hydro Ottawa's depreciation rates are in Schedule 2-7-1 - Depreciation, Amortization Disposal, Table 5, page 5.

[1] Kinectrics Inc., *Asset Depreciation Study for Use by Electricity Distributors*, EB-2010-0178 (July 8, 2010).

Table B - Property, Plant, and Equipment Depreciation Rates 2021-2030 Using TUL from Hatch Study[2]

USoA	Asset Description	Hatch Study Depreciation Rate
1609	Capital Contributions Paid*	2.20%
1611	Computer Software	10% - 20%
1612	Land Rights*	2.00%
1805	Land	N/A
1808	Buildings	1.3% - 3.3%
1815	Transformer Station Equip. >50 kV[3]	1.9% - 6.7%
1820	Distribution Station Equip. <50 kV[3]	1.9% - 6.7%
1825	Storage Battery Equipment	5% - 10%
1830	Poles, Towers & Fixtures[3]	1.90%
1835	Overhead Conductors & Devices	2.2% - 4%
1840	Underground Conduit[3]	1.90%
1845	Underground Conductors & Devices[3]	1.6% - 4%
1850	Line Transformers[3]	1.9% - 2.4%
1855	Services (Overhead & Underground)	2.20%
1860	Meters	6.70%
1905	Land	N/A
1908	Buildings & Fixtures	1.3% - 5%
1915	Office Furniture & Equipment	10.00%
1920	Computer Equipment - Hardware	10% - 25%
1930	Transportation Equipment	6.7% - 12.5%
1935	Stores Equipment	10.00%
1940	Tools, Shop & Garage Equipment	10.00%
1945	Measurement & Testing Equipment	10.00%
1950	Power Operated Equipment	6.7% - 8.3%
1955	Communications Equipment	4% - 12.5%
1960	Miscellaneous Equipment*	10.00%

[2] USofAs in this table with an asterisk (*) are not included in the Kintectrics study referenced in the Schedule
[3] These USofA accounts have been updated with the Hatch Study TUL and do not reflect Hydro Ottawa's actual depreciation rates, please refer to Table 5 of Schedule 2-7-1 Depreciation, Amortization Disposal for the list of actual rates

USoA	Asset Description	Hatch Study Depreciation Rate
1970	Load Mgmt Controls Customer Premises*	10.00%
1975	Load Mgmt Controls Utility Premises*	10.00%
1980	System Supervisor Equipment[3]	2.5% - 6.7%

1

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

3-SEC-62

EVIDENCE REFERENCE:

[Ex.3-1-1, Attachments A and B]

QUESTION(S):

With respect to the Load Forecast:

a. Please provide actual data for customer numbers, kWhs and kWs for November and December 2024 and each month in 2025 up to the most available actuals.
b. Please rerun the load forecast with the updated data and provide an updated Appendix 2-IB - Load Forecast Analysis.
c. Please provide a table showing the originally forecasted billing determinates for each month between November 2024 to year-to-date 2025 with the most up-to-date actuals compared to actuals and weather normal actuals.

RESPONSE(S):

a) Please find actual customer numbers, kWh, and kW data in Tables B, D, and F of Attachment 3-SEC-62(A) - Bill Determinants Actuals for Nov 2024-June 2025 (with original submitted forecasts).

b) Hydro Ottawa has requested Itron rerun the load forecast with updated data including kWh and kW sales, customer and connection counts, as well as updated economic and population data. Updated Appendix 2-IB has been provided as Attachment 3-SEC-62(B) - Updated Revenue Load Forecast Appendix 2-IB. Please note, Hydro Ottawa has not incorporated the revenue

load forecast submitted as part of this response in the Application update detailed in interrogatory response 1-Staff-1 and the related Attachments.

c) For a complete comparison (forecasts vs. actuals vs. weather normalized actuals) of all three bill determinants (kWh, kW and customer counts), please refer to Attachment 3-SEC-62(A) - Bill Determinants Actuals for Nov 2024-June 2025 (with original submitted forecasts).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

3-SEC-63

EVIDENCE REFERENCE:

[Ex. 3-1-1, Tables 1 and 2, Appendix 2-IB and Attachment B]

QUESTION(S):

With respect to Appendix 2-IB:

a. Please provide a spreadsheet that includes a break-down of 2025-2030 forecasts by class for Weather Normalized consumption and demand, into the base revenue load forecast, the adjustment for CDM and eDSM, the adjustments for electrification and for Large Load Requests. Please ensure totals for each of the adjustments reconcile to those shown in Exhibit 3-1-1, Tables 1 & 2 and Appendix 2-IB.
b. Please provide details of all reclassifications of general service customers between 2021 and 2024, i.e. number of customers and resulting kWhs and kWs moved between classes for each year.
c. Please confirm that based on Tables 3-3 and 3-4 in Attachment B, for the GS > 50 kW and <5,000 kW grouping, the only adjustment related to electrification, is related to Light-Duty Vehicles. If so, please explain why there is no adjustment for increased electric heating and cooling in commercial buildings and if not, please explain the adjustment.

RESPONSE(S):

a) For the complete breakdown (Baseline, CDM and Electrification & Large Load) of the 2025-2030 forecasts (consumption and demand), please refer to Attachment SEC-63(A) - 2025-2030 Weather-Normalized Consumption and Demand Full Breakdown.

b) Table A provides the net number of customers moved as a result of annual reclass for General Service customers for Historical years 2021-2024. The resulting net kWh and kW from these customers, based on the billing determinants of the year the customer was reclassified, has been provided in Table B and Table C. Hydro Ottawa completes the annual reclassification in Q4 (October/November) of each year.

Table A - 2021-2024 Annual Reclassification Net Customer Movement

	2021	2022	2023	2024
Small Commercial	202	16	112	-95
50 - 1,499 kW GS	-189	-13	-107	100
1,500-4,999 kW GS	-12	-3	-5	-6
Large Use	-1	0	0	1

Table B - Net kWh Movement as result of Annual Reclass Customers

	2021	2022	2023	2024
Small Commercial	29,568,338	(1,993,835)	11,642,450	(22,328,362)
50 - 1,499 kW GS	26,296,047	(12,822,499)	(20,496,992)	29,166,235
1,500-4,999 kW GS	(29,488,770)	14,816,334	8,854,542	(23,203,725)
Large Use	(26,375,616)	0	0	16,365,852

Table C - Net kW Movement as result of Annual Reclass Customers

	2021	2022	2023	2024
Small Commercial	68,901	17,407	(263,631)	2,936
50 - 1,499 kW GS	34,400	(43,355)	561,406	25,884
1,500-4,999 kW GS	(57,617)	25,948	(297,775)	(80,625)
Large Use	(45,684)	0	0	51,804

c) For class level General Service >50 kW electrification assumptions, please refer to Section 8.3 of Schedule 3-1-1 - Revenue Load and Customer Forecast. Hydro Ottawa confirms the kWh in Table 3-3 of Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast relate to Light-Duty Electric Vehicles. Hydro Ottawa did not add incremental electricity demand related to heating and cooling from the General Service >50 kW rate class other than what historical and economic factors would forecast, in alignment with the analysis completed for the General Service < 50kW class detailed in Section 8.2 of Schedule 3-1-1 Revenue Load and Customer Forecast.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

3-SEC-64

EVIDENCE REFERENCE:

[Ex. 3-1-1, Tables 7 and 8]

QUESTION(S):

With respect to the statement “The negative values in Tables 7 and 8 denote anticipated customer rate reclassification due to the increase in forecasted demand and as such the baseload forecast is being reclassified.” For the General Service and Large Use classes:

a. Please breakout the changes in kWh and kWs into:
    i. Increases due to general electrification
    ii. Increases due to known and anticipated system expansion requests
    iii. Reclassification to new class due to increased load
b. Please provide the number of customers being reclassified as a result of the increased load.
c. For the general electrification load increase please provide the source data.
d. Please provide a listing of each known and anticipated system expansion request. (Note: it is not necessary to identify the customers, just which class they are in, the additional load and the new class.)

RESPONSE(S):

a) The General Service and Large Use electrification forecast included in Table 7 and Table 8 of Schedule 3-1-1 - Revenue Load and Customer Forecast is based on Light Duty Electric Vehicle adoption and anticipated Large Load requests, not general electrification.

The incorporated large commercial electrification loads are a result of specific customer requesting additional load that may or may not be related to electrification needs (such as electrified heating and cooling or electric public transportation) and most have an associated system expansion request. The requests included in the revenue load forecast are from current customers and will result in reclassification when the increase in load is realized. The large load forecast was estimated based on consideration of both ii) and iii) and cannot be broken down into these distinct items.

b) Please refer to 3-Staff-127 response (b).

c) As described in question (a) customer specific electrification was included in the electrification and large load forecast. This was determined based on signed Offers to Connect or load summary forms provided by the customer. The electrification profile used for these customers was provided by Black and Veitch and further described in interrogatory response 7.0-VECC-56.

d) Please refer to 3-Staff-127 response (b). All large load commercial electrification included in the revenue load forecast is anticipated to be reclassified to Large User. The reclassification kW and additional revenue demand have been detailed in interrogatory response 3.0-VECC-72 response (c). The reclassification kWh and additional consumption has been provided in interrogatory response 3.0-VECC-29 response (c).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

3-SEC-65

EVIDENCE REFERENCE:

[Exhibit 3-1-2]

QUESTION(S):

With respect to the 2025 load forecast:

a. Please confirm that for the analysis shown in this Exhibit for the 2024 Bridge Year, Hydro Ottawa had ten months of actual data and no actual data for 2025, as stated in Exhibit 3-1-1.

b. If confirmed, please explain how the updated forecast for 2025 was determined.

RESPONSE(S):

a) Confirmed.

b) The revenue load forecast used historical data up to October 2024 then applied factors that influence consumption and demand such as historical weather patterns, economic trends, population growth, and end-use saturation and efficiency trends. Please see Schedule 3-1-1 - Revenue Load and Customer Forecast and Attachment 3-1-1(B) - Hydro Ottawa Long-Term Electric Energy and Demand Forecast for full details on revenue load forecast inputs and assumptions for Bridge and Test Years. The 2025 Bridge Year forecast, is included in Hydro Ottawa's revenue load and customer forecast for this application and uses the same consistent methodology.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-66

EVIDENCE REFERENCE:

[Ex.4]

QUESTION(S):

Please provide a revised version of following Appendices to show 2024 full year actuals, actuals, as well as year-to-date actuals for 2025, as well as year-to-date actuals at same point in time in each of 2023 and 2024.

a. Appendix 2-JA
b. Appendix 2-JC
c. Appendix 2-K

Please also update the 2025 and 2026 full year forecasts if they have changed.

RESPONSE(S):

a. Please see Attachment 1-Staff-1(A) - Chapter 2 Appendices in the response to interrogatory 1-Staff-1 for a revised Appendix 2-JA showing 2024 full year actuals, and June year-to-date actuals for 2025 (along with comparable six month periods for 2024 and 2023).

   Please note that the year-to-date June 2025 results are subject to year-end adjustments, as certain reclassification and true-up accounting entries are performed annually and are not reflected in these interim figures. An updated 2025 Bridge forecast will not be available until October 2025. There are no planned changes to the 2026 Test Year.

b. Please see Attachment 1-Staff-1(A) - Chapter 2 Appendices in the response to interrogatory 1-Staff-1 for a revised Appendix 2-JC showing full year actuals, and June year-to-date actuals for 2025 (along with comparable six month periods for 2024 and 2023).

Please note the commentary in the response to part (a) above regarding the June actuals, 2025 Bridge forecast and 2026 Test Year.

c. Please see Attachment 1-Staff-1(A) - Chapter 2 Appendices in the response to interrogatory 1-Staff-1 for Appendix 2-K updated for 2024 Actuals. However, please note that June actuals are not available in the level of detail required for Appendix 2-K. As an alternative, please see Table A below that shows compensation at the Appendix 2-JC OM&A Program level for June year-to-date 2025 (along with comparable six month periods for 2024 and 2023).

Table A – June YTD Compensation in Appendix 2-JC OM&A Programs ($'000s)

Programs	June Year-to-Date Costs		
	2023	2024	2025
Metering	$ 1,129	$ 1,370	$ 1,759
Engineering & Design	$ 7,199	$ 7,429	$ 8,486
Distribution Support	$ 18,762	$ 19,111	$ 20,747
Collections	$ 377	$ 301	$ 386
Customer Billing	$ 1,680	$ 1,703	$ 1,747
Customer & Community Relations	$ 2,525	$ 2,277	$ 2,661
Information Management & Technology	$ 2,644	$ 3,142	$ 3,401
Safety, Environment & Business Continuity	$ 834	$ 1,012	$ 1,151
Human Resources	$ 1,698	$ 1,657	$ 1,676
Supply Chain	$ 972	$ 949	$ 1,029
Facilities	$ 505	$ 515	$ 522
Finance	$ 1,830	$ 1,965	$ 2,239
Regulatory Affairs	$ 542	$ 687	$ 894
Corporate Costs	$ 604	$ 620	$ 575
TOTAL	**$ 41,301**	**$ 42,738**	**$ 47,271**

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-67

EVIDENCE REFERENCE:

[Ex.4-1-1, p. 18]

QUESTION(S):

With respect to the OM&A budget:

a. Please provide details of the 0.15% efficiency embedded in the $140M 2026 OM&A budget.
b. Please explain what is meant by 'capped' at 0.15%.
c. Please identify and quantify any planned efficiencies/productivity initiatives that are already built into the 2026-2030 budget. For each initiative, please provide a quantitative estimate of forecast savings, and include the full methodology and assumptions used in the calculation.

RESPONSE(S):

Hydro Ottawa interprets the reference to this interrogatory should be Schedule 1-3-1 - Rate Setting Framework.

a) The 2026 OM&A budget amount of $140M was set with assumptions of embedded productivity of $3.4M, corresponding to a reduction of 2.3%, which results in a 2027-2030 additional annual stretch already embedded in OM&A of 0.61%.

For details on productivity benefits specific to 2026 OM&A, please refer to the response to interrogatory 1-Staff-3. Please also see Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement

b) 'Capped' refers to the maximum limit applied to the reduction component of Hydro Ottawa's proposed efficiency adjustment (X factor) within its CROF. Hydro Ottawa has proposed a cap of 0.15% to take into account that the PEG Model does not fully account for the unique challenges associated with rapid growth and electrification. Additionally, Hydro Ottawa has proposed this cap despite its already embedded significant productivity savings (0.61%) in its 2026 OM&A base forecast. Hydro Ottawa contends that it is already delivering significant productivity and efficiency gains through internal efficiency and productivity savings embedded into its 2026 OM&A forecast. The 0.15% cap on the PEG Model's output acknowledges this while still incorporating an additional stretch factor.

c) Planned efficiencies and productivity initiatives that are already built into the 2026-2030 OM&A budget are quantified in Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement. OM&A productivity savings are also specifically split out in the response to interrogatory to 1-Staff-3.

Please refer to Table B in the response to interrogatory 1-SEC-25 with respect to the quantitative estimate of forecast OM&A savings over the 2026-2030 period for Labour and Supply Chain Optimization Initiatives. Table C in the same response details the methodology and assumptions used in the calculation for each initiative. Please also refer to Attachment 1-SEC-25(A) - Supporting Calculations - Labour and Supply Chain Optimization Productivity Initiatives.

Please refer to Table B in the response to interrogatory 1-SEC-27 with respect to the quantitative estimate of forecast OM&A savings over the 2026-2030 period for Innovation and Digital Transformation Initiatives. Table E in the same response details the methodology and assumptions used in the calculation for each initiative. Please also refer to Attachment 1-SEC-27(A) - Supporting Calculations - Innovation and Digital Transformation Productivity Initiatives.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-68

EVIDENCE REFERENCE:

[Ex.4-1-1, p.6, Table 3; p.12]

QUESTION(S):

With respect to OM&A per Customer and per FTE:

a. Please extend Table 3 to include the years 2027 to 2030.

b. Hydro Ottawa states that: “Additional resources are also needed to manage the aftermath of storms, including emergency response for clearing debris and restoring safe conditions”. Please identify which of the new positions this is referring to and what portion of each position is dedicated to emergency response.

RESPONSE(S):

a) See Table A below:

Table A – OM&A per Customer and per FTE 2021 - 2030

	OEB Approved	Historical Years			Bridge Years		Test Years					2030 Test CAGR
	2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2021-2030
OM&A ($M)	$ 90.6	$ 84.7	$ 100.5	$ 112.8	$ 115.3	$ 118.9	$ 140.0	$ 147.3	$ 154.9	$ 162.9	$ 171.4	7.3%
Customers	*344,802*	*349,695*	*356,062*	*361,688*	*367,728*	*373,277*	*377,521*	*381,118*	*384,796*	*388,582*	*392,422*	
OM&A per Customer	$ 262.8	$ 242.3	$ 282.4	$ 311.8	$ 313.6	$ 318.6	$ 370.9	$ 386.4	$ 402.5	$ 419.3	$ 436.7	5.8%
FTE	616	585	595	494	628	641	716	766	780	769	771	
OM&A per FTE	$ 147,173	$ 144,843	$ 169,098	$ 228,438	$ 183,631	$ 185,410	$ 195,575	$ 192,249	$ 198,578	$ 211,852	$ 222,248	4.7%

b) The statement regarding "additional resources" needed to manage the aftermath of storms is found within the discussion of the Vegetation Management program in Section 3.3 of Schedule 4-1-1 - Operations, Maintenance and Administration Summary. This statement does not refer to net new full-time equivalent (FTE) positions for clearing debris and ensuring safe conditions. Instead, "additional resources" is a broad term that refers to increased overtime efforts from existing staff to support emergency operations, as well as the engagement of outside contractors. The Vegetation Management program, in particular, relies heavily on these external resources. While Hydro Ottawa is not proposing to increase its dedicated emergency response staff, incremental positions in all other areas will provide support during emergency situations as needed.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-69

EVIDENCE REFERENCE:

[Ex.4-1-1, Attachment A – Transition to Cloud Computing]

QUESTION(S):

With respect to the transition to cloud computing:

a. Please provide an update on work to date for the EAM.

b. Please confirm that the $6.4M shown in Table 4 for Implementation and Internal Labour for the EAM are one-time costs.

RESPONSE(S):

a) Please see the response to interrogatory 4-CCC-36 part e).

b) Confirmed.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-70

EVIDENCE REFERENCE:

[Ex. 4-1-2, Table 2 and p.6-7]

QUESTION(S):

With respect to the OM&A Cost Drivers:

a. Please provide details on the $8M increase in 2022 and $8M increase in 2023 due to Major Weather Events.
b. Please provide details on the $6M increase in 2023 due to the Labour Strike.
c. Please explain the $6M reduction in 2023 attributed to the reversal of non-recurring costs.
d. Please provide details of the $7M reduction in 2024.
e. Please explain why the above ‘one-time costs’ increased by $22M but only $13M was reversed.
f. Please provide further details on the 2026 cost drivers related to the Customer Engagement Platform ($0.9M), Other minor technology program costs ($0.8M) and the increase in other costs beyond the items listed ($1.3M).

RESPONSE(S):

a) Please see the response to interrogatory 4-EP-7.

b) Refer to Table A for a breakdown of the requested costs:

Table A – Costs of Labour Strike ($'000 000s)

	Historical Year
	2023
Security and logistics	$5.3
External Contractors	$3.9
Incremental Labour Costs	$3.0
Legal Fees	$0.4
Others	$0.3
Compensation reduction	($7.1)
TOTAL	**$ 5.9**

The $5.9M increase in 2023 costs (rounded to $6.0M in Table 2 within Schedule 4-1-2 - Operations, Maintenance and Administration Program Costs) due to the labour strike are reflected across the program areas described in Schedule 4-1-2. They include:

- Strike-related security hired for the duration of the 84-day strike and a few resources that were retained in the planning stage as well as some close-out activities. Additional logistics-related costs also included vehicle rentals, fencing and barriers, lock boxes, management shuttle costs, courier and mail deliveries, AZ-licensed drivers for bucket trucks, office space rental, security camera rentals, security mobile patrols, lodging for out-of-town contractors and Hydro Ottawa emergency response employees as needed, and labour disruption planning consulting services.
- Contract resources employed to respond to unexpected severe weather events that occurred during the 84-day labour strike to restore power safely and efficiently for customers.
- Incremental labour costs incurred during the strike for management and non-union overtime as well as on-call and shift differential pay to maintain essential services and respond to outages 24/7.
- Legal costs associated with the strike, such as the injunction order and mediation fees.

- These additional costs were partially offset by a reduction in union compensation costs (net of allocation) throughout the duration of the strike, resulting in the net $6M increase in 2023 costs.

c) The $5.5M net cost reduction in 2023 (rounded to $6.0M in Table 2 of Schedule 4-1-2 - Operations, Maintenance and Administration Program Costs) reflects the combined impact of many factors on OM&A costs. The most notable factors are IT Maintenance and subscriptions, as detailed in Interrogatory response 4-CCC-36, and Vegetation Management Costs, detailed in Interrogatory response 4-Staff-139. Please see Table B for a breakdown of these costs:

Table B – 2023 Additional OM&A Cost Drivers ($'000 000s)

	2023
Reversal of one-time cost incurred in 2022:	
Major Weather Events	$ (7.7)
Cost increases in 2023:	
IT External Support and Subscription	$ 1.3
Vegetation Management Costs	$ 1.0
Others	$ (0.1)
Other Costs (Net Impact)	**$ (5.5)**

d) Please see the response to interrogatory 4-Staff-132.

e) As explained in part c and part d above, while the one-time costs reversed, there were also additional costs incurred. These are explained by either higher inflation than the OEB inflation parameters or growth in the programs.

f) Additional details on the requested cost drivers for 2026 are provided below:

- Customer Engagement Platform $0.9M: the $0.9M increase is related to a shift from capital, on-premise software solutions to cloud-based ones, which results in the costs appearing in OM&A rather than in capital. The main projects of the Customer Engagement Platform program are discussed in Section 3 of Schedule 2-5-9 - General Plant Investments. These

projects include the integration of a 24/7 AI-powered chatbot and enhancements to Hydro Ottawa's outage communications tool. Cloud computing as a whole, including its accounting implications, is discussed in detail in Attachment 4-1-1-(A) - Transition to Cloud Computing.

- Other minor technology program costs $0.8M:
  - $0.3M for programs which have moved from perpetual licenses to a cloud-based subscription service. For example, costs relating to MyAccount, and various ERP enhancements that are periodic costs in nature (specific systems include Workday, JDE, and HR Technology).
  - $0.1M for consulting costs for work on software integrations, which will improve process efficiency by reducing the number of systems that staff must access to complete their work.
  - $0.3M for a pilot project on using AI for grid optimization.
- Other costs beyond the items listed $1.3M:
  - Other costs beyond the items listed are predominantly related to the Testing, Inspection, and Maintenance program enhancement, as detailed in Table A of the interrogatory response 4-Staff-134. Total program enhancement of $5.6M which includes the $4.6M Proactive Distribution Maintenance highlighted in Table 2 of Schedule - 4-1-2 OM&A Program Costs. The $1.0M variance between the two tables represents the smaller items that are below the materiality threshold. The remaining $0.3M represents other costs that exceed the OEB inflation parameters.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-71

EVIDENCE REFERENCE:

[Ex. 4-1-2, p. 19 and Ex. 9-2-1, Table 1]

QUESTION(S):

With respect to Testing, Inspection & Maintenance:

a. Of the $6.1M increase in Testing, Inspection & Maintenance in 2026, $2.8M is attributed to the Non-Wires Programming & System Integration. Table 1 of Exhibit 9-2-1 shows $2.192M as the baseline for the required DVA. Please explain the $608k difference.
b. Please provide details on what 'new evolving trends/technologies' Hydro Ottawa is planning to use.
c. Please provide an update on the drone pilot project.

RESPONSE(S):

a) The $608k variance between the $2.8M annual program cost in Schedule 4-1-2 - Operations, Maintenance and Administration Programs and the $2.192M reported in Schedule 9-2-1 - Group 1 Accounts is due to Labour Recovery as detailed in Table A below.

Table A - Non-Wires Solutions 2026 Costs ($'000 000s)

	2026
Testing, Inspection & Maintenance Program in Exhibit 4-1-2 OM&A Program Costs	$ 2.8
Labour Recovery included in Collections in Exhibit 4-1-2 OM&A Program Costs	$ (0.2)
Labour Recovery in Customer & Community Relations in Exhibit 4-1-2 OM&A Program Costs	$ (0.4)
Table 1 of Exhibit 9-2-1	**$ 2.2**

b) Hydro Ottawa has proposed funding between 2026-2030 to introduce improvements to maintenance programs/practices based on changing/evolving needs. To this end, Hydro Ottawa is exploring opportunities to automate and improve the capture of inspection information, enhance condition assessment through artificial intelligence, as shown below:

- **Image Recognition for Anomaly Detection:** Utilize image recognition, based on images captured during inspections and patrols, to identify anomalies and establish asset degradation mechanisms.
- **Machine Learning for Regional Analysis:** Utilize K-Means Clustering and other Machine Learning techniques for geographical analysis. This involves grouping areas based on shared characteristics (e.g., inspection data, asset names, installation types) to pinpoint distinct regional patterns and understand their underlying drivers.
- **Automated Station Inspections:** Automate station inspection forms using image-based recognition capabilities to identify nameplate information and asset deficiencies.
- **Real-time Asset Condition Assessment:** Develop intelligent models (e.g., Duval's Pentagon) for dynamic, real-time condition assessment of critical assets like station transformers, leveraging online monitoring data.

c) For an update on the drone pilot project, please refer to the response to interrogatory 4-Staff-135 part f).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-72

EVIDENCE REFERENCE:

[Ex. 4-1-2, Appendices 2-JB and 2-JC]

QUESTION(S):

Please complete Excel file 4-SEC-72, by mapping the cost drivers amounts shown in Appendix 2-JB to the Program variances from Appendix 2-JC as shown in the following table. (Note available information from the Exhibit has already been shown as examples).

RESPONSE(S):

Please see completed Excel Attachment 4-SEC-72(A) - Appendix 2-JC by Appendix 2-JB Cost Drivers 2026.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-73

EVIDENCE REFERENCE:

[Ex.4-1-3, Attachment A – Employee Compensation Strategy, Table 10]

QUESTION(S):

With respect to employee compensation:

a. Please extend Table 10 to include 2021 approved and 2021 to 2023 actuals.
b. Please provide the final actual number of full-time permanent positions, temporary full-time and part-time employees, at the end of 2024.
c. What was the actual vacancy rate for 2024?
d. Please provide a year-to-date actual number of full-time permanent positions filled in 2025, and provide an update on the vacancy rate for 2025.
e. Please explain why Hydro Ottawa believes the vacancy rate in 2026 will be lower than 2024, when both attrition rates and internal movement are increasing.

RESPONSE(S):

a) Please see response to interrogatory 4-CCC-52.

b) Table A provides the requested information. Please note that the number of temporary employees at a specific point in time is different from the number of FTEs. In particular, part time employees will be captured as partial FTEs.

Table A - Full Time Positions and Temporary Employees as of December 31, 2024

Position Type	Count
Full Time Permanent Positions	667
Temporary Full Time Employees	20
Temporary Part Time Employees	28

c) The actual vacancy rate for 2024 was 11%.

d) Year to date the number of full-time permanent positions filled in 2025 is 28. The vacancy rate at June 30, 2025 is 9%.

e) Hydro Ottawa believes the vacancy rate in 2026 will be lower than 2024 for a variety of reasons. First, with an 84-day labour strike in 2023, recruitment efforts were significantly impacted which put added pressure on vacancy rates in 2024. As stated in Section 4.1 of Schedule 4-1-3(B) - Workforce Planning Strategy, Hydro Ottawa has implemented a number of programs and initiatives to enhance external recruitment efforts and to increase awareness of career opportunities at the utility. Please see response to 4-Staff-168 for details of the effectiveness of recent recruitment activities.

Further, through reduced anticipated retirements in the coming years and changes to the external labour market brought on by economic uncertainty, Hydro Ottawa is seeing attrition rates trending downwards and this is expected to continue for the coming years.

In addition, in 2024, an additional HR Advisor was added to support internal recruitment and hiring processes and reduce overall time to fill positions.

Finally, as noted above, the vacancy rate has dropped from 11% in 2024 to 9% as of June 30, 2025.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-74

EVIDENCE REFERENCE:

[Ex.4-1-3, p.14, Appendix 2-K and Attachment B – Workforce Planning Strategy]

QUESTION(S):

With respect to overtime:

a. Please provide a breakdown of compensation attributable to overtime for each year in Appendix 2-K.
b. Please explain how Hydro Ottawa forecasts overtime.

RESPONSE(S):

a. Please see Attachment 4-CCC-52(A) - Breakout of Appendix 2-K for the breakdown of compensation attributable to overtime for each year in Appendix 2-K.

b. Please see interrogatory response 4-CCC-52 for the explanation of how Hydro Ottawa forecasts overtime.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-75

EVIDENCE REFERENCE:

[Ex.4-1-3, Attachment B – Workforce Planning Strategy, Figures 4 and 5]

QUESTION(S):

For each of OM&A and capital, please provide the actual/forecasted contracted services over the same time period as Figures 4 and 5.

RESPONSE(S):

Hydro Ottawa notes that the “Program Costs” supporting Figure 4 referenced above do not directly correspond to OM&A program costs. The total program costs supporting Figure 4 are comprised of costs for capital, maintenance and services to third parties. Accordingly, Tables A and B below provide the contracted services for Program Costs and Capex aligned with the classifications used to create the original figures. Table A covers historical years 2016 - 2023, while Table B covers the bridge and test years (2024 - 2030).

Table A – Contracted Services for Program and Capex Costs Historical Years 2016 - 2023 ($'000s)

Reference Figures	Historical Years							
	2016	2017	2018	2019	2020	2021	2022	2023
Contracted Services in Figure 4 Program Costs	$ 62,232	$ 81,461	$ 126,352	$ 84,122	$ 97,470	$ 84,571	$ 79,362	$ 79,285
Contracted Services in Figure 5 Capex	$ 51,271	$ 70,535	$ 114,259	$ 69,246	$ 85,326	$ 71,135	$ 62,407	$ 55,854

Table B – Contracted Services for Program and Capex Costs Bridge and Test Years 2024 - 2030 ($'000s)

	Bridge Years		Test Years				
	2024	2025	2026	2027	2028	2029	2030
Contracted Services in Figure 4 Program Costs	$ 98,452	$ 109,246	$ 172,216	$ 145,625	$ 119,853	$ 127,560	$ 113,928
Contracted Services in Figure 5 Capex	$ 81,594	$ 92,141	$ 160,767	$ 136,275	$ 109,450	$ 121,850	$ 107,498

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-76

EVIDENCE REFERENCE:

[Ex.4-1-3, Attachment C – Workforce Growth, Tables 1 and 3, Figures 5 and 6, Appendix 2-K]

QUESTION(S):

With respect to compensation:

a. Table 1 shows 50 new positions added in 2024 and Appendix 2-K shows an increase in FTEs of 134 (628-494). Please reconcile.

b. Please confirm that based on the figures in Tables 1 and 3, that of the 81 new positions forecasted for 2026, 68 are primarily funded under OM&A and 13 are dedicated to capital.

c. Please identify those new positions forecasted for 2026 which will be primarily capital.

d. Please confirm that the vacancy rate of 8% applies to both OM&A and capital positions.

e. Based on the 8% vacancy and 63 of the FTEs being primarily OM&A, 12 FTEs being primarily capital , and the information in Appendix 2-K, SEC has calculated the following:

Total Compensation			
	Increase in 2026	Increase in FTEs	$/FTE
OM&A	$ 9,123,792	63	$ 144,822.10
Capital	$ 4,503,346	12	$ 375,278.85
Total	$ 13,627,139	75	$ 181,695.18

Please explain the large difference between $/FTE for capital versus OM&A.

f. Please provide the underlying dollars used to create Figures 5 and 6.

RESPONSE(S):

a) FTEs in 2023 are low due to the 84-day labour strike. This creates a significant difference between 2023 and 2024, where unionized employees worked for the full year. Please note that FTEs and positions are not the same. The 50 new positions added in 2024 are budgeted positions; the position exists whether or not an employee is filling it at any point in time. On the other hand, and as noted in Attachment 4-1-3(A) - Employee Compensation Strategy, "FTE is a calculated value derived from the total regular hours paid each year divided by the regular hours of work scheduled each year by a single employee…". As fewer hours were worked by many employees in 2023 due to the labour strike, the number of FTEs in 2023 is relatively low compared to other years.

An analysis was conducted to normalize the number of FTEs in 2023 to approximate what the FTE number for the year would be had the labour strike not occurred. The normalized FTEs for 2023 is 567. Please note that this is an approximation that accounts for the hours that unionized staff would have likely worked had the labour strike not occurred and does not take into account other factors such as delays to recruitment due the the labour strike which also had an impact on the number of FTEs.

Table A provides a reconciliation of FTEs between 2023 historical year and 2024 bridge year.

Table A - Reconciliation of FTE in Appendix 2-K

	Historical Year	Bridge Year
	2023	**2024**
Number of Full-Time Permanent Positions	617	667
Vacancy Rate	12%	10%
Vacancy Rate translated into FTEs	(74)	(69)
Other FTE Adjustment	(75)	0
Number of FTEs Sub-Total	**468**	**598**
Temps and Part Time	26	30
Number of FTEs (Appendix 2K)	**494**	**628**

b) It is not the case that 68 of the new 2026 positions are funded under OM&A and 13 are dedicated to capital. Table 1 of the reference summarizes all of the new positions by Appendix 2-JC program. The breakdown of positions into programs has no direct relationship with the allocation of positions to capital and OM&A. Similarly, Table 3 of the reference displays the workforce segmentation of the positions that fall under the Metering, Engineering & Design, and Distribution Operations programs and has no direct relationship with the allocation of positions to capital and OM&A. The majority of the 81 new positions forecasted for 2026 contribute to both capital and OM&A work.

Table B displays the rounded breakdown of new positions into Capital and OM&A.

Table B - 2026 New Positions by Capital and OM&A

	2026
OM&A[1]	44
Capital	37
Total	**81**

c) As noted above, the positions contribute to both capital and OM&A and their time is allocated via timesheets or burden allocation.

d) The same vacancy rate is applied to all positions.

e) As noted in the response to (b) above, the allocation of new positions into capital and OM&A differs from the table proposed. Further, the variance in compensation from one year to the next is attributable to more than just new FTEs. For instance, annual compensation and benefit increases for all employees are included in compensation forecasts for 2026, which would account for a portion of the difference between 2026 and 2025 total compensation amounts.

[1] Please note that positions that are allocated to Other Revenue (i.e. Services to Third Parties) are included in OM&A.

In addition to this, in Appendix 2-K, the breakdown of capitalized compensation represents the direct labor portion as included in the bottom table in Appendix 2-D. The compensation costs for Supply Chain, Supervision, and Engineering in Appendix 2-D are not captured within the capitalized compensation in Appendix 2-K because those categories contain a mix of compensation and non-compensation costs, and their separation is not practical since burdens instead of time sheets are used for allocation. Therefore, all burdened employees are included in the OM&A line within Appendix 2-K.

There is no difference in the $/FTE between OM&A and Capital, any delta in the $/FTE relates to the level of the new position and the approximate salary.

f) Please see the response to interrogatory 4-CCC-54.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-77

EVIDENCE REFERENCE:

[Ex.4-1-3, Attachment C – Workforce Growth, Table 1]

QUESTION(S):

With respect to workforce growth:

a. Please provide more details for each of the forecasted 22 new positions in Engineering & Design in 2026, i.e. position title, job duties.
b. Please provide more details for each of the forecasted 43 new positions in Distribution Operations in 2026, i.e. position title, job duties.

RESPONSE(S):

a) Please see response to interrogatory 4-Staff-159 for the new positions by JC program. Summaries of the job responsibilities are provided below.

Distribution Engineer: Provides strategic and tactical advice for distribution system asset management, planning, design, maintenance, and reliability. Develops contingency plans, reviews real-time operating constraints, maintains an accurate system condition picture, and possesses expertise in load flows, circuit loadings, capacities, equipment ratings, and short circuit calculations.

Grid Modernization Engineer: Provides strategic and tactical guidance on data requirements, modeling, monitoring, control, and communication for the distribution system. Leads operational

support for Grid Modernization, evaluating, developing, and implementing new technologies while enhancing existing processes and equipment.

Engineering Technologist: Prepares engineering designs, drawings, and other technical information for low, medium, and high complexity projects, including estimates, bills of materials, and work packages for distribution system expansion, upgrades, or rehabilitation, and customer services.

Project Administrator: Manages low-complexity projects, identifying goals, needs, and scope. Monitors and documents tasks, ensuring timely delivery of materials. Communicates status to stakeholders and documents processes using project management tools.

Project Coordinator: Oversees medium to high complexity projects from initiation to completion, ensuring timely execution and effective stakeholder communication. Identifies and resolves potential roadblocks to project success.

Work Planner: Responsible for collaborating on medium to high complexity distribution project designs, estimating work, reviewing material, and creating work breakdown structures.

Work Scheduler: Responsible for creating daily and weekly schedules, and monthly workload forecasts for internal and external construction crews for distribution projects, while providing recommendations based on data driven analysis.

Resource Scheduling Agent: Serves as Hydro Ottawa's primary contact for mobile workforce management, collaborating with stakeholders to optimize mobile worker productivity. This role also involves tracking and organizing internal and external crew schedules for sustainment and demand projects.

Supervisor Positions: Provide operational oversight and planning, as well as employee management and related management functions.

b) Please see response to interrogatory 4-Staff-159 for the new positions by JC program, summaries of the job responsibilities are provided below.

Direct Labour Positions: Includes certified and skilled trades as listed in 3.1.4.2 of 4-1-3 (B) - Workforce Planning Strategy.

Vault Maintenance Specialist: Responsible for the inspection, regular maintenance and shutdown coordination of customer owned / Hydro Ottawa owned vaults, switchgear and customer owned substations. Supports a wide range of field services for residential, large commercial and industrial customers and provides technical services internally.

System Operations Planners: Holds key responsibilities for the distribution system, including assessing and approving all work requests submitted to the Controlling Authority that involve the distribution system. Further, the System Operations Planner is tasked with organizing, prioritizing, and planning these requests, as well as scheduling all associated work activities for the System Control Centre.

Plant Inspector: Responsible for inspecting, verifying and confirming the construction and maintenance of both overhead and underground Hydro Ottawa plant, as well as the installation of third party plant in or on Hydro Ottawa infrastructure, conforms to Hydro Ottawa standards.

QA Inspector: Ensures that all work performed on the electricity distribution network, including distribution, stations, and metering equipment, meets established standards and specifications. This role involves verifying that construction and maintenance activities are executed correctly, safely, and in compliance with all relevant regulations and procedures.

Utility Forestry Inspector: Confirms that contractors work in accordance with applicable laws and safety regulations, inspects contractor performance against quality of work standards. Acts as a liaison between contractors, overhead line crews, and the Control Room. Performs site assessments and creates estimates of crew and equipment hours required for each job site.

Project Engineer: Manages capital budget implementation via project management of large station, distribution, DER connection projects, and engineering programs. Oversees scope, schedule, budget, risk mitigation, and performance reporting, ensuring planning, design, and execution remain within scope, budget, and schedule.

Data Engineer: Builds and maintains the data infrastructure that supports grid operations and business analysis. Responsible for the design, construction, and management of data pipelines to collect and transform raw data from various sources into a usable format. Responsible for the creation of automated reports and dashboards

Supervisor Positions: Provide operational oversight and planning, as well as employee management and related management functions.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-78

EVIDENCE REFERENCE:

[Ex.4-2-1, Table 3 and Appendix 2-N]

QUESTION(S):

With respect to shared services:

a. Please explain why the cost of shared services provided by Hydro Ottawa to Hydro Ottawa Holding Inc. and Hydro Ottawa Energy Services Inc. have increased immaterially from 2021 approved to 2026 forecast, with no change in service, when Hydro Ottawa's OM&A is forecasted to increase by 55% over the same period.
b. Please explain what services provided by Hydro Ottawa Holding Inc. fall in the Customer Service, Corporate Communications category and why the amount allocated has increased by 218% (from $517k to $1,646k from 2021 to 2026).

RESPONSE(S):

a. The cost of shared services provided by Hydro Ottawa to Hydro Ottawa Holding Inc. and Hydro Ottawa Energy Services Inc. has risen at a slower pace than the increase in Hydro Ottawa's own OM&A. This is due to a reduction in the level of services provided. While the pricing methodology has remained the same, the level of services provided has changed. As noted in Appendix 2-N, the actual price for shared services increased by 36% for Hydro Ottawa Holding Inc. and 41% for Hydro Ottawa Energy Services Inc., however there is only an increase of 5% for Hydro Ottawa Capital Corporation. As noted in Section 3.1.2 of Schedule 4-2-1 - Shared Services and Corporate Cost Allocation, one of the affiliates within Hydro Ottawa Capital Corporation reduced its reliance on Hydro Ottawa services significantly, including no longer

using Hydro Ottawa owned warehouse or office space, and reduced their reliance on certain technology systems. In addition, all of the affiliates have hired additional staff which has allowed them to perform some duties that were previously supported by Hydro Ottawa, reducing the services Hydro Ottawa is providing. In addition there were other declines in services such as customer services and corporate communications, as well as regulatory services.

The 55% increase in Hydro Ottawa's OM&A is largely driven by factors specific to its own business and not related to the shared services provided to its affiliates, refer to Schedule 4-1-2 - Operations, Maintenance and Administration Program Costs for more details.

b. The 218% increase in the amount allocated from Hydro Ottawa Holding Inc. for Customer Service and Corporate Communications is due to two key factors: a rise in base costs and an increased allocation percentage to Hydro Ottawa. The base costs have grown significantly since 2021, reflecting high inflation over the past few years. Additionally, the portion of these costs allocated to Hydro Ottawa has increased from 46% in 2021 to 80% in 2026. This combined effect accounts for the jump from $517k to $1,646k over this period.

The services provided under this category include strategic leadership and oversight for core customer services like billing, collections, key accounts and customer experience, as well as a wide range of proactive communications and engagement activities, such as public and media relations, and crisis management. This work is executed through various channels, including the website, social media, and direct customer outreach, with a focus on education and feedback collection.

The demand on executive management and communications teams has significantly increased, driven by a heightened focus on customer engagement and public expectations following recent extreme weather events. The devastating 2022 Derecho, in particular, created a lasting impact on customer sentiment and a greater need for reassurance during all types of power interruptions—whether planned or unplanned. This has required significant investment in new services, such as the development of a new outage alert system that provides real-time notifications via text and email based on customer preferences. Additionally, the team has

expanded its proactive education efforts to help customers understand complex topics like rate applications, grid infrastructure, safety, and the broader energy transition. This proactive, customer-centric approach has led to an increase in staff and resources, justifying the higher costs and the increased allocation percentage.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

4-SEC-79

EVIDENCE REFERENCE:

[Ex.4-2-3, Table 1]

QUESTION(S):

With respect to One-Time Regulatory Costs:

a. Please provide the breakdown of the $2.7M consultants' costs forecast.
b. Please provide a revised version of Table 1, that shows the one-time regulatory costs incurred at the date of the filing of the Application.
c. Please explain the more than 6 times increase in forecast 2026 legal costs related to the Application, as compared to what was forecast for the 2021 application.
d. Please prepare an estimate of one-time regulatory costs based on the assumption that this Application also reaches a full or substantial settlement.

RESPONSE(S):

a. Table A below provides a breakdown of the consultants' costs forecast related to this Application:

Table A - One-Time Regulatory Costs - 2026 Consultants Forecast ($'000s)

Description	2026 Forecast
Benchmarking	$ 296
Customer Engagement	$ 345
Distribution System Plan and Operations, Maintenance & Administration	$ 1,541
Load Forecast and Cost Allocation	$ 160
Training, IR Consulting, Technical Conference Support, Oral Hearing and Other	$ 355
TOTAL	**$ 2,697**

b. Please see the response to interrogatory 4-CCC-60, part d) for one-time regulatory costs incurred to June 30, 2025. The timing goes slightly past the date of filing, as a result it includes other activities such as the error checking process, confidentiality process and some training costs for next steps in the rate application process. However, there were no accruals made for intervenor or OEB costs to the end of June.

c. Please see the response to interrogatory 4-CCC-60, part b) for an explanation of the increase in one-time legal costs.

d. Hydro Ottawa estimates that one-time regulatory costs would be approximately $4.1M based on the assumption that this Application reaches a full or substantial settlement (without the requirement for a full oral hearing).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

6-SEC-80

EVIDENCE REFERENCE:

[Ex.4]

QUESTION(S):

With respect to Appendix 2-H:

a. Please update Appendix 2-H to include 2024 full year actuals and 2025 year-to-date actuals, as well as year-to-date actuals for the same point in time in 2023 and 2024.
b. Please update the 2025 and 2026 full year forecasts if they have changed.

RESPONSE(S):

a) Please see Attachment 1-Staff-1(A) - Chapter 2 Appendices in the response to interrogatory 1-Staff-1 for a revised Appendix 2-H showing 2024 full year actuals, and June year-to-date actuals for 2025 (along with comparable six month periods for 2024 and 2023).

Please note that the year-to-date June 2025 results are subject to year-end adjustments, as certain reclassification and true-up accounting entries are performed annually and are not reflected in these interim figures.

b) An updated 2025 Bridge forecast will not be available until October 2025. There are no planned changes to the 2026 Test Year.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

6-SEC-81

EVIDENCE REFERENCE:

[Ex.6-3-5, p. 2, Tables 1 and 2]

QUESTION(S):

With respect to Services to Third Parties:

a. Please break out the Services to Third Parties (net of costs) lines in Tables 1 and 2 to show revenue and expenses separately.

b. Please further break-out the Services to Third Parties expenses and revenue lines in part (a) into the following, as per the example table below:

   i. Isolating and re-energizing services
   ii. Mutual aid
   iii. Transformer vault shutdown access services
   iv. Inspection services
   v. Generator services
   vi. Projects that do not end up reaching a state to generate revenue
   vii. Non-Wires Customers Solutions Program
   viii. Any other services not included above

Services to Third Parties	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Isolating and re-energizing services - Revenues										
Isolating and re-energizing services - Expenses										

Isolating and reenergizing services - Net										
Etc.										

c. Please explain why Hydro Ottawa does not charge for all costs for those Services to Third Parties, even if the projects do not end up reaching a stage to generate revenue.

RESPONSE(S):

a) Please see Table A and B for breakout of Services to Third Parties by Revenue and Expense.

Table A - Services to Third Parties 2021-2025 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years	
	2021	2022	2023	2024	2025
Revenue	$ 6.5	$ 6.6	$ 5.5	$ 6.5	$ 6.1
Expense	$ (8.6)	$ (7.8)	$ (7.0)	$ (8.2)	$ (8.1)

Table B - Services to Third Parties 2026-2030 ($'000 000s)

Services to Third Parties	Test Years				
	2026	2027	2028	2029	2030
Revenue	$ 6.2	$ 6.9	$ 7.2	$ 7.4	$ 7.6
Expense	$ (10.6)	$ (11.6)	$ (12.1)	$ (12.4)	$ (12.8)

b) A breakout of the Third Party Services has been provided in Table C-J.

i) Isolation and de-energized is included within what is deemed in Table C Service Desk. However, this program also includes all Appendix G OH and UG services. Hydro Ottawa's

cost and budget methods do not allow further breakout. Please see Table C for a break-out the Services to Third Parties expenses and revenue for isolating and re-energizing services

Table C - Service Desk 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Service Desk Revenue	$ 1.2	$ 1.6	$ 2.0	$ 1.2	$ 1.2	$ 1.2	$ 1.6	$ 1.7	$ 1.7	$ 1.8
Service Desk Expense	$ (3.2)	$ (3.2)	$ (3.3)	$ (2.6)	$ (2.7)	$ (3.2)	$ (3.7)	$ (3.9)	$ (4.0)	$ (4.1)
Service Desk Net	$ (2.0)	$ (1.6)	$ (1.4)	$ (1.4)	$ (1.5)	$ (2.0)	$ (2.0)	$ (2.2)	$ (2.3)	$ (2.4)

ii) Mutual Aid work is typically charged at cost and as a result has a $0 net impact. This is consistent with the explanation provided in Section 3.2 of Schedule 1-3-5 - Distributor Consolidation and Collaboration, where these services are noted as being not-for-profit. Please see Table D for a break-out the Services to Third Parties expenses and revenue for mutual aid.

Table D - Mutual Aid 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Mutual Aid Revenue	$ 0.2	$ 0.1	$ 0.0	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.1	$ 0.2
Mutual Aid Expense	$ (0.2)	$ (0.1)	$ (0.0)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.2)
Mutual Aid Net	$ -	$ 0.1	$ 0.0	$ 0.0	$ (0.0)	$ 0.0	$ 0.0	$ (0.0)	$ (0.0)	$ (0.0)

iii) Please see Table E for a break-out the Services to Third Parties expenses and revenue for transformer vault shutdown access services

Table E - Vault Access 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Transformer vault shutdown access services Revenue	$ 0.4	$ 0.5	$ 0.4	$ 0.4	$ 0.4	$ 0.5	$ 0.5	$ 0.5	$ 0.6	$ 0.6
Transformer vault shutdown access services Expense	$ (0.6)	$ (0.6)	$ (0.5)	$ (0.5)	$ (0.5)	$ (0.7)	$ (0.8)	$ (0.9)	$ (0.9)	$ (0.9)
Transformer vault shutdown access services Net	$ (0.2)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.1)	$ (0.2)	$ (0.3)	$ (0.3)	$ (0.3)	$ (0.3)

iv) Inspection Services is within what is deemed in Table C Service Desk. Please refer to i).

v) The Generator Services program refers to provisions to the battery loan program which has no spend to date and no forecast spend in the test years

vi) Please see Table C - Service Desk revenue and expense. Hydro Ottawa provides one free customer layout per rolling twelve month period for a secondary infill or service upgrade for a residential or commercial property as per the conditions of services. The customer layout may include an initial site review, cost estimate, and review of the service loading for the changes to the new or existing services. The costs for the projects that do not end up reaching a state to generate revenue are included in Service Desk.

vii) Please see Table F for a break-out the Services to Third Parties expenses and revenue for Non-Wires Customers Solutions Program.

Table F - Non-Wires Customers Solutions Program 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Non-Wires Customers Solutions Program Revenue	-	-	-	-	-	-	-	-	-	-
Non-Wires Customers Solutions Program Expense	-	-	-	-	-	$ (2.0)	$ (2.0)	$ (2.0)	$ (2.0)	$ (2.0)
Non-Wires Customers Solutions Program Net	-	-	-	-	-	$ (2.0)	$ (2.0)	$ (2.0)	$ (2.0)	$ (2.0)

viii) Please see Table G-J for a break-out the Services to Third Parties expenses and revenue for services that are not included in the above.

Table G - Temporary Services 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Temporary Services Revenue	$ 0.9	$ 0.9	$ 0.3	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2
Temporary Services Expense	$ (0.9)	$ (0.8)	$ (0.3)	$ (0.2)	$ (0.2)	$ (0.3)	$ (0.4)	$ (0.4)	$ (0.4)	$ (0.4)
Temporary Services Net	$ 0.0	$ 0.2	$ (0.0)	$ (0.0)	$ (0.0)	$ (0.1)	$ (0.1)	$ (0.2)	$ (0.2)	$ (0.2)

Table H - Distribution Design 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Distribution Design Revenue	$ 3.0	$ 1.7	$ 2.0	$ 3.7	$ 3.3	$ 3.1	$ 3.4	$ 3.5	$ 3.6	$ 3.7
Distribution Design Expense	$ (2.6)	$ (1.6)	$ (1.8)	$ (3.4)	$ (3.0)	$ (2.6)	$ (2.9)	$ (3.0)	$ (3.1)	$ (3.2)
Distribution Design Net	$ 0.5	$ 0.2	$ 0.2	$ 0.3	$ 0.3	$ 0.5	$ 0.5	$ 0.5	$ 0.5	$ 0.5

Table I - Reliability Services 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Reliability Services Revenue	$ 0.3	$ 1.0	$ 0.3	$ 0.4	$ 0.4	$ 0.4	$ 0.5	$ 0.5	$ 0.5	$ 0.5
Reliability Services Expense	$ (0.2)	$ (0.8)	$ (0.3)	$ (0.4)	$ (0.4)	$ (0.4)	$ (0.4)	$ (0.4)	$ (0.5)	$ (0.5)
Reliability Services Net	$ 0.1	$ 0.2	$ (0.0)	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0	$ 0.0

Table J - Other Services 2021-2030 ($'000 000s)

Services to Third Parties	Historical Years			Bridge Years		Test Years				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Other Services Revenue	$ 0.5	$ 0.7	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.6	$ 0.7
Other Services Expense	$ (0.9)	$ (0.8)	$ (0.7)	$ (1.1)	$ (1.1)	$ (1.3)	$ (1.3)	$ (1.4)	$ (1.4)	$ (1.5)
Other Services Net	$ (0.4)	$ (0.1)	$ (0.1)	$ (0.5)	$ (0.6)	$ (0.7)	$ (0.7)	$ (0.8)	$ (0.8)	$ (0.8)

Please refer to Section 4.3 in Schedule 6-3-1 - Other Revenue Summary for more information regarding the offsetting account to Other Revenue and Other operating revenues.

c) These initiatives are part of Hydro Ottawa's strategy to prioritize safety and electrification, even when it results in a net cost. The significant increase in losses from 2025 to 2026 are due to two key initiatives:

- Starting in 2026, Hydro Ottawa has forecasted to spend $2M per year for its Non-Wires Customer Solutions Program, which includes targeted local programs.
- Also starting in 2026, Hydro Ottawa is proposing to offer Residential Electrical Isolations/Re-energizations for electrical work at no charge to customers, reducing revenue forecasts by $0.5M per year, please refer to interrogatory response 1-PP-1 for more information.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

6-SEC-82

EVIDENCE REFERENCE:

[Ex.6-3-5, Appendix 2-H]

QUESTION(S):

Please provide a breakdown of line 195, 'Services to Third Parties Costs' into affiliate and non-affiliate.

RESPONSE(S):

Attachment 1-Staff-1(A) - Chapter 2 Appendices 2-H has been updated to reflect these amounts in rows 195 and 196.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

8-SEC-83

EVIDENCE REFERENCE:

[Ex.8-2-3, p.6]

QUESTION(S):

With respect to the System Losses Plan, please explain why Hydro Ottawa has chosen not to include “Improved System Loses” as a criterion for project evaluation, as originally planned.

RESPONSE(S):

While Hydro Ottawa’s 2022-2025 System Losses Plan initially proposed including "Improved System Losses" as a criterion for project evaluation to emphasize its importance, this specific criterion has not been implemented within our overarching project value model.

The rationale for this decision stems from the following:

- Limited Standalone Cost-Effectiveness: Our analysis, including studies on solutions like Sentient Energy’s GEMS®+ENGO®, indicated that pursuing capital investments solely for line loss reductions was generally not cost-effective (please see Attachment 8-2-3(B) - Hydro Ottawa System Losses Plan).
- Comprehensive Project Prioritization: Hydro Ottawa's investment decision-making process is designed to optimize projects by balancing a broad spectrum of factors. These factors include:
  - Asset condition and lifecycle cost
  - Labour resources and overall financial costs.
  - Critical risks related to health and safety, system capacity, environmental stewardship, and compliance.

- Benefits such as improving system reliability and operational efficiencies, and enabling distributed generation.

Therefore, while system loss reduction is considered a benefit, it has not emerged as a primary driver for advancing projects independently within our comprehensive planning framework. Our focus remains on projects that deliver the most value across these multifaceted objectives.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

8-SEC-84

EVIDENCE REFERENCE:

[Ex.8-3-1, Table 2]

QUESTION(S):

With respect to Hydro Ottawa's request to increase its Standard Supply Service ("SSS") Charge:

a. How many customers are currently supplied by a Retailer?
b. Please provide details of the activities and programs that make up the 2026 SSS expense of $6,764,099.
c. Please explain why Hydro Ottawa has determined that the costs for this service should not be subject to an 'X' factor adjustment?
d. Please explain why the increase in revenue of $5.6M in 2026 over 2025 for SSS is not reflected in similar decreases in OM&A costs in Appendix 2-JB.

RESPONSE(S):

a) Table A below details the current number of Hydro Ottawa customers supplied by a retailer compared to the total number of customers as of June 30, 2025.

Table A - Customer Count Breakdown - Retailer & SSS

	June 2025
Retailer Customers	4,647
SSS Customers	370,438
TOTAL CUSTOMERS	**375,085**

b) Please refer to interrogatory response 8-CCC-66 a) for further details of the 2026 SSS expense.

c) The OEB approves annual adjustments (with no productivity offset)[1] based on the OEB inflation factor for Retailer Service Charges (RSCs) and Pole Attachment Charges, both are province-wide rates, to ensure the charges remains appropriate over time and do not shift costs to distribution ratepayers[2], and/or non-retailer ratepayers (SSS customers) are not cross-subsidizing the energy retailers[3]. Hydro Ottawa believes the same approach should be taken for the SSS Charge to ensure the SSS charge is kept up to date over time, ensure any difference between costs and revenue is minimized for these services and retailer enrolled customers are not cross-subsidizing SSS customers.

Furthermore, as described in Schedule 8-3-2 - Standard Supply Service Charge, Hydro Ottawa continues to drive efficiencies through automating processes related to SSS services and the capital investments required have not been included in the total costing.

d) Please see interrogatory response 8-CCC-66 b).

[1] Ontario Energy Board, *Report of the Ontario Energy Board Energy Retailer Service Charges*, EB-2015-0304 (November 29, 2018) Page 15
[2] Ontario Energy Board, *Report of the Ontario Energy Board Wireline Pole Attachment Charges,* EB-2015-0304 (March 22, 2018) Page 36
[3] Ontario Energy Board, *Report of the Ontario Energy Board Energy Retailer Service Charges,* EB-2015-0304 (November 29, 2018) Page 4

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

8-SEC-85

EVIDENCE REFERENCE:

[Ex.8-4-1, Table 1 and Appendix 2-H]

QUESTION(S):

With respect to Hydro Ottawa's request to change some of its Specific Service Charges ("SSC"):

a. For each charge listed in Table 1, please provide the actual number of occurrences in 2021 to 2024, and forecasted number of occurrences in 2025 and 2026, and the total expected revenue.
b. Hydro Ottawa is forecasting a $991k decrease in the average revenue from SSC between 2021-2025 and 2026-2030. Please explain the impact, if any, this change has on OM&A.

RESPONSE(S):

a. Please see Table A below for the actual number of occurrences in 2021 to 2024, and forecasted number of occurrences in 2025 and 2026.

For the expected revenue please refer to Table 1 - Specific Service Charge Revenue 2021-2025 ($'000s) and Table 2 - Specific Service Charge Revenue 2026-2030 ($'000s) in Schedule 6-3-2 Specific Service Charge Revenue.

Table A - SSC Occurrences

	Historical Years				Bridge Year	Test Year
	2021	2022	2023	2024	2025	2026
Customer Administration						
Easement Certificate for Unregistered Easements	280	288	130	177	207	232
Duplicate invoices for previous billing	695	165	386	234	417	416
Special Billing Service, per hour	148	158	106	116	143	141
Credit Reference/Credit Check (+ credit agency costs)	70	20	21	13	33	35
Unprocessed Payment Charge	2,391	2,653	3,175	3,383	3,739	3,096
Account Set Up Charge / Change of Occupancy Charge	66,642	59,526	52,395	55,314	58,621	59,415
Interval Meter - Field Reading	-	-	-	-	-	-
High Bill Investigation - If Billing is Correct	4	7	5	5	8	6
Non-Payment of Account						
Reconnect at Meter - Regular Hours	739	1,436	1,725	2,934	2,605	1,794
Reconnect at Meter - After Regular Hours	15	229	243	443	570	236
Reconnect at Pole - Regular Hours	1	4	1	12	7	4
Reconnect at Pole - After Regular Hours	1	-	-	-	1	1
Other						
Temporary Service - Install and Remove ("TS-I&R") - Overhead - no transformer	51	48	19	34	13	29
TS-I&R - Underground - no transformer	34	28	35	24	20	28
TS-I&R Overhead - with transformer	10	6	2	10	3	1
Specific Charge to Access Power Poles - Wireline	69,642	70,208	70,543	70,651	70,555	70,555
Energy Resource Facilities Administration Charge	-	-	-	-	-	1

b. The forecasted decrease in average revenue from SSC between 2021-2025 and 2026-2030 stems from Hydro Ottawa's achievement of operational efficiency and cost savings. This reduction in SSCs, like the Account Set Up/Change of Occupancy Charge (average reduction of $1M annually) and Reconnect at Meter Charges, is a result of process improvements and automation, including remote meter reconnection technology and the adoption of cloud-based programs. Essentially, investments and enhancements have generated these savings, which Hydro Ottawa is passing on to customers through lower SSCs, showcasing successful productivity and continuous improvement initiatives.

As outlined in Section 4.3 of Attachment 1-3-3(A) - PEG Benchmarking Analysis, the ongoing system maintenance and upgrade costs associated with these services are included in OM&A expenses. Therefore, while SSC revenue is decreasing, the costs to maintain and upgrade the systems that enabled these savings are included in the OM&A budget.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-86

EVIDENCE REFERENCE:

[Ex.9-1-3, Attachment A]

QUESTION(S):

Please update the Deferral and Variance Account (Continuity Schedule) with 2024 actuals, if not already done.

RESPONSE(S):

Hydro Ottawa has updated the Deferral and Variance Account (Continuity Schedule) with 2024 actuals, please see Attachment 1-Staff-1(C) - OEB Workform - 2026 DVA Continuity Schedule.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-87

EVIDENCE REFERENCE:

[Ex.9-1-3, p.17-27]

QUESTION(S):

With respect to the proposed capital additions differential variance accounts:

a. Please provide a table that shows for each account/sub-account, the specific programs (and sub-programs) that it applies, there respective forecast capital additions for each year of the term that would be the baseline for any variances, and if they are symmetrical or asymmetrical.

b. Please provide a revised version to part (a), if there was no change in accounts/sub-accounts from what was approved in EB-2019-0261.

RESPONSE(S):

a) Table A below provides the proposed capital additions by variance account, the programs under each, the forecasted annual additions for 2026-2030, and whether the accounts are symmetrical or asymmetrical.

For greater clarity, Hydro Ottawa is proposing to exclude the PILs capital contribution from any capital additional differential variance account. Once established, the PILs capital contribution balance is set and would not be trued up.

Hydro Ottawa's proposed capital variance accounts and/or sub-accounts are based upon annual and cumulative net capital additions at the investment category level, not the program level.

Table A - Capital Additions Differential Variance Accounts ($'000s)[1]

Differential Variance Account	Programs	Symmetrical / Asymmetrical	Test Years					Total
			2026	2027	2028	2029	2030	2026-2030
General Plant (CCRA)		Symmetrical	$ 7,697	$ 7,642	$ 10,608	$ 17,015	$ 1,024	$ 43,986
General Plant (PILs Contributions)		No Variance Account	$ (5,066)	$ (4,096)	-	-	-	$ (9,162)
General Plant (Excluding CCRA & PILs Contributions)		Asymmetrical						-
	Fleet Replacement		$ 12,099	$ 14,206	$ 11,138	$ 3,014	$ 135	$ 40,593
	Tools Replacement		$ 1,080	$ 956	$ 884	$ 882	$ 1,203	$ 5,005
	Buildings - Facilities		$ 1,587	$ 1,314	$ 706	$ 1,217	$ 1,726	$ 6,551
	Grid Technologies		$ 1,093	$ 886	$ 1,043	$ 638	$ 637	$ 4,296
	Meter to Cash		$ 302	$ 1,000	$ 6,833	$ 352	$ 363	$ 8,850
	Customer Engagement Platform		$ 851	$ 710	$ 311	$ 320	$ 330	$ 2,522
	Enterprise Solutions		$ 233	$ 84	$ 928	$ 80	$ 105	$ 1,429
	Infrastructure and Cybersecurity		$ 2,002	$ 1,631	$ 1,316	$ 3,049	$ 3,904	$ 11,903
	Data and System Integrations		$ 773	$ 627	$ 473	$ 492	$ 1,116	$ 3,482
Subtotal			$ 20,019	$ 21,415	$ 23,634	$ 10,045	$ 9,519	$ 84,632
System Renewal/System Service		Asymmetrical						-
	Stations & Bldgs Infra Renewal		$ 20,989	$ 23,135	$ 22,239	$ 17,337	$ 24,593	$ 108,293
	OH Distribution Asset		$ 12,913	$ 12,941	$ 13,547	$ 14,056	$ 14,342	$ 67,800

[1] Figures are based on 2026-2030 Capital Additions totals in Appendix 2-BA of interrogatory 1-Staff-1.

			Test Years					Total
Differential Variance Account	Programs	Symmetrical / Asymmetrical	2026	2027	2028	2029	2030	2026-2030
	Renewal							
	UG Distribution Assets Renewal		$ 19,097	$ 19,675	$ 20,598	$ 21,787	$ 21,877	$ 103,034
	Corrective Renewal		$ 12,538	$ 12,783	$ 13,406	$ 13,879	$ 14,245	$ 66,851
	Metering Renewal		$ 15,366	$ 14,648	$ 16,220	$ 19,269	$ 20,861	$ 86,364
	Stations Enhancements		$ 547	$ 557	$ 574	$ 680	$ 692	$ 3,050
	Distribution Enhancements		$ 17,528	$ 19,433	$ 18,451	$ 18,619	$ 18,755	$ 92,786
	Grid Technologies		$ 3,959	$ 11,615	$ 58	$ 5,008	$ 271	$ 20,912
	Control and Optimization		$ 691	$ 1,756	$ 364	$ 379	$ 396	$ 3,586
	Field Area Network		$ 3,000	$ 4,829	$ 6,876	$ 3,990	$ 2,057	$ 20,750
Subtotal			$ 106,627	$ 121,373	$ 112,334	$ 115,005	$ 118,089	$ 573,427
System Renewal/System Service (Capacity Upgrades)		Symmetrical	$ 55,724	$ 69,084	$ 113,765	$ 30,479	$ 41,929	$ 310,980
System Access (excluding Residential, Plant Relocation & Commercial expansions related to enabling housing development)		Asymmetrical						-
	System Expansion		$ 3,708	$ 48,155	$ 5,606	$ 909	$ 17,412	$ 75,790
	Customer Connections unrelated to enabling housing development		$ 3,695	$ 7,067	$ 5,967	$ 5,530	$ 6,179	$ 28,438
	Generation Connections		$ 5	$ 6	$ 18	$ 17	$ 20	$ 66
	Metering		$ 323	$ 332	$ 347	$ 356	$ 367	$ 1,724
Subtotal			$ 7,731	$ 55,559	$ 11,937	$ 6,811	$ 23,978	$ 106,018

			Test Years					Total
Differential Variance Account	**Programs**	**Symmetrical / Asymmetrical**	**2026**	**2027**	**2028**	**2029**	**2030**	**2026-2030**
System Access (Residential, Plant Relocation & Commercial expansions related to enabling housing development)		Symmetrical						-
	Plant Relocation		$ 2,763	$ 2,920	$ 3,074	$ 3,117	$ 3,210	$ 15,084
	Customer Connections		$ 11,070	$ 14,371	$ 13,965	$ 14,099	$ 15,182	$ 68,687
Subtotal			$ 13,833	$ 17,291	$ 17,039	$ 17,216	$ 18,392	$ 83,771
Total Symmetrical			**$ 77,254**	**$ 94,016**	**$ 141,412**	**$ 64,709**	**$ 61,345**	**$ 438,737**
Total Asymmetrical			**$ 134,377**	**$ 198,347**	**$ 147,906**	**$ 131,861**	**$ 151,586**	**$ 764,076**
No Variance Account			**$ (5,066)**	**$ (4,096)**	**-**	**-**	**-**	**$ (9,162)**
Grand Total			**$ 206,565**	**$ 288,267**	**$ 289,318**	**$ 196,570**	**$ 212,931**	**$ 1,193,651**

b) Table B below provides the proposed capital additions by variance account, the programs under each, the forecasted annual additions for 2026-2030, if there was no change in accounts/sub-accounts from what was approved in EB-2019-0261.

Table B - Capital Additions Differential Variance Accounts - Existing Approved Framework from EB-2019-0261 ($'000s)[2]

			Test Years					Total
Differential Variance Account	Programs	Symmetrical / Asymmetrical	2026	2027	2028	2029	2030	2026-2030
General Plant (CCRA)		Symmetrical	$ 7,697	$ 7,642	$ 10,608	$ 17,015	$ 1,024	$ 43,986
General Plant (PILs Contributions)		No Variance Account	$ (5,066)	$ (4,096)	-	-	-	$ (9,162)
General Plant (Excluding CCRA & PILs Contributions)		Asymmetrical						-
	Fleet Replacement		$ 12,099	$ 14,206	$ 11,138	$ 3,014	$ 135	$ 40,593
	Tools Replacement		$ 1,080	$ 956	$ 884	$ 882	$ 1,203	$ 5,005
	Buildings - Facilities		$ 1,587	$ 1,314	$ 706	$ 1,217	$ 1,726	$ 6,551
	Grid Technologies		$ 1,093	$ 886	$ 1,043	$ 638	$ 637	$ 4,296
	Meter to Cash		$ 302	$ 1,000	$ 6,833	$ 352	$ 363	$ 8,850
	Customer Engagement Platform		$ 851	$ 710	$ 311	$ 320	$ 330	$ 2,522
	Enterprise Solutions		$ 233	$ 84	$ 928	$ 80	$ 105	$ 1,429
	Infrastructure and Cybersecurity		$ 2,002	$ 1,631	$ 1,316	$ 3,049	$ 3,904	$ 11,903
	Data and System Integrations		$ 773	$ 627	$ 473	$ 492	$ 1,116	$ 3,482
Subtotal			$ 20,019	$ 21,415	$ 23,634	$ 10,045	$ 9,519	$ 84,632
System Renewal/System Service		Asymmetrical						-
	Stations & Bldgs Infra		$ 20,989	$ 23,135	$ 22,239	$ 17,337	$ 24,593	$ 108,293

[2] Figures are based on 2026-2030 Capital Additions totals in Appendix 2-BA of 1-Staff-1

			Test Years					Total
Differential Variance Account	Programs	Symmetrical / Asymmetrical	2026	2027	2028	2029	2030	2026-2030
	Renewal							
	OH Distribution Asset Renewal		$ 12,913	$ 12,941	$ 13,547	$ 14,056	$ 14,342	$ 67,800
	UG Distribution Assets Renewal		$ 19,097	$ 19,675	$ 20,598	$ 21,787	$ 21,877	$ 103,034
	Corrective Renewal		$ 12,538	$ 12,783	$ 13,406	$ 13,879	$ 14,245	$ 66,851
	Metering Renewal		$ 15,366	$ 14,648	$ 16,220	$ 19,269	$ 20,861	$ 86,364
	Capacity Upgrades		$ 55,724	$ 69,084	$ 113,765	$ 30,479	$ 41,929	$ 310,980
	Stations Enhancements		$ 547	$ 557	$ 574	$ 680	$ 692	$ 3,050
	Distribution Enhancements		$ 17,528	$ 19,433	$ 18,451	$ 18,619	$ 18,755	$ 92,786
	Grid Technologies		$ 3,959	$ 11,615	$ 58	$ 5,008	$ 271	$ 20,912
	Control and Optimization		$ 691	$ 1,756	$ 364	$ 379	$ 396	$ 3,586
	Field Area Network		$ 3,000	$ 4,829	$ 6,876	$ 3,990	$ 2,057	$ 20,750
Subtotal			$ 162,350	$ 190,456	$ 226,099	$ 145,484	$ 160,018	$ 884,407
System Access (excluding Residential, Plant Relocation)		Asymmetrical						-
	System Expansion		$ 3,708	$ 48,155	$ 5,606	$ 909	$ 17,412	$ 75,790
	Customer Connections		$ 6,376	$ 12,600	$ 10,490	$ 9,661	$ 10,838	$ 49,965
	Generation Connections		$ 5	$ 6	$ 18	$ 17	$ 20	$ 66
	Metering		$ 323	$ 332	$ 347	$ 356	$ 367	$ 1,724
Subtotal			$ 10,412	$ 61,093	$ 16,460	$ 10,943	$ 28,637	$ 127,545
System Access (Residential and Plant Relocation)		Symmetrical						-
	Plant Relocation		$ 2,763	$ 2,920	$ 3,074	$ 3,117	$ 3,210	$ 15,084

			Test Years					Total
Differential Variance Account	Programs	Symmetrical / Asymmetrical	2026	2027	2028	2029	2030	2026-2030
	Customer Connections		$ 8,390	$ 8,838	$ 9,442	$ 9,967	$ 10,523	$ 47,160
Subtotal			$ 11,152	$ 11,758	$ 12,517	$ 13,084	$ 13,734	$ 62,244
Total Symmetrical			**$ 18,849**	**$ 19,400**	**$ 23,125**	**$ 30,099**	**$ 14,758**	**$ 106,230**
Total Asymmetrical			**$ 192,782**	**$ 272,963**	**$ 266,193**	**$ 166,471**	**$ 198,173**	**$ 1,096,583**
No Variance Account			**$ (5,066)**	**$ (4,096)**	**-**	**-**	**-**	**$ (9,162)**
Grand Total			**$ 206,565**	**$ 288,267**	**$ 289,318**	**$ 196,570**	**$ 212,931**	**$ 1,193,651**

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INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-88

EVIDENCE REFERENCE:

[Ex.9-1-3, p.25]

QUESTION(S):

Hydro Ottawa proposes changes to the existing System Access Capital Additions Revenue Requirement (Residential and Plant Relocation) Differential Variance Account to "be modified to also include commercial expansions (under System Access) and capacity upgrades (under System Service) related to enabling housing development as defined under Ontario's Bill 214, the *Affordable Energy Act*, 2024."

a. Please explain what is meant by "related to housing development".
b. Please explain the relationship between commercial expansions and housing developments.

RESPONSE(S):

a) When referring to capital investments "related to housing development," Hydro Ottawa encompasses a broader scope than just direct residential connections: they are capital investments required to support the Ontario government's housing development initiatives, including any resulting legislative amendments arising from Ontario's Bill 214, the Affordable Energy Act, 2024 or further amendments to regulatory instruments related to housing developments. There are not limited to, but are expected to be comprised of:

- New Residential Connections and Growth: This covers projects for new residential subdivisions and the general expansion of housing due to population growth. This aligns

with Ontario's Bill 214, the Affordable Energy Act, 2024, which promotes new housing development in high-growth areas.

- Commercial Expansions Supporting Housing: Commercial growth is considered essential to support and accommodate an increasing residential population as well, the development of mixed-use buildings and communities where commercial and residential components are integrated
- Capacity Upgrades for Combined Growth: Increased residential and commercial development drives a growing demand for electricity infrastructure. "Capacity upgrades" within our System Service category are critical investments. These involve building greenfield or upgrading substations, transformers, and lines, all to meet escalating demand, power the growing community, and address electrification impacts from new housing.

b) Commercial expansion and housing development are intricately linked; commercial growth is essential to support and accommodate an increasing residential population. Both residential and commercial developments collectively drive the growing demand for electricity distribution infrastructure. Hydro Ottawa's capital investment planning, particularly within its System Access and System Service categories, addresses these interconnected growth patterns. This includes strategic investments for residential and commercial connections, alongside associated capacity upgrades. Community design plans frequently designate "Mixed-Use" or "Commercial" areas adjacent to residential units, underscoring this planned co-development.

In November 2024, the Ontario Energy Board made amendments to Appendix B of the Distribution System Code to facilitate housing development connections. In particular, a definition for “housing development” was added, and “means a project to construct multiple residential accommodations on a piece of land that will be divided into multiple parcels and offered for sale, and that will be comprised predominantly of residential accommodations but may also include public buildings, industrial and commercial buildings or space appropriate for such buildings.” [emphasis added].

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-89

EVIDENCE REFERENCE:

[Ex.9-1-3, p.29]

QUESTION(S):

With respect to the Performance Outcomes Accountability Mechanism Deferral Account

a. For each year the mechanism has been in place, please provide the specific metrics and targets for each year, and Hydro Ottawa's actual performance.
b. Please explain why Hydro Ottawa has not proposed continuation with an updated or revised version of the Performance Outcomes Accountability Mechanism Deferral Account.

RESPONSE(S):

a) Please see Tables A-E below for each of the five Performance Outcome Accountability Mechanism (POAM) specific metrics, targets and Hydro Ottawa's actual performance for the years 2021-2024. Hydro Ottawa will be publishing the actual performance results for 2024 POAM metrics in the Annual Custom Incentive Report (CIR) before the end of 2025.

Table A - POAM Metric #1

Metric		2021	2022	2023	2024
# of Service Interruptions Caused by Defective Overhead Equipment - Excluding Major Event Days		●	●	●	●
	Target	115	115	115	111
	Actual	77	82	82	50

Green ≤Target; Yellow >Target and <110% Target; Red ≥110% Target

Table B - POAM Metric #2

Metric		2021	2022	2023	2024
# of Service Interruptions Caused by Defective Underground Equipment - Excluding major Event Days & Leaking Padmount Transformers		●	●	●	●
	Target	114	114	114	110
	Actual	105	90	61	90

Green ≤Target; Yellow >Target and <110% Target; Red ≥110% Target

Table C - POAM Metric #3

Metric		2021	2022	2023	2024
System Average Interruption Duration Index (SAIDI) - Excluding Major Event Days & Loss of Supply		●	▲	▲	●
	Target	0.91	0.91	0.91	0.89
	Actual	0.82	1.02	1.03	0.88

Green ≤Target; Yellow >Target and <105% Target; Red ≥105% Target

Table D - POAM Metric #4

Metric		2021	2022	2023	2024
Wood Pole Replacement Unit Cost ($ per Pole)		●	✕	✕	✕
	Target	$8,510	$8,510	$8,510	$8,510
	Actual	$8,415	$9,951	$9,559	$15,301

Green ≤Target; Yellow >Target and <105% Target; Red ≥105% Target

Table E - POAM Metric #5

Metric		2021	2022	2023	2024
Underground Cable Replacement Cost ($ per Km of Cable)		●	●	●	●
	Target	$103,051	$103,051	$103,051	$103,051
	Actual	$62,244	$101,334	$71,793	$53,623

Green ≤Target; Yellow >Target and <105% Target; Red ≥105% Target

b) There are two principal factors informing Hydro Ottawa's proposal to not utilize an updated or revised version of the Performance Outcomes Accountability Mechanism Deferral Account (POAM) for the 2026-2030 rate period.

The first is that the utility is proposing the inclusion of a unique earnings sharing mechanism (ESM) as part of its rate-setting framework. An ESM enables the sharing of utility earnings with customers when earnings rise above a certain threshold that may be passed along to customers in the form of rate reductions or rate offsets. The ESM in Hydro Ottawa's proposed 2026-2030 rate plan has been structured so as to serve as both a continuous improvement and customer protection mechanism.

As the former, the ESM leans on the OEB's Pacific Economics Group (PEG) model in establishing remuneration benefits, insofar as the utility would need to maintain its Cohort III efficiency position in the adjusted PEG model in order to be able to retain any cumulative earnings up to the defined threshold. As the latter, the ESM would utilize a 150 basis point threshold for triggering the sharing of earnings, instead of the standard 300 basis point dead band which is the established practice for OEB rate-making purposes. The lower threshold will provide greater customer protection by enabling a faster sharing of any excess earnings.

This uniquely tailored ESM will help to ensure the following: Hydro Ottawa is held accountable for its performance during the upcoming rate period; the utility maintains a rigorous focus on efficiency; and the interests of the utility are aligned with those of customers. For further details, please refer to Schedule 1-3-1 - Rate Setting Framework and Schedule 1-3-2 - Proposed Annual Reporting - 2026-2030.

Secondly, the ESM allows for a balanced approach to maintaining efficiency and continuous improvement by allowing Hydro Ottawa to focus on areas of greatest need and benefit and changing customer preferences. It also does not penalize the utility directly for unexpected economic impacts such as high inflation, supply chain disruption and tariffs and allows the utility to make gains in other aspects that remain more controllable. The Utility Scorecard and CIR

Annual reporting ensure continuous oversight of key metrics as compared to historical performance and planning objectives.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-90

EVIDENCE REFERENCE:

[Ex.9-1-3, p.40; *Decision and Order* (EB-2023-0143), October 31, 2023]

QUESTION(S):

As part of its approval of the Getting Ontario Connected Act (GOCA) Variance Account, the OEB stated that it in the context of a request for disposition that it "agrees with OEB staff on the necessity for utilities to demonstrate that recorded amounts in their accounts are both incremental to the base rates and are a direct result of Bill 93."[emphasis added] Please explain and provide to substantiate how the entire variance in locate costs is a direct result of Bill 93.

RESPONSE(S):

The GOCA deferred variance account balances capture increased average cost per locate due to Bill-93. As summarized in Table 9 - External Cost per Locate 2021-2026, found in Schedule 4-1-2 - Operations, Maintenance and Administration Program costs, the cost per locate doubles between 2021 and 2023, from $32.89 to $58.97. The increase in cost exceeded the economy-wide inflation during that period, while the number of locate requests remained relatively flat. The primary driver for this escalation was Bill-93's requirement for locates to be completed within a five-day timeframe, which led to increased contractor prices due to the limited supply of qualified service providers in the region. These higher prices, specifically for labour costs associated with meeting the expedited timeframe, are captured in the GOCA deferred variance account balance.

Hydro Ottawa notes that, to address the escalating volume and cost of locate requests, the utility has implemented the following strategies, which have helped to minimize the costs captured in the GOCA variance account:

- **Clearing House Implementation:** Hydro Ottawa onboarded a clearing house in 2022 to analyze locate requests and automatically clear those without electrical infrastructure, eliminating unnecessary field visits. This approach has increased Hydro Ottawa's remote clear rate from 10% to 24%.
- **Expansion of Alternate Locate Agreements (ALAs):** ALAs allow approved excavators to proceed without a traditional field locate under specific conditions, such as digging without mechanical methods. ALAs were implemented prior the enactment of Bill 93 and have proven to be an effective tool for helping to manage locate requests and control program costs.

As detailed in Table 2 of Schedule 1-3-4 - Facilitating Innovation and Continuous Improvement, these initiatives have produced $2.4M in productivity savings.

Hydro Ottawa will continue to track the variance between locate costs resulting from Bill 93 and the approved cost included in base rates for 2024 and 2025, as per the OEB's generic GOCA variance account,[1] 1508 Sub-Account, on the premise that its locates expense forecast includes effects (higher costs) that are a direct result of Bill 93.

Hydro Ottawa confirms that a financial analysis was completed to compare the amounts of locates included in base rates versus the incremental costs as a direct result of Bill 93. A specific vendor was identified as the primary supplier for locate work performed as a result of Bill 93. Only the incremental amounts greater than what was in the base rates are included in the GOCA variance account.

[1] Ontario Energy Board, Letter RE: *Getting Ontario Connected Act Variance Account*, EB-2023-0143 (October 31, 2023).

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-91

EVIDENCE REFERENCE:

[Ex.9-1-4, p.3]

QUESTION(S):

With respect to Account 1592 – CCA Subaccount:

a. Please provide CCA continuity schedules for both the regular and accelerated CCA amounts in 2020.
b. Please explain why the Accelerated CCA is lower than the Regular CCA.
c. Please explain why the Difference in Grossed Up PILs amount is not reflected in the DVA continuity schedule as an entry in 2020.

RESPONSE(S):

a. Please see interrogatory response 9-Staff-212, part d) and specifically the Attachments (A)-(C) in interrogatory response 9-Staff-212.

b. Please see interrogatory response 9-Staff-212 part d).

c. The difference in grossed up PILs is reflected in the DVA continuity schedule. Please see Table A in the interrogatory response to 9-Staff-213 and Attachment 1-Staff-1(C) - OEB_Workform - 2026 DVA_Continuity_Schedule. Please also note that the grossed up PILs difference for CCRA has been revised to $2,393. Please see interrogatory response 9-Staff-212, part d), specifically Table A.

INTERROGATORY RESPONSES TO SCHOOL ENERGY COALITION

9-SEC-92

EVIDENCE REFERENCE:

[Ex.9-2-1, p.1-2]

QUESTION(S):

With respect to the proposed Non-Wires Solutions Variance Account:

a. Is the account meant to capture variance in costs of identified NWS projects only, or would it also capture costs for any new NWS projects undertaken by Hydro Ottawa that has not be forecast as part of the DSP?

b. If it includes the latter, and the NWS project replaces, or differs, traditional investment included in rates, would the account reflect the savings from cancellation or deferral?

RESPONSE(S):

Please refer to response interrogatory 1-Staff-18.