Assessment of Risks & Opportunities with Expanding Third Party Access to Smart Metering Entity Data

Accenture Report for the IESO's Smart Metering Entity

September 23rd, 2024
Final Deliverable

accenture

Table of Contents

While Accenture has strived to be exhaustive in its assessment, expanding TPA to SME data is a topic that should be treated as an evolving matter and monitored continually at the IESO. This subject should be examined on a consistent basis, particularly as the Ontario's electricity grid matures within a dynamic regulatory environment and alongside the emergence of new and innovative technologies such as AI, GenAI and cloud computing. It is recommended that the IESO and SME continue to monitor and investigate up-and-coming risks and opportunities that may arise in providing TPA to SME data on a regular basis and keep these investigations closely integrated within the IESO's existing risk function on a corporate level.

1. Executive Summary

The Smart Metering Entity (SME) at the Independent Electricity System Operator (IESO) has engaged Accenture to perform an assessment of potential risks & opportunities with expanding Third Party Access (TPA) to SME data beyond Canadian Governmental Entities. This report encompasses the findings of that assessment. It seeks to identify the various risks and opportunities associated with expanding TPA to SME data, and strategies to mitigate the risks and capitalize on the opportunities. This assessment has been performed in the context of SME data being used by companies with various commercial interests, either by themselves, in combination with IESO published data, and/or with other external datasets.

Fundamentally, this report looks to address the following 3 key risk opportunity questions that are top of mind for the IESO Executive and its Board of Directors. Throughout this assessment, the key risk/opportunity questions (below) are addressed using a subset of core themes and examples such as operational & infrastructure management and market dynamics & competition among others. Various recommended strategies are then proposed to address these key questions and themes. See Figure 1, aside.

Figure 1: the approach used to study risks & opportunities with expanding TPA to SME data.

Table 1: Top 3 key risk questions to address.

Topic	Risk Question	Likelihood	Mitigations
Grid Security	"Can third parties use aggregated SME data to better model the power flows on the grid and find vulnerabilities?"	Unlikely	a) SME data is 2 months delayed b) IESO already publishes near-real time forecasts that are fairly accurate c) SME data is only residential and about half of the load d) Rigid de-identification of SME data
Market Manipulation	"Can third parties use the SME data to gain an unfair market advantage by understanding zonal constraints?"	Unlikely	
De-Anonymization	"Can third parties who have access to sophisticated AI and existing personal data leverage the aggregated SME data to re-personalize data?"	Unlikely	a) Data Use Agreements with companies to not re-personalize the data to the individual level b) Privacy by Design principles

Table 2: Top 3 key opportunity questions to address.

Topic	Opportunity Question	Likelihood	Benefits
New Business Opportunities	*"Can expanding TPA to SME data spur new business opportunities within Ontario (e.g. new energy programs for residential customers) and put money back into ratepayer pockets?"*	Almost certain	a) New energy efficiency programs b) New Ontario startups in energy data c) Better DER placement
Driving Competition	*"Can expanding TPA to SME data drive further competition amongst market participants in the Ontario electricity market and help drive down electricity prices for customers?"*	Possible	a) Reduction in peak load as ICI participants better predict peak
Maintaining Business Relevance	*"Can expanding TPA to SME data help the IESO maintain business relevance within the evolving and dynamic power, energy & utilities sectors in Canada and across North America?"*	Likely	a) IESO considered a leader in the SME and data space b) Keeps IESO brands as leader

Through this assessment, Accenture has conducted over 25 interviews with IESO staff across numerous business units, examined well over 20 modern research publications on the topic of smart meter data, and reached out of handfuls of global subject matter advisors at Accenture on the topic of advanced metering infrastructure, grid system operations and digital marketing. The list of risks and opportunities uncovered in this study is a culmination of those efforts. In total, the key themes were identified as follows:

Key Risk Themes

1. Privacy & information security;
2. Financial & economic;
3. Operational & infrastructure management;
4. Market dynamics & competition;
5. Data utilization & integrity; and
6. Compliance & regulatory.

Key Opportunity Themes

1. Energy efficiency & conservation;
2. Operational & infrastructure management;
3. Innovation & technological advancement;
4. Compliance & regulatory;
5. Stakeholder engagement & satisfaction;
6. Market dynamics & competition; and
7. Financial & economic.

On the risk side, Accenture reviews with the IESO market teams did not find any significant risks of market manipulation in expanding TPA to SME data. The IESO already provides many datasets publicly that can be used to generate load forecasts. Expanded TPA to SME data is unlikely to raise the risk profile of the IESO and SME in relation to market participants having significant capabilities to improve their forecasting abilities. It would be important to the IESO to ensure equal access of this data to all market participants, to avoid unfair advantage to individual market participants and introduce economic inefficiency into the market. Reviewing internally with Accenture's AI and GenAI teams, our subject matter advisors did not believe that the aggregated SME data could be de-anonymized or be used to create individualistic profiles of Ontarians based on their smart meter data.

From an opportunities standpoint, the expansion of TPA to SME data does show promise in creating new products and services in the market that have the potential to put money back into the pockets of Ontario ratepayers. Data-driven findings from SME consumption data can unlock new energy efficiency programs, better locate distributed energy resources, spur new competition and business across the province, and ultimately serve the best interests of Ontarians as it relates to their energy usage and insights that can be developed from an aggregated load forecasting level.

Conclusion

This assessment concludes that expanding TPA to SME data beyond Canadian Governmental Entities **does not** appear to result in any scenarios that would likely increase the existing overall risk profile of the IESO or SME. Rather, it appears that the expansion of TPA to SME data would yield many positive opportunities in the market that may benefit Ontario ratepayers.

2. Overview of the Assessment & Approach

2.1 Objectives of the Assessment

The Independent Electricity System Operator (IESO) operates the province's central smart meter data repository and Meter Data Management and Repository (MDM/R) under the Smart Metering Entity (SME) at the IESO. The SME collects and processes electricity usage data from over 5M smart meters in Ontario and provides Local Distribution Companies (LDCs) across the province with billing data for all residential and small general service customers. The electricity usage data is built on the principles of Privacy by Design, as established by Ontario's Information and Privacy Commissioner (IPC), such that data collection, storage and management adhere to stringent security and privacy protocols.

In March 2022, the SME received approval from the Ontario Energy Board (OEB) to provide third party access (TPA) to smart meter data to Canadian Governmental Entities. At the time, the OEB also requested that the SME provide an expanded TPA recommendation by April 2025 and preferably earlier. In April 2024, the SME began their assessment to form a recommendation on whether the OEB should, or should not, expand TPA to the SME data. An interim report was submitted by April 30, 2024, and the final assessment to the OEB is expected by end of 2024. The primary objective of this assessment is to provide a thorough and comprehensive analysis of the potential risks and opportunities that may arise with expanding third party access to Smart Metering Entity (SME) data, beyond the current Canadian Governmental Entities.

As defined in the 2022 OEB, Canadian Governmental Entities are: "Federal and provincial governments, including ministries, agencies, boards, commissions, tribunals and wholly owned corporations, or in the case of non-share capital corporations, where such corporations are controlled by a federal or provincial governments, as well as municipalities (or regional governments), universities, school boards, hospitals and First Nations. First Nations means a "council of the band" as that term is defined in subsection 2(1) of the Indian Act (Canada). "Canadian Governmental Entities" does not include: Private sector entities, publicly traded companies, individual doctors, professors, or government officials and all those entities that do not fall in one of the categories outlined above."

Stakeholder engagement performed by the SME to date has shown high levels of interest in expanded access to SME data. This study aims to identify and evaluate various potential uses of SME data, particularly when combined with external datasets, that may either elevate the overall risk profile or provide new opportunity for both the IESO and the SME. For reference, SME TPA data is provided in relation to IESO operational data as well as external data sets in Figure 2. In addition, this assessment aims to offer strategic recommendations that may help mitigate any identified risks and/or capitalize on any identified opportunities for relevant stakeholders. By understanding these evolving themes, this investigation seeks to inform the SME, the IESO Executive and the IESO's Board of Directors of various tactics that may be used to navigate the complexities of expanding TPA to SME data.

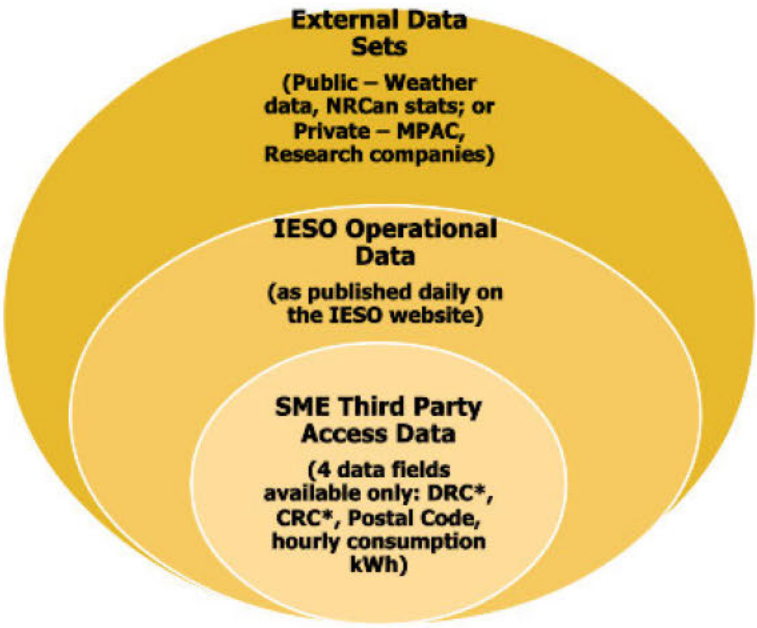


Figure 2: IESO SME TPA data in relation to IESO operational data and external data sets.
*DRC – Distributor Rate Class, Residential or Small Commercial <50kW
*CRC – Commodity Rate Class, Price Plans: Time of Use, Tiered, or Ultra Low Overnight Rate

2.2 Scope of the Assessment & Assumptions

The scope of this assessment has been limited to the following areas.

Table 3: Scope of services conducted by Accenture for the IESO and SME.

Scope	Description
Data Analysis & Scope Classification	Gathered and assessed various IESO data sources, including but not limited to: a. The **SME data** that is restricted to the 4 data fields available to third party access (as per the OEB order): i. Postal code; ii. Customer type (residential or small commercial); iii. Pricing type (TOU, ULO, tiered); and iv. Hourly consumption. b. The **IESO data** that is limited to the data that is currently published publicly on the IESO report site (i.e. does not include the data that is available to market participants based on their username and password access) c. The **other data sources** that is publicly available (e.g. weather data, NRCan statistics, MTO EV data) or can be privately sourced (e.g., MPAC, research companies)

Risk Identification & Mitigation Strategies	Conducted a risk assessment to identify malicious ways in which the expansion of third-party access to SME data can be used for any of the following. Malicious ways include but may not be limited to: a. Adversely affecting the IESO and/or its market participants; b. Providing market participants with favorable advantage to the existing settlement market(s); and c. Instilling general ethic and societal, performance and security, and/or control and governance-related risks upon the IESO. The mitigation strategies include mechanisms and techniques to control and/or minimize these identified risks.
Opportunity Identification & Implementation Strategies	Conversely to the "Risk Identification & Mitigation Strategies" scope above, evaluated the potential benefits of expanding third party access to SME data at the IESO, including market efficiencies, consumer benefits and innovation opportunities as they are related to the Ontario electricity market.
Regulatory Considerations	Reviewed and assessed regulatory considerations and industry standards (e.g. SME's Data Aggregation Standards as approved by the IPC and the OEB) to ensure they are accounted for when expanding TPA to SME data and that IESO remains compliant and does not encounter any regulatory challenges.
Stakeholder Engagements	Facilitated discussions and interviews with IESO staff to gather insights and ensure a comprehensive understanding of the extent and impact of potential access expansions. This scope was limited to IESO personnel and did not include any third-party stakeholders including Ontario electricity market participants.
Reporting & Findings	Prepared (i) an Executive Summary of findings and (ii) a long-form report summarizing findings of the assessment, including identified risks, opportunities and actionable recommendations for IESO.

2.3 Approach & Methodology

The approach towards completing the assessment of risks and opportunities consisted of a four-pronged study. Each of the following perspectives were used to ensure that Accenture provided the IESO with a holistic and comprehensive investigation into the ways smart meter data can be used and combined with external datasets for various purposes. Accenture leveraged local and global power & utilities industry specialists, AI & GenAI subject matter advisors and its global research team to perform this assessment. This study represents the culmination of those insights, case studies, research papers, interviews and client perspectives.

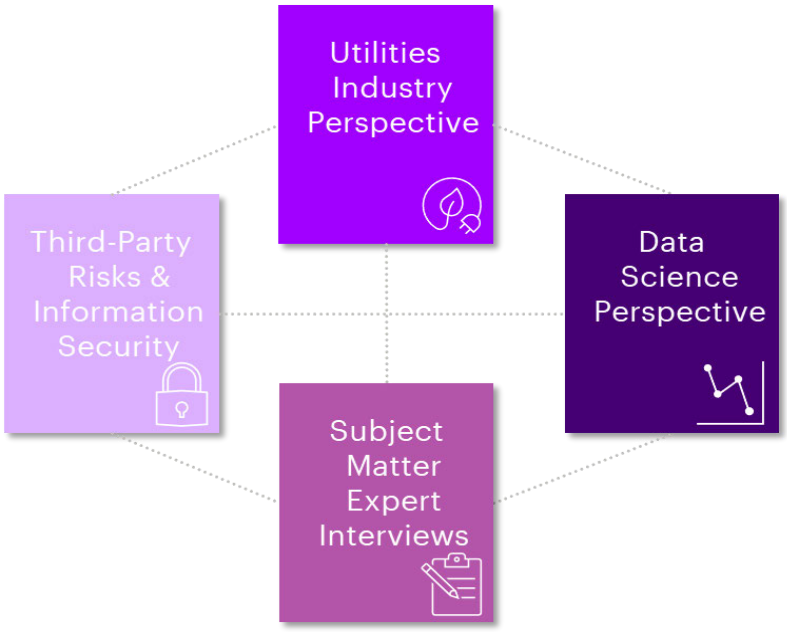


Figure 3: The four perspectives that were used to perform the investigation.

1. **Utilities Industry Perspective**
   Assessed how smart meter data is used internally at IESO and within the market. In addition, the investigation included how similar consumer-level datasets from adjacent industries can be used by third parties. This study included but was not limited to:
   a. Market participants & market settlement (e.g. in the context of calculation engines such as TRA, DSO/DAOS, MRP)
   b. Industry-specific data models (e.g. Microsoft and formerly ADRM Software)
   c. Raw AMI 1.0 & 2.0 data (e.g. next-gen metering, 15min interval data)
   d. Applications of big data analytics & machine learning in Transmission & Distribution systems (e.g. electricity market applications such as price & load forecasting, wide-area monitoring, customer and event classification, demand management, business expansion planning, microgrid and resilience strategies)
   e. Upcoming market trends in Ontario and Canada (e.g. MRP at IESO, DERs, electrification, digitization, DSOs, decarbonization efforts, ESG reporting)
   f. Insights from other related industries (e.g. government and census data)

2. **Data Science & AI-Enablement**
   Investigated the smart meter data from a data analytics & AI lens. Assessed how data science techniques can be used to infer patterns in the AMI data (e.g. customer usage, behavior patterns). In addition, assessed how GenAI and AI can interrogate the smart meter data (and metadata) to enable malicious uses as well as opportunities, when combined with external datasets. This study included but was not limited to:
   a. Combination of smart meter data with external datasets (e.g. weather, Environics data, marketing profiles, demographic)
   b. Analysis of smart meter data with GenAI (interrogation of AMI data, insights analysis for malicious use/risks/opportunities, combination with external datasets) & data science (e.g. synthetic data generation, pattern inference of AMI data)
   c. Data de-anonymization techniques of smart meter data (e.g. load disaggregation, customer de-anonymization)

3. **Third-Party Risks & Information Security***
   Assembled a global perspective on threats and vulnerabilities that exist around smart meter data from an information security perspective. More specifically, how smart meter data has been used maliciously in the past and can potentially be used in the future. This study included but was not limited to:
   a. Geopolitical risks (e.g. political advertising) and opportunities (e.g. improving global energy policies)
   b. Phishing, malicious actors and events (e.g. exfiltration of operational grid data, personal information breaches and grid integrity compromises)
   c. Past global ISO data breaches and information security concerns (e.g. Toronto smart city with Sidewalk Labs)

   ** Note: cybersecurity and data privacy (e.g. Cybersecurity compliance, cloud computing requirements, Ontario Energy Board and Ministry of Energy regulations) are considered outside this scope of work as it is understood that these matters are handled by IESO through Lighthouse and other IESO capabilities.*

4. **Subject Matter Expert Interviews**
   Interviewed various stakeholders across the IESO and Accenture to assemble individual business unit perspectives on the risks and opportunities that exist around smart meter data, as detailed in Table 4 below for the IESO. Assessed how each area can be affected by expanding TPA to SME data from the perspectives of the Market teams, IT experts, Regulatory & Legal Affairs, Planning & Conservation teams & Smart Metering Entity.

Table 4: The list of IESO and SME stakeholders that were interviewed as part of this study.

[redacted]	Business Unit
	Corporate and Market Services
	Corporate and Market Services
	Corporate and Market Services
	Corporate Strategy
	Information & Technology Services
	Information & Technology Services
	Information & Technology Services
	Legal Services
	Legal Services
	Market Assessment & Compliance
	Market Renewal Program
	Markets & Reliability
	Markets & Reliability
	Markets & Reliability
	Markets & Reliability
	Markets & Reliability
	Planning Conservation & Resource Adequacy
	Planning Conservation & Resource Adequacy
	Planning Conservation & Resource Adequacy
	Regulatory Affairs
	Smart Metering
	Smart Metering
	Smart Metering
	Smart Metering
	Smart Metering
	Smart Metering

Throughout this assessment, the key risk / opportunity questions that are top of mind for the IESO Executive and its Board of Directors are illustrated using a subset of core risk / opportunity themes and examples. These are then underpinned by various recommendation strategies that may be used by the IESO and SME to either mitigate the perceived risks or capitalize on the potential opportunities that expanding TPA to SME Data may provide. See Figure 4 below.

Figure 4: The structure used to study risks & opportunities with expanding TPA to SME data.

2.4 Studying Risks & Opportunities using the IESO's Risk Assessment Criteria

Adhering to the IESO's Risk Assessment Criteria is a core aspect of the approach for this assessment, ensuring that the study performed here closely aligns with the established guidelines, impact and likelihood criteria of the IESO. To best replicate the IESO's Risk Assessment Criteria, the severity of risks and opportunities that have been identified in this study and used to assess the risks and opportunities associated with expanding third party access of SME data are defined in Figure 5 below. Definitions for impact and likelihood follow shortly after.

Probability	Impact: Insignificant	Minor	Moderate	Significant	Critical
Almost Certain	Low	High	Critical	Critical	Critical
Likely	Low	Medium	High	Critical	Critical
Possible	Insignificant	Low	Medium	High	Critical
Unlikely	Insignificant	Insignificant	Low	Medium	High
Rare	Insignificant	Insignificant	Low	Medium	Medium

Figure 5: A risk assessment framework that is representative of the IESO's.

The impact criteria for this assessment are defined as follows:

1. **Insignificant:** negligible impact, no noticeable effect to the IESO, SME, market participants and/or general public
2. **Minor:** small impact, minimal disruption to the IESO, SME, market participants and/or general public
3. **Moderate:** noticeable impact, manageable disruption to the IESO, SME, market participants and/or general public
4. **Significant:** major impact, substantial disruption to the IESO, SME, market participants and/or general public
5. **Critical:** severe impact, extensive disruption to the IESO, SME, market participants and/or general public

The likelihood criteria for this assessment are defined as follow:

1. **Rare:** 0% to 5% likelihood of occurrence within the next 5 years
2. **Unlikely:** 5% to 35% likelihood occurrence within the next 5 years
3. **Possible:** 35% to 65% likelihood occurrence within the next 5 years
4. **Likely:** 65% to 90% likelihood of occurrence value within the next 5 years
5. **Almost Certain:** 90% to 100% likelihood of occurrence within the next 5 years

It should be noted: while risks are assessed in terms of probability, impact and severity, the opportunities are simply categorized as “High”, “Medium” and “Low” in terms of their potential.

3. Global & Technology Considerations for Expanding TPA Access to SME Data

3.1 Global Considerations including Other System Operators

3.1.1 North American Perspectives

The American Council for an Energy-Efficient Economy (ACEEE)
The American Council for an Energy-Efficient Economy (ACEEE) released a 2020 report analyzing the barriers and best practices for leveraging Advanced Metering Infrastructure (AMI), including third-party data sharing. The report emphasizes the importance of integrating AMI data with customer engagement tools, pricing strategies, and incentive programs to encourage energy use changes.[1] On another note, the New England ISO Information Policy highlights the need for confidentiality in handling sensitive information, providing guidelines that may be relevant for the ISO, Stakeholder Committees, and Governance Participants to review regarding the publication and distribution of such data.[2] In addition, regulations like California's 15/15 Rule governs aggregated energy data access, ensures that utilities only share aggregated data that includes at least 15 customers, with no single customer's usage making up more than 15% of the total. This could help the IESO in further refining its data aggregation measures such as Privacy by Design.

The US Department of Energy (DOE) 2020 Smart Grid System Report
The U.S. Department of Energy (DOE) published a comprehensive report in 2020 on smart grids, including a detailed section on cybersecurity that explores the risks posed by third-party system integrations with utility systems. The report discusses several key frameworks and models, such as Grid Modernization Initiative (GMI) and the NIST Interoperability Frameworks. GMI is a comprehensive strategy to ensure the grid can handle modern demands, including DERs and smart technologies. It emphasizes grid reliability, resilience, flexibility, thus this framework could be a relevant strategy for IESO to investigate when considering grid modernization. The NIST Interoperability framework facilitates seamless integration of diverse systems and technologies with the grid, which could be important and relevant if/when the IESO make technology investments and needs to standardize protocols.[3]

---

[1] Kushler, M., Nowak, S., & Witte, P. (2020). *A National Survey of State Policies and Practices for Energy Efficiency Program Evaluation*. American Council for an Energy-Efficient Economy. Available online.
[2] ISO New England Inc., *Attachment D – ISO New England Information Policy*, effective April 1, 2021, available online.
[3] U.S. Department of Energy. (2020). *2020 Smart Grid System Report*. Available online.

The National Association of Regulatory Utility Commissioners (NARUC)
The NARUC has developed a structured Grid Data Sharing Framework aimed to assist state utility regulatory affairs in managing third-party access to smart grid data. NARUC's framework serves as an adaptable tool that addresses the specific needs of individual states to encompass diverse regulatory approaches. The NARUC playbook provides examples, insights, and a summary of state practices to address key challenges, such as lengthy regulatory proceedings, data transparency, and resource limitations. The framework enables practical implementation of use cases while considering security and quality standards, while also addressing common challenges like technical readiness, resource constraints, and the complexity of establishing security protocols. The strategic application of NARUC's tools can enhance and aid in decision-making and help commissions better manage grid data sharing in an evolving regulatory environment.[4] The NARUC Grid Data Sharing Framework can guide the IESO in navigating regulatory challenges, ensuring data quality, and establishing strong security protocols.

The North American Electric Reliability Corporation (NERC)'s Critical Infrastructure Protection (CIP) Compliance Program
The NERC-CIP compliance ensures the reliability and security of the bulk electric system by enforcing standards for critical cyber assets. The IESO should continue to take into consideration that their compliance requires organization to identify and categorize these assets, establish robust access controls, and implement rigorous monitoring protocols. Compliance requires maintaining security controls, including data encryption, incident response pans, and employee training. Regular audits are conducted to verify compliance to standards.[5]

3.1.2 European Perspectives

The ENTSO-E Network Code on Cybersecurity
The ENTSO-E Network Code on Cybersecurity details essential measures to protect cross-border electricity flows and data from AMI/SME systems, playing a key role in integrating cybersecurity within European energy data practices. The IESO would need to conduct detailed risk assessments that align with the ENTSO-E's standards when considering TPA into the EU. The code aims to improve demand-side flexibility by enabling structured third-party access to AMI data, which supports demand response services for more effective supply-demand balancing. It highlights the importance of a robust regulatory framework to ensure compliance with privacy and security standards, fostering consumer trust and participation.

Frameworks for TPA Developed by Various Transmission System Operators (TSOs) and National Energy Regulators (NERs) within the European Union
Various TSOs and NERs within the EU have developed frameworks for TPA to smart meter data. Like GDPR, UK's Smart Metering Implementation Programme (SMIP) required explicit consent from consumers before sharing smart meter data. This framework controls the levels of access energy suppliers have to customer data. National regulatory frameworks vary across EU member states, making compliance with local rules essential. Individual countries like Germany and France have different regulations that vary in transparency and security controls. Thus, compliance with national regulations is essential for effective roll-out for TPA to SME data.[6] For the IESO, understanding these variations, particularly in areas such as consumer consent,

[4] National Association of Regulatory Utility Commissioners (NARUC). (n.d.). *Grid Data Sharing and Electric Vehicles*. Available online.
[5] Butt, D. P., & Bradley, R. A. (2017). *Advances in Nuclear Fuel and Waste Management in Pyroprocessing* (Report No. 1357442). U.S. Department of Energy, Office of Scientific and Technical Information. Available online.
[6] The UK Smart Metering Implementation Programme. CyanConnode. (n.d.). Available online

transparency, and security, can help ensure that their approach aligns with best practices in privacy protection and data governance.

3.1.3 Australasian Perspectives

The Australian Energy Market Operator (AEMO)'s Consumer Data Right (CDR) Initiative
AEMO is recognized for its proactive approach to data sharing, particularly through initiatives like the Consumer Data Right in Energy and their comprehensive data transparency frameworks. AEMO is heavily involved in implementing the CDR in Australia's energy sector; the CDR allows consumers to access and share their energy data with accredited third parties to enable better energy services, comparisons, and innovations (such as Green Button data in Ontario, Canada). By examining AEMO's data transparency frameworks, the IESO could potentially develop a more consumer-centric model for Smart Meter data sharing.

Japan's Electricity Security Policy
Alongside the liberalization of the retail market, Japan is undertaking a significant smart meter deployment initiative, with projections estimating up to 80 million smart meters to be installed in the early 2020s. By 2020, the total number of installed smart meters had already reached 61 million. This rapid expansion increases the potential for personal data breaches and cybersecurity risks, adding to the existing vulnerabilities in power control systems. In response, Japan has developed comprehensive security guidelines for both smart meters and power control systems that may be relevant for the IESO to investigate for leading modern practices. The Electricity Business Act was revised in 2016 to incorporate these updates. Among the guidelines, it is mandated that all smart meters undergo cybersecurity audits, which operators may conduct themselves. Additionally, in April 2017, the Japanese electricity industry established the Japan Electricity-Information Sharing and Analysis Centre (E-ISAC). This organization facilitates the sharing of best practices, information on vulnerabilities and cyberattacks, and enhances cooperation with international ISACs to bolster overall cybersecurity and data security efforts.[7] The establishment of mandatory cybersecurity audits and the creation of the Japan Electricity-Information Sharing and Analysis Centre (E-ISAC) provide a blueprint for proactive risk mitigation, which could be particularly beneficial as the IESO balances expanding access to data with maintaining the integrity of its power control systems.

3.3 Industry Data Model Perspective for Smart Meter Data

3.3.1 Industry Data Model Considerations

[7] International Energy Agency. (2021). *Japan Electricity Security Policy*. Available online.

Through the investigation into the AUDM for Utilities (and taking into account broader power & utilities industry data model considerations), it does not appear that the aggregated SME data poses any significant risk to the IESO or SME in a third party being able to meaningfully integrate the aggregated SME data into a detailed and operational utilities data model (e.g. within a digital twin of the electrical grid). The SME data that may be provided through expanded TPA is done so at an aggregated level and limited to only four fields (postal code, customer type, pricing type, hourly consumption). Referring to Figure 6, there is not sufficient information in the aggregated data to identify a specific meter through either a Meter Id, Geo Location Service Point Id, Meter Deployment Id, Billing Account Usage Id, or other. As a result, the aggregated SME data may provide limited value to third parties who are looking to integrate it into a detailed virtual representation of the physical grid to better understand grid operations or specific residential and small commercial consumption patterns.

3.3.2 Market Renewal Program Data Considerations

The forthcoming improvements to the current Ontario electricity market design that will come into effect by means of the Market Renewal Program (MRP) are of relevance to this assessment. These improvements will deliver significant value to the system and Ontario electricity consumers by how electricity is supplied, scheduled and priced in the future. The calculation engines that will be implemented to support day-ahead market (DAM), pre-dispatch (PD) and real-time (RT) processes to meet the system needs for a given dispatch day rely heavily on market participant offers, bids and various other data inputs. These other data inputs will continue to include reliability requirements, approved outages, variable generation forecasts, the network model, and demand forecasts across the Ontario electricity grid. The demand forecasts for the MRP calculation engines will now be generated for 4 areas across the province with greater granularity to drive more accurate load forecasts and settlement. As taken from the detailed design document provided by the IESO for Offers, Bids and Data Inputs[8] for the MRP, Figure 7 on the following page illustrates the future offer, bid and data input processes that will be implemented as part of the MRP at the IESO to support the operation of the new DAM, PD and RT engines. Highlighted in yellow within the figure is the demand forecast data input, which bears relevance to the SME data consumption information, as described in the following paragraph.

When it comes to third parties recreating IESO grid operations and market settlement processes by means of the MRP calculation engines, it is readily apparent from Figure 7 the complexity of what such an effort would entail. There are numerous data inputs, regulatory considerations, mathematically complex calculation engines, and outputs that work in harmony to settle the supply and demand of the Ontario electricity market. Though demand forecast input is an important component of the equation, it only represents a small sliver of the information required to make real-time settlement decisions about how the grid operates and the load required to sustain economic operations. Furthermore, residential and small commercial customer smart meter consumption data represent only roughly 50-60% of the electricity demand across the province of Ontario. The SME data provided through the TPA program only represents this proportion of demand. In addition, the SME data provided through the TPA program is provided to third parties with typically a 2-month delay, ie. from a historical perspective, meaning that this information cannot be used to provide great insight into day-ahead or real-time.

[8] Independent Electricity System Operator. (2024). *Offers, Bids, and Data Inputs - Market Renewal Program (Version 2)*. Available online.

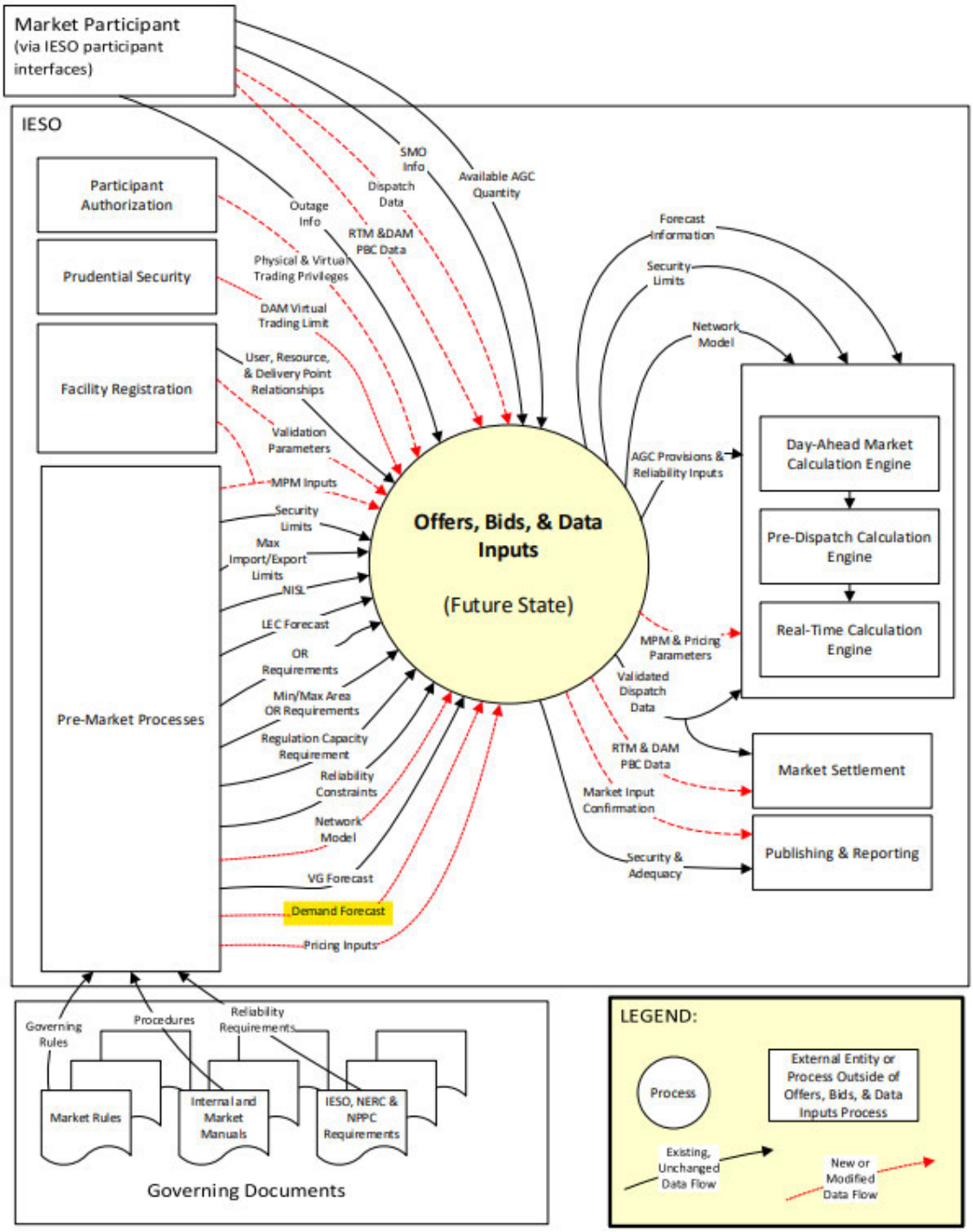


Figure 7: Future offer, bid and data input processes for the MRP calculation engines. The demand forecast—relevant to consumption data for the province that is partly captured through residential and small commercial smart meter data—is highlighted in yellow in the lower left.

3.4 Modern Technology, Data & AI Techniques

3.4.1 Digital Twins of the Electrical Grid

As outlined in Section 3.3, the potential to create digital twins of the electric grid hinges significantly on the availability of data and the rapid advancement of technology. The integration of AMI has led to an unprecedented volume of detailed data, including interval consumption, voltage, and outage information. This data forms, in part, the foundation for developing digital twins, providing users of this digital grid with near real-time, virtual replica of the physical electrical grid.[9] However, the intended data to be provided to third parties by the IESO does not provide this level of detail, it does provide an opportunity to be combined with other published data sets to infer on further insights. By leveraging big data analytics, there is a possibility that industry utility participants can process and model this data to optimize grid management, predict outages, and make informed investment decision in infrastructure. Technological advancements like ML and AI play a pivotal role in enhancing the digital twin's efficiency. AI algorithms can learn from historical and real-time data to improve the accuracy of forecasts, anticipate maintenance needs, and adapt to evolving consumption patterns. Additionally, cloud computing provides scalable storage and computational power, making it possible to create and maintain digital twins across large and complex grids.

When it comes to third parties creating a digital twin of the electric grid using SME data, it presents as a very low risk as the possibility to create one is unlikely. Currently, the SME data being discussed is historical, and is only released with a 2-month latency once a third-party request comes in. Even though there is a possibility that AI can learn the relationship between historical data and predictive forecast models, the feasibility and attractiveness to quickly populate models and accurately produce predictions without the need for extensive historical data is low due to the not having access to real-time insights. In addition, the complexity and unavailability of certain datasets that are required to recreate a digital twin of the physical electricity grid should deem this concern virtually null for the IESO and SME at this time.

[9] Sharma, A., Kosasih, E., Zhang, J., Brintrup, A., & Calisnescu, A. (2022, August 8). *Digital Twins: State of the art theory and practice, challenges, and open research questions*. Journal of Industrial Information Integration. Available online.

3.4.2 AI and GenAI Applications for Aggregated SME Data

Modern Artificial Intelligence (AI) and Generative AI (GenAI) techniques provide powerful computational capabilities to analyze large volumes of data and draw insights that would otherwise be prohibitive to process with traditional computational methods. As it relates to aggregated SME data, AI and GenAI can more readily enhance the analysis of electricity consumption patterns across the province by processing and computing these vast datasets with novel algorithms. Some examples of how AI and GenAI can be used on the aggregated SME datasets include:

- **Customer segmentation and insights:** techniques such as K-means clustering may be used to segment customers (or groups of customers) based on their energy usage patterns from the aggregated SME data. Third parties may then tailor energy savings programs or specific retail products (e.g. hot water tanks) based on clusters of similar consumption patterns (e.g. by neighbour or zone).
- **Identifying unusual consumption patterns:** third parties may leverage techniques such as isolation forest machine learning models to identify unusual energy consumption patterns in the aggregated SME data. These patterns may uncover probable scenarios of energy theft, faulty meters (or groups of meters) or inefficient energy-consuming products that are being used.
- **Demand & energy price forecasting:** users of the aggregated SME data may predict future energy consumption and energy prices using techniques such as Gradient Boosting Machines (GBMs). These algorithms use historical energy prices, weather data and electricity consumption patterns to determine forecasts that aid in bid/offer pricing strategies and/or energy cost minimization strategies.
- **Classification based on consumption signatures:** machine learning techniques such as Support Vector Machines (SVMs) may be used by third parties on the aggregated SME data to identify which types of energy products (e.g. appliances) are being used based on their consumption signatures. While this technique would yield low likelihood of accurate insights at the aggregate SME data level, SVMs may be used at an individual consumer level (e.g. an individual household's smart meter data) to infer these levels of insights.
- **Generating synthetic data for scenario simulation:** smart meter data may be synthetically generated using GenAI and/or Generative Adversarial Networks (GANs) techniques to mimic real electricity consumption patterns. The synthetic smart meter data may be used to generate various scenarios, such as the implementation of renewable sources across the grid and/or distributed energy resources (e.g. even such as Electric Vehicles / EVs) throughout it.

By leveraging these AI and GenAI techniques and machine learning models, third party consumers of the SME data can unlock valuable insights that may lead to better energy management solutions, improved customer understanding and service and possibly enhanced grid reliability due to amassed downstream benefits.

Deanonymizing aggregated SME data involves computational techniques that can potentially re-identify individual electricity consumers (e.g. residential or small commercial customers) or specific entities from the anonymized datasets. Within the context of leveraging AI and GenAI to de-anonymize the aggregated SME data, it is believed that the mechanisms the IESO and SME have implemented and are looking to further implement in aggregating the SME data (i.e. enhanced Privacy by Design, differential privacy) make it virtually impossible for such disaggregation techniques to be effective based on modern AI and GenAI capabilities.

Many modern techniques attempt to re-identify individual datapoints through inference based off patterns (e.g. time of day specific appliances are used) and correlation with adjacent datasets (e.g. social media posts showing individuals are on vacation). For example, at an individual service point level, energy disaggregation and load identification techniques such as Non-Intrusive Load Monitoring (NILM) and supervised machine learning models can be used to break down energy usage patterns from individual smart meter data into component appliances and devices using publicly available appliance energy usage data.[10] This may allow for detailed insights into residential devices to make predictions and optimizations to anticipate the use of appliances at home, which of course also raises data privacy concerns. These models, like decision trees and neural networks, can be trained using known historical energy usage patterns for specific appliances and applied to new datasets to estimate the usage of individual devices.[11] Within the context of aggregated SME data, however, the likelihood of NILM techniques being used to disaggregate the data into individual service point insights remains low, and the potential misuse for techniques such as NILM on aggregated SME data does not appear to be a potential threat for the IESO and SME at this time. While many of these techniques may at times appear promising for small and localized datasets, the Privacy by Design principles implemented by the IESO and SME on the province-wide, aggregated SME data deems them rather ineffective for these types of applications. As the field of AI and GenAI continues to evolve with more modern capabilities and strengths, it is recommended that the IESO and SME continue to implement robust data privacy and masking techniques to protect any sensitive information relating to Ontario electricity consumers.

3.4.3 Addressing Privacy Concerns

The IESO has adopted data aggregation techniques to address privacy concerns and mitigate risks associated with TPA to SME data. For each equivalence class, defined by the unique combination of Postal Code, Customer Type, Price Plan, and Hourly Interval Date Time, data quality and privacy regulations ensure compliance with standards. The IPC has been involved during this TPA program development, providing ongoing review and guidance around privacy controls. The third-party access rules of de-identification have been developed by an IPC recommended privacy expert, and the SME is undertaking periodic reviews to ensure compliancy. The SME has been applying the most stringent de-identification rules such that any risk of re-identification is virtually nil. Additionally, if any single premise accounts for more than 75% of the total consumption in an equivalence class, the premise must be removed or further aggregated. These precautions support data utility while safeguarding privacy and ensuring system integrity.[12]

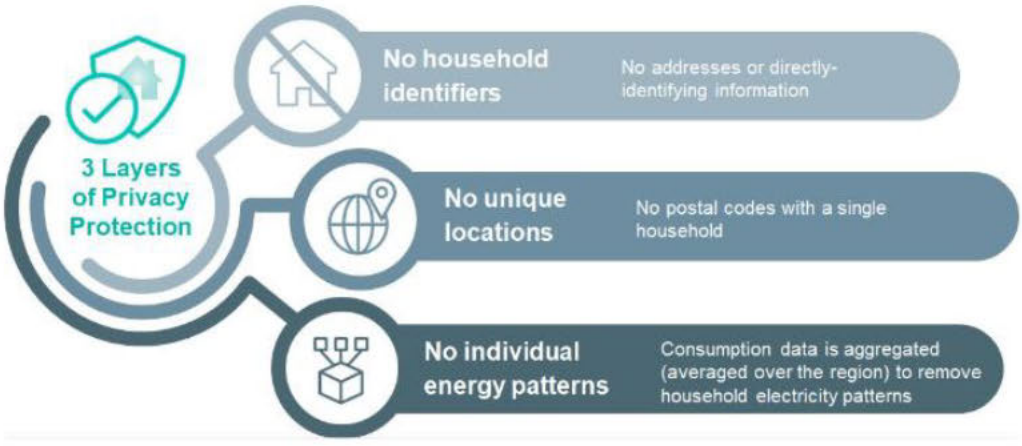


Figure 8: Three layers of Privacy Protection for TPA applications.[13]

3.5 Current Vendor Landscape for Consumers of Smart Meter Data

In recent years, the Utility sector has seen rapid growth in the use of AI-powered platforms and advanced energy analytics to enhance operational efficiency and decision-making processes. Research and market analysis conducted highlights the following diverse vendor landscape where companies are utilizing smart meter data and predictive technologies to supplement system operators and market participants in optimizing energy usage, grid reliability, and customer engagement. These companies offer solutions that leverage AI, machine learning, and advanced data analytics to provide insights into energy consumption patterns, optimize demand response programs, and support the integration of renewable energy, ultimately driving the transition to a smarter and more sustainable energy system.

[10] Qiu, S., Wu, J., & Xiao, Y. (2020). "A Review of Smart Grid: Technologies, Applications, Challenges, and Future Directions," *Energies*, 13(12), 3117. https://doi.org/10.3390/en13123117. Available online.
[11] Ali, S., Shamsi, M. H., & Siddiqui, M. A. (2018). "Energy management in a microgrid with renewable energy sources: A literature review," *Energy Informatics*, 1, 4. https://doi.org/10.1186/s42162-018-0038-y. Available online.
[12] " An Evaluation of the De-identification Recommendations for the IESO's Aggregate Consumption Data ", November 10, 2023.
[13] Independent Electricity System Operator. (n.d.). *Data sharing*. Independent Electricity System Operator. Available online.

Table 5: Illustrative landscape of current vendors utilizing smart meter data commercially.

Company	Date Founded	Description	Size	Location	Website
Tapestry (Part of Alphabet)	2021	Tapestry, a moonshot project by Alphabet's X division (formerly Google X), focuses on providing a holistic, virtualized view of the electric grid, helping utilities transition to cleaner, more reliable energy sources through advanced computational tools and simulations. Utilizes smart meter data to model and simulate grid conditions, providing insights into energy flow and real-time monitoring for optimizing grid operations and renewable integration.	Tapestry - Small 50-100 employees Alphabet - Large 180,000+ employees	California, United States	Tapestry
TESLA Energy Forecasting Solutions	1992	Acquired by Yes Energy, Tesla provides advanced demand forecasting solutions for utility companies, leveraging three decades of expertise to help energy traders and operators optimize their operations and stay competitive in rapidly evolving markets. Uses smart meter data for advanced demand forecasting, allowing for some accurate predictions and load management to optimize energy trading and consumption patterns.	Medium 200-250 employees	Colorado, United States	Tesla Energy Forecasting Solutions (Yes Energy)
Peak Power	2015	Peak Power offers AI-powered energy storage and grid optimization solutions, enabling commercial buildings, utilities, and grid operators to optimize energy consumption and reduce costs by managing peak demand and integrating renewable energy sources. Leverages smart meter data to forecast peak demand periods and optimize energy usage, improving cost efficiency for users and facilitating the integration of renewable resources.	Medium 100-200 employees	Ontario, Canada	Peak Power
Arcus Power Corp	2018	Arcus Power provides energy market intelligence using AI and machine learning through their PwrDispatch Tool, helping utilities forecast energy prices, optimize trading strategies, and improve operational efficiency. Utilizes smart meter data to enhance energy price forecasting, helping utilities and market participants optimize trading strategies and improve grid efficiency.	Small 10-50 employees	Alberta, Canada	Arcus Power Corp
Bidgely	2011	Bidgely offers AI-powered insights through its UtilityAI platform, enabling utilities to optimize energy usage, improve grid reliability, and enhance customer engagement. Their solutions, integrated with platforms like Salesforce, help utilities better manage energy consumption patterns. Smart meter data is used to provide utilities with insights into customer consumption behavior, disaggregating household energy use for personalized energy-saving recommendations.	Medium 250-300 employees	California, United States	Bidgely
Uplight	2019	Uplight offers a suite of customer engagement solutions designed for utilities, leveraging data analytics to deliver personalized energy-saving recommendations and optimize demand response programs, ultimately enhancing energy efficiency and customer satisfaction. Employs smart meter data to enable personalized energy efficiency programs and demand response efforts, helping utilities enhance customer engagement and grid stability.	Medium 400-500 employees	Colorado, United States	Uplight
Innowatts	2014	Innowatts provides an AI-driven energy analytics platform that helps utilities optimize energy procurement, improve customer engagement, and enhance operational efficiency. Their platform offers insights into energy consumption patterns, demand forecasting, and pricing strategies. Analyzes smart meter data to predict energy consumption patterns, enabling utilities to better forecast demand, optimize energy procurement, and engage with customers effectively.	Medium 200-250 employees	Texas, United States	Innowatts
Grid4C	2013	Specializing in AI-powered predictive analytics for the energy sector, Grid4C helps utilities optimize energy demand, detect anomalies, and improve grid operations. Their platform enhances grid reliability, reduces operational costs, and supports renewable energy integration. Utilizes smart meter data to improve demand forecasting and detect anomalies in energy consumption, helping utilities optimize grid operations and reduce costs.	Medium 100-150 employees	Texas, United States	Grid4C

Enel X	2017	**Enel X provides innovative energy management, demand response, and energy efficiency solutions. Their platforms help utilities and large energy consumers optimize energy use, reduce costs, and transition to a more sustainable energy system. Leverages smart meter data to improve demand response and enhance energy efficiency for utilities, helping optimize consumption and reduce peak load periods.**	Large 3000-4000 employees	Rome, Italy	Enel X
Siemens' Grid Twin	2019	**Siemens' Grid Twin offers a Digital Twin solution for utilities, enabling real-time monitoring, predictive maintenance, and enhanced decision-making. The platform helps utilities simulate grid operations, improving performance and reliability while facilitating the integration of renewable energy sources. Smart meter data is used to provide insights into energy consumption and grid performance, enabling better demand management, optimization of grid operations, and improved integration of renewable energy sources.**	Large 10,000+	Munich, Germany	Siemens' Grid Twin
GE Digital's Grid Solutions	2001	**GE Digital offers advanced grid analytics, including Digital Twin technology, to help utilities simulate grid behavior under various conditions, optimize grid performance, and plan for contingencies. Their platform provides advanced analytics and insights for enhanced decision-making and grid resilience. The utilization of smart meter data enhances load forecasting capabilities and strengthens grid resilience by delivering detailed insights into energy consumption patterns and grid conditions.**	Large 20,000+	California, United States	GE Digital
AutoGrid's Predictive Controls	2010	**AutoGrid provides AI-powered predictive control solutions that enable utilities to create virtual models of the grid, optimizing distributed energy resources (DERs) and enhancing grid flexibility. Their platform helps utilities simulate and predict grid behavior to improve overall grid management and performance. AutoGrid leverages smart meter data to improve the reliability of these virtual models due to insights obtained about consumer energy patterns and grid conditions.**	Medium 200-250 employees	California, United States	AutoGrid
Rodan Energy Solutions	2003	**Rodan Energy Solutions provides clients with metering system, data management and information access services through the practical application of metering, communication, and information system technologies. Smart data is leveraged here to help clients make data-driven decisions through the various insights obtained from data analysis.**	Medium 100-200 employees	Ontario, Canada	Rodan Energy

4. Potential Risks Associated with Expanding TPA to SME Data

This assessment has identified risks across 6 themes associated with expanding Third-Party Access (TPA) to Smart Meter Entity (SME) data, namely: privacy & information security risks, financial & economic risks, operational & infrastructure risks, market dynamics & competition risks, data utilization & integrity risks, and compliance & regulatory risks.

The risks were identified through a thorough analysis of the existing SME TPA Data request process, IESO documentation, stakeholder interviews, internal Accenture research teams, and a review of industry best practices. This analysis focused on understanding the potential risks associated with expanding third-party data access beyond the current stakeholders.

4.1 Key Risk Themes

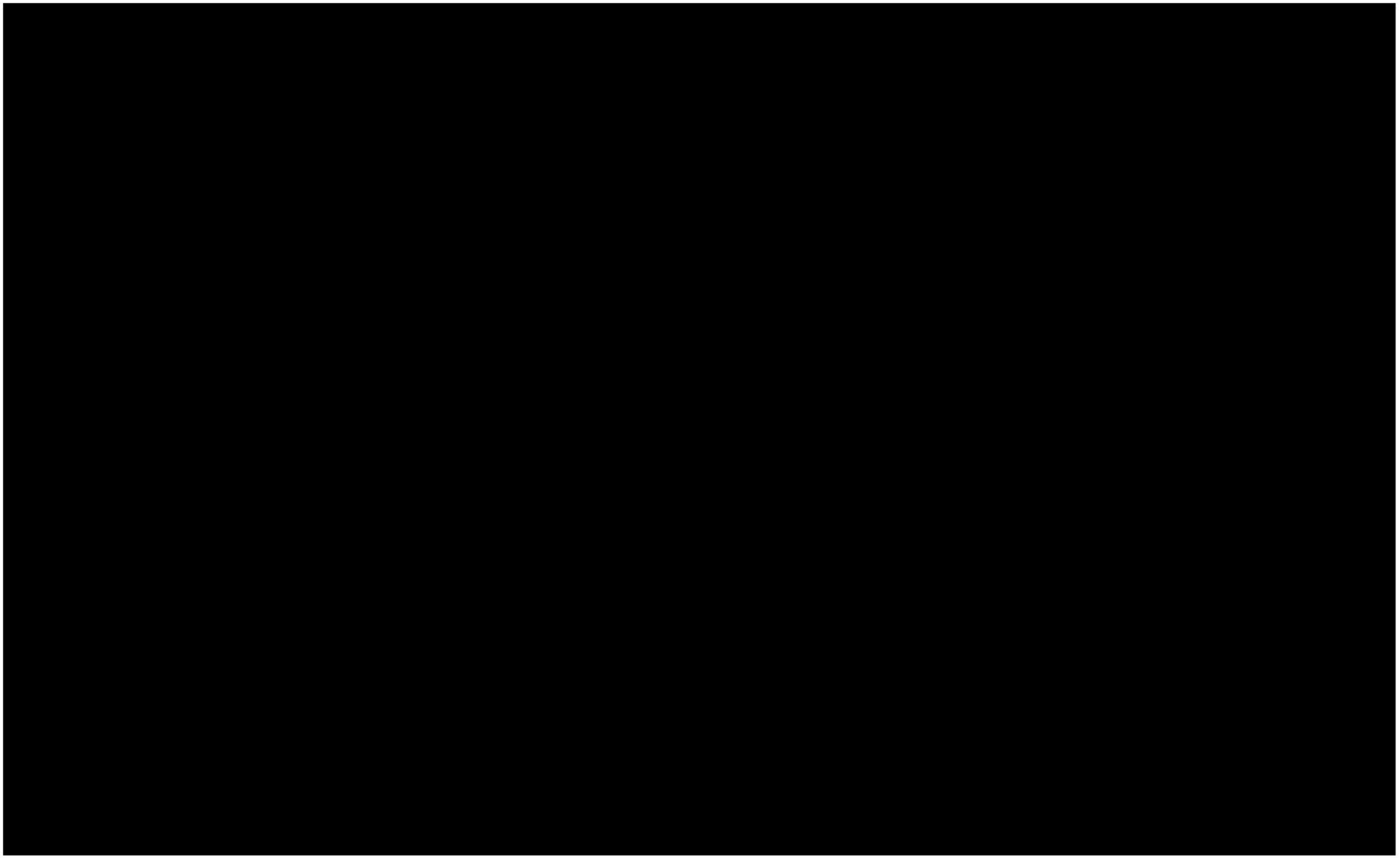
Key risk themes were identified by grouping similar risks, guided by the strategic and operational IESO risk criteria framework. This framework aided in categorizing the risks and assigning impact and probability rating as detailed in section 2.4. The following themes have been identified:

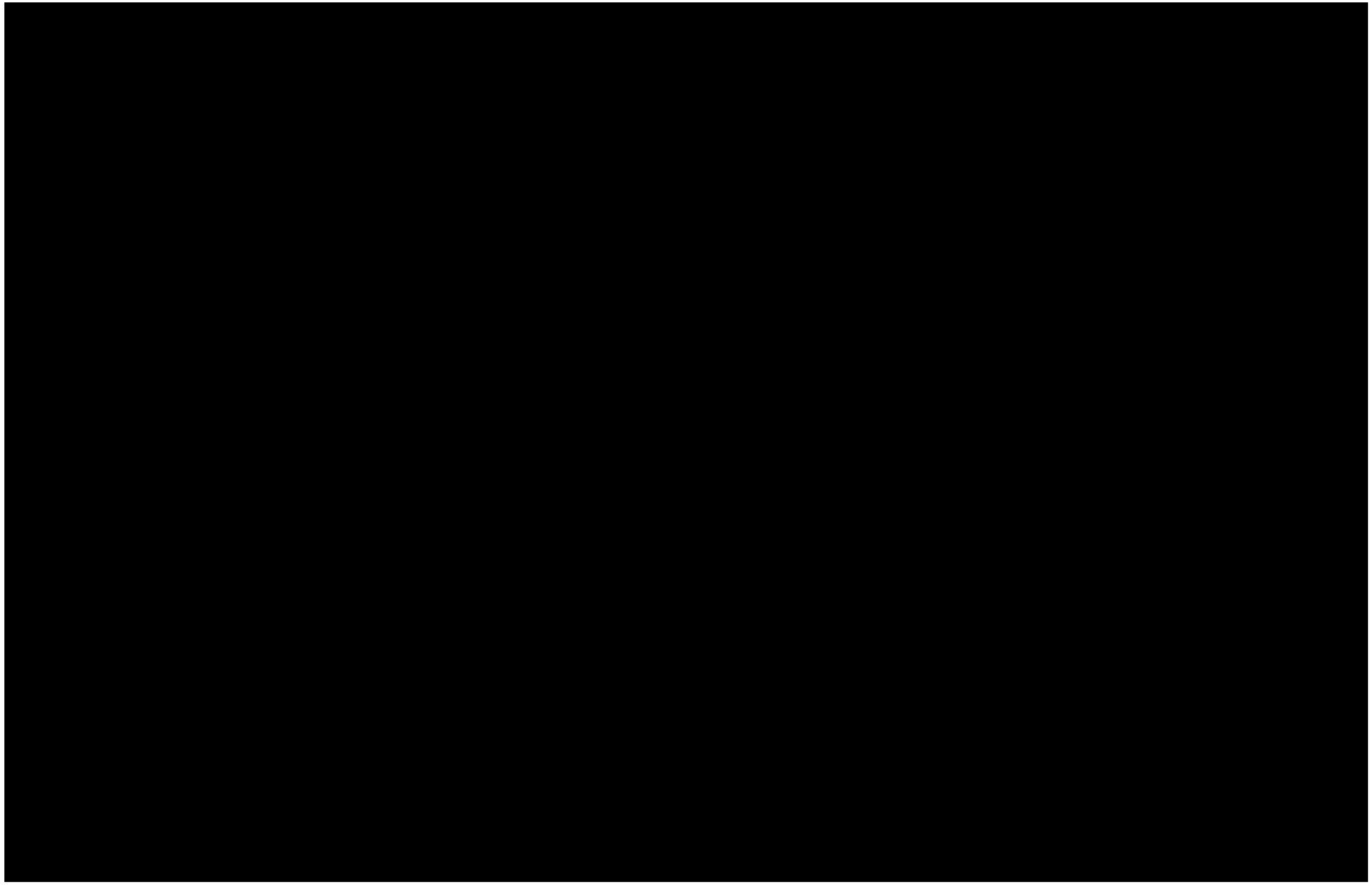
Table 6: Key risk themes uncovered in this assessment.

#	Risk Theme	Description
1	Privacy & Information Security	Privacy breaches by third parties, AI exfiltrating operational data, identifying grid vulnerabilities, and bad actors using impersonation to gain unauthorized control. These threats jeopardize operational authority, security, and enable market manipulation.
2	Financial & Economic	Third-party misuse of SME data for exploitative monetization can cause reputational damage, loss of trust, and regulatory fines. Additionally, these malpractices can reduce market value, while market malpractices inflate costs and undermine integrity. Release of data could create conflicts between LDCs and third parties.
3	Operational & Infrastructure	Unauthorized simulations that create digital twins of the power system used for malicious purposes. Malicious use of SME data could weaken IESO's authority and complicate grid management.
4	Market Dynamics & Competition	Generators can misuse SME data to manipulate prices and harm competition, raise electricity prices. Larger entities can outcompete smaller ones, reducing market diversity and raising energy costs. Strategic bid/offer manipulation by market participants leveraging the aggregated SME data to obtain more accurate load forecasts.
5	Data Utilization & Integrity	Commercial drivers of big data companies may not always be aligned with responsible and ethical uses of data. Expanding TPA to SME data may pose a reputational risk to the IESO. Big data companies might misuse consumer data, causing loss of trust from market participants.
6	Compliance & Regulatory	The IESO faces risks in compliance, liability, and fairness. TPA access to SME data could create a precedence for more information disclosure than the IESO would like. Moreover, the IESO could be liable for third-party data misuse, even with DUAs. Unequal data access could lead to bias accusations of unfair information disclosure causing regulatory and reputational issues.

4.2 Detailed Risks Identified

Table 7: Detailed risk list along with their respective impact and probability.



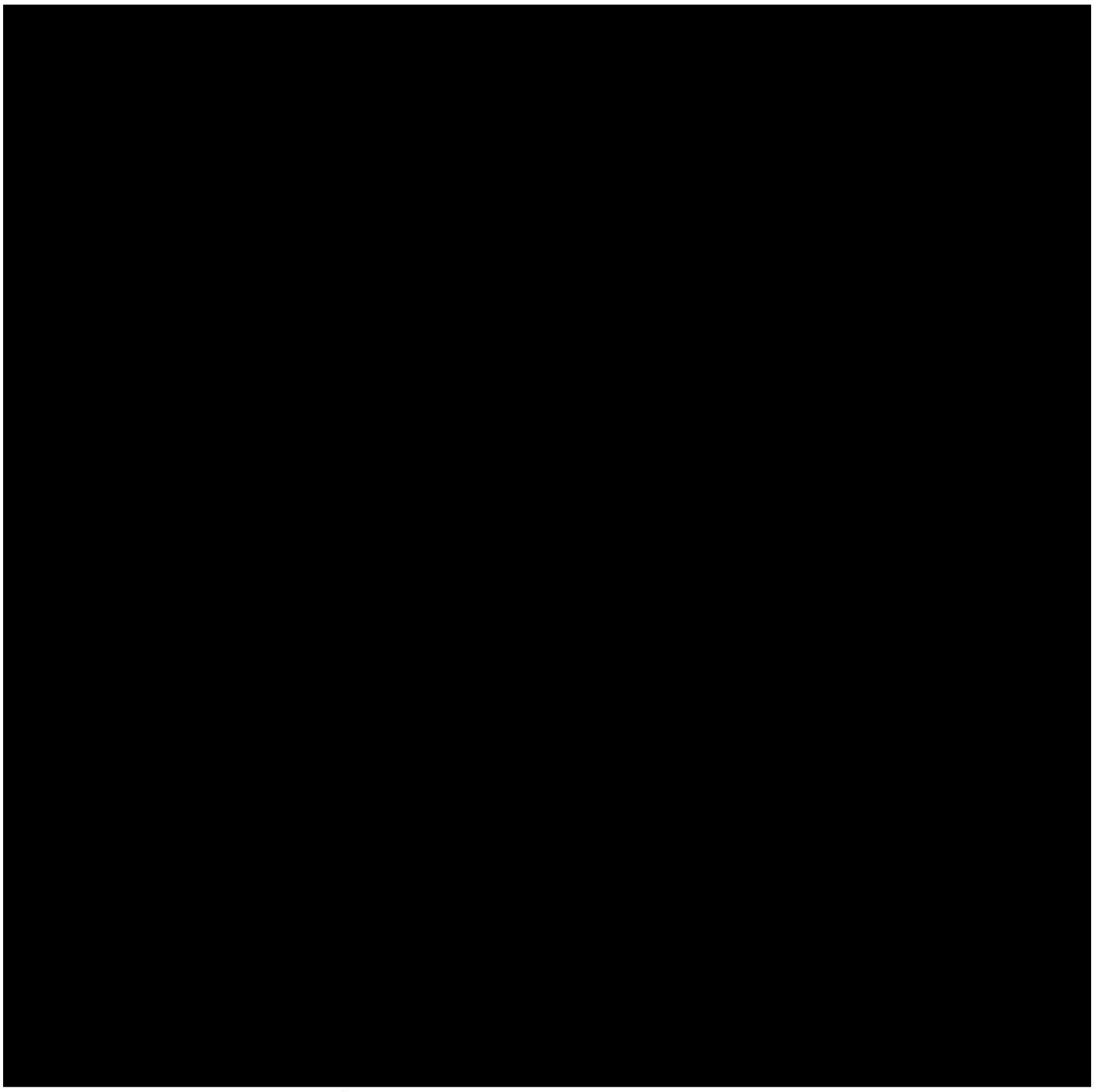


Probability \ Impact	Insignificant	Minor	Moderate	Significant	Critical
Almost Certain	None	None	None	None	None
Likely	None	**R2.3**	None	None	None
Possible	None	**R1.8** **R5.2** **R5.5** **R6.4** **R6.5**	**R2.1** **R2.2** **R3.1** **R4.1** **R4.2** **R4.3** **R6.1** **R6.3**	**R1.1**	None
Unlikely	None	**R3.5** **R5.3**	**R1.7** **R1.9** **R2.4** **R3.2** **R3.3** **R3.4**	**R1.2** **R1.3** **R1.4** **R1.5** **R5.1** **R6.2**	None
Rare	None	None	**R1.6**	None	None

Figure 9: The detailed risks, distributed across a risk assessment framework that is reflective of the IESO's.

4.3 Recommendations to Mitigate the Risks

Expanding TPA to SME data presents several risks that are largely tied to casting a wider user base for the SME data, ranging from data privacy breaches to potential market manipulation. To address these concerns, the following strategies are recommended to mitigate these risks effectively. Each strategy is aligned with the core challenges of managing data security, regulatory compliance and market fairness, ensuring a balance to support innovation while safeguarding public interest and infrastructure integrity.



[14] Kaur, D., & Awasthi, A. (2018). Study on sustainable development through green supply chain management. *International Journal of Computer Science and Network Security, 18*(3), 99–105. Available online

5. Opportunities Associated with Expanding TPA to SME Data

The assessment identified various key opportunities across 8 themes associated with expanding Third-Party Access (TPA) to Smart Meter Data (SME). The 8 themes are: energy efficiency & conservation, operational & infrastructure management, innovation & technological advancement, compliance & regulatory, stakeholder engagement & satisfaction, data utilization & cost savings, market dynamics & competition, and financial & economic insights.

The opportunities were identified through a comprehensive analysis of the current SME Data request landscape, IESO documentation, stakeholder interviews, internal Accenture research teams, a review of industry best practices. The assessment focused on understanding the potential benefits of leveraging SME data to enhance the utilities landscape.

5.1 Key Opportunity Themes

Key opportunity themes were identified by grouping together similar opportunities guided by the strategic and operational risk criteria framework provided by IESO. The framework facilitated the categorization as well as the assignment of impact and probability.

Table 8: Key opportunity themes.

#	Opp Theme	Description
1	Energy Efficiency & Conservation	Energy efficiency and conservation programs that can drive energy savings through conservation, demand management, and targeted behavior-based energy programs.
2	Operational & Infrastructure Management	Optimized system performance through better load forecasting accuracy that leads to better operational and generation dispatch decisions and long-term system planning.
3	Innovation & Technological Advancement	Innovations in the utilities space through SME data usage in supplementing R&D efforts. Leveraging insights into energy consumption patterns for finer digitization efforts and increased DER penetration. Reduction in costs for LDCs due to improved insights in performing evaluation, measurement, and verification (EM&V) processes for assessing energy efficiency programs.
4	Compliance & Regulatory	Sustainable and compliant energy sector due to informed decision-making based on accurate and timely insights into energy consumption, hence driving progress into net-zero goals.
5	Stakeholder Engagement & Satisfaction	A more engaged and informed customer base as a result of personalized energy reports, user-friendly platforms and generally more tailored services to residential needs.
6	Market Dynamics & Competition	Market efficiency and amelioration of market dynamics due to transparency in insights about energy consumption and market trends attracting private sector investment and market competition.
7	Financial & Economic insights	Optimized resource allocation, planning and budgeting by leveraging insights into energy consumption patterns leading to informed economic analysis.

5.2 Detailed Opportunities Identified

Table 9: Detailed opportunity list along with their respective impact and probability.

Opp #	Opportunity	Impact	Likelihood	Opportunity Level	Relevant External Data Sets	Proposed Capitalization Opportunity
1. Energy Efficiency & Conservation Opportunities						
1.1	Expanding TPA to SME data presents an opportunity for third parties to better understand electricity consumer behaviour to encourage participation in conservation and demand management programs. Ultimately, these measures may help foster energy-saving behaviour for residential customers and improve grid efficiency.	Moderate	Likely	High	Weather Data, Census & Demographic Data	Development of Targeted Programs
1.2	Aggregated SME data can help improve demand forecasting, predict market and load changes, and provide insights into different consumption patterns. This offers third parties, like Ontario electricity market participants, an opportunity to optimize their operations, refine their bidding strategies, and take advantage of market opportunities.	Moderate	Likely	High	Energy Market & Grid Data, Census & Demographic Data	Investments in Data Analytics & Technology
1.3	There is an opportunity for expanded TPA to SME data to drive the evolution and implementation of energy efficiency programs across the province. Over the long-term, this may help Ontario reduce its provincial carbon emissions and contribute to broader federal net-zero sustainability targets such as those related to Canada's 2030 Agenda.	Moderate	Possible	Medium	Weather Data, Census & Demographic data	Investments in Data Analytics & Technology
1.4	Aggregated SME data presents an opportunity for generators to gain deeper insights into residential energy usage and patterns and enable more precise market dynamic studies and tailored energy solutions for customers. This is especially important as Distributed Energy Resources (DERs) become more prominent in the coming decade.	Moderate	Possible	Medium	Energy Market & Grid Data, Census & Demographic Data	Investments in Data Analytics & Technology
1.5	Expanding TPA to SME data presents an opportunity for market participants to implement and refine automated demand response systems that adjust energy output or consumption based on grid conditions using the SME data.	Moderate	Possible	Medium	Energy Market & Grid Data, Census & Demographic Data	Investments in Data Analytics & Technology
1.6	There is an opportunity for third parties to leverage aggregated SME data to infer regions or zones in the province that are more likely to have specific types of large appliances or heating mechanisms (e.g. through load disaggregation techniques). This could create a win-win situation: service providers could tailor their offerings, while residential and commercial customers could move towards more energy-efficient appliances or heating solutions.	Moderate	Possible	Medium	Energy Market & Grid Data, Census & Demographic Data	Establishment of Strategic Partnerships
1.7	Generators can use SME data to identify high-consumption areas for residential and small commercial customers and determine where Distributed Energy Resources (DERs) would be beneficial. By using DERs to offset high demand, it could reduce the need for costly infrastructure	Minor	Likely	Medium	Census & Demographic Data	Investments in Data Analytics & Technology

	upgrades and make it easier for customers in remote areas to connect to the grid.					
1.8	Expanding TPA to SME data provides the IESO with an opportunity to streamline and automate the TPA request intake and data export processes. This may help support market participation in TPA to SME data, improve data quality and make the data-sharing process more consistent and efficient.	Minor	Possible	Low	Energy Market & Grid Data	Investments in Data Analytics & Technology
2. Operational & Infrastructure Management Opportunities						
2.1	There is an opportunity for aggregated SME data to be used to support operational decision making and system planning and improve the DER placement to optimize the efficiency of the grid. Third parties who may be interested in leveraging aggregated SME data to inform operational and infrastructure decisions include owner/operators of power-generating assets, LDCs, engineering and consulting firms, amongst others.	Moderate	Possible	Medium	Census & Demographic Data	Investments in Data Analytics & Technology
2.2	There is an opportunity for EV companies and LDCs to leverage aggregated SME data to anticipate peak loads and offer incentives for low-cost, off-peak charging to customers with electric or hybrid plug-in vehicles.	Minor	Likely	Medium	Traffic & Transportation Data, Census & Demographic Data	Establishment of Strategic Partnerships
2.3	There is an opportunity for market insight companies to leverage aggregated SME data to better predict peak demand hours and inform Class A customers of ways to maximize their ability to participate in the Industrial Conservation Initiative (ICI) program. Consequently, this may shift the burden of Class A electricity costs towards Class B customers.	Moderate	Possible	Medium	Census & Demographic Data, Energy Market & Grid Data	Establishment of Strategic Partnerships
2.4	There is an opportunity for real-estate development firms to leverage aggregated SME data to inform urban planning decisions, including zoning and infrastructure development, as well as investment opportunities based on population growth and insights.	Moderate	Possible	Medium	Traffic & Transportation Data, Census & Demographic Data	Establishment of Strategic Partnerships
2.5	There is an opportunity for EV companies and LDCs to leverage aggregated SME data to support the planning and development of EV infrastructure (e.g. charging stations) across the province.	Moderate	Possible	Medium	Traffic & Transportation Data, Census & Demographic Data	Establishment of Strategic Partnerships
3. Innovation & Technological Advancement Opportunities						
3.1	There is an opportunity for academia and research institutes to leverage aggregated SME data to drive innovation and research on electricity consumption, market design and net-zero initiatives. This may include, but not be limited towards the impact of EVs, GHG emissions, carbon neutrality, and energy demand forecasts for the coming decades. It also provides an opportunity for EM&V to be done at an aggregate level to see the impact of conservation programs.	Minor	Likely	Medium	Social Media Data, Energy Market & Grid Data, Census & Demographic Data, Weather Data, Traffic & Transportation Data	Establishment of Strategic Partnerships
3.2	There is an opportunity for the private sector to leverage aggregated SME data to develop new products and and services focused on electricity consumption and demand management.	Minor	Likely	Medium	Energy Market & Grid Data	Investments in Data Analytics & Technology
3.3	There is an opportunity for third parties who conduct energy audits to improve their investigations with aggregated SME data and offer more precise energy-saving recommendations to residential customers, based on neighborhood trends and usage patterns.	Moderate	Possible	Medium	Census & Demographic Data	Establishment of Strategic Partnerships

3.4	The expansion of TPA to SME data presents the IESO and SME with an opportunity to monetize its data beyond the current cost recovery model. There is an opportunity for the IESO and SME to explore revenue-generating mechanisms (e.g. data subscription services, APIs) and monetizing access as the TPA demand increases. The IESO and SME should remain mindful that operating costs to sustain compliance with the DUAs (e.g. auditing third parties for abiding by the terms and conditions) may increase through time, particularly as more TPA requests are fulfilled by the IESO. Conversely, there is an opportunity for the IESO and SME to explore the release of its aggregated SME data entirely as open-source and publicly available, free-of-charge. This may help enable transparency, collaboration, cost savings, standardization and focus efforts on innovation and the development of new solutions for the IESO and SME.	Minor	Possible	Low	Energy Market & Grid Data	Establishment of Strategic Partnerships
3.5	Expanding TPA to SME data provides local distribution companies (LDCs) with greater and accelerated insight into evaluation, measurement & verification (EM&V) processes that assess the performance of energy efficiency programs and measure demand savings. In turn, this could help reduce the LDC costs related to performing these assessments.	Minor	Possible	Low	Energy Market & Grid Data	Investments in Data Analytics & Technology
3.6	By expanding TPA to SME data, there is an opportunity for the IESO to position itself as a leader in promoting open access to electricity and grid information in the province of Ontario and across Canada. This may foster and drive the IESO's position and reputation in the market for innovation, invention and new technological advancements and ideas.	Minor	Possible	Low	Energy Market & Grid Data	Establishment of Strategic Partnerships
4. Compliance & Regulatory Opportunities						
4.1	There is an opportunity to leverage aggregated SME data to inform capital planning and residential programs to improve Ontario electricity market needs and demands. The third parties driving these initiatives may be LDCs, academic and research institutions.	Moderate	Possible	Medium	Census & Demographic Data, Energy Market & Grid Data	Development of Targeted Programs
4.2	There is an opportunity for third parties to leverage aggregated SME data to information the development of evidence-based energy policies and modernize regulations and/or compliance programs. These third parties may include LDCs, legal teams and lawyers, organizations such as Electricity Canada, and so on and so forth.	Moderate	Possible	Medium	Energy Market & Grid Data	Development of Targeted Programs
4.3	SME data can be used to advocate for policies and initiatives that encourage data sharing and innovation in the electricity sector, by revealing usage trends and providing evidence for policy changes. It helps engage stakeholders, demonstrates the benefits of collaboration, and supports the creation of regulations that balance privacy with transparency.	Moderate	Possible	Medium	Energy Market & Grid Data	Investments in Data Analytics & Technology
4.4	There may be an opportunity for third parties such as LDCs to leverage aggregated SME data to pinpoint areas of energy theft and other illegal activities, address billing issues and reduce unauthorized consumption of electricity across the province. This can be achieved by analyzing usage patterns for anomalies and identifying specific high-risk areas.	Minor	Possible	Low	Census & Demographic Data	Establishment of Strategic Partnerships
5. Stakeholder Engagement & Satisfaction Opportunities						
5.1	Expanding TPA to SME data has the potential to drive personalized energy-saving recommendations from third parties to residential customers, which may enhance their participation in energy efficiency programs, rebates, and incentives, leading to greater overall impact for the Ontario electricity market.	Moderate	Possible	Medium	Census & Demographic Data, Energy Market & Grid Data	Development of Targeted Programs

6. Market Dynamics & Competition Opportunities						
6.1	Expanding TPA to SME data provides the IESO with an opportunity to establish strategic partnerships with third parties for the mutual benefit of one another. For instance, the IESO could provide a large technology company with a streaming dataset of aggregated SME data in exchange for cloud computing resources at zero capital or operational cost to the IESO of the development of more accurate load prediction models.	Moderate	Possible	Medium	Social Media Data, Energy Market & Grid Data, Census & Demographic Data, Weather Data, Traffic & Transportation Data	Establishment of Strategic Partnerships
6.2	Expanding TPA to SME data provides the Ontario electricty market with an opportunity to look for ways to enhance market efficiency through the integration of DERs and other such resources. Third parties that are centered around innovation in the power & utilities sector may drive new business models, energy savings and cost savings opportunities for the IESO, market participants and general consumers of electricity across Ontario.	Moderate	Possible	Medium	Energy Market & Grid Data	Investments in Data Analytics & Technology
6.3	Ratepayers in Ontario could benefit from expanded third-party access (TPA) to SME data, as it may foster competition among local distribution companies (LDCs), generators, and other market participants. By investing in data analytics and technology, these companies can leverage the increased data access to improve decision-making and operational efficiency. This competition, supported by advanced analytics, could enhance market efficiency and lead to lower electricity prices across the province.	Moderate	Possible	Medium	Energy Market & Grid Data	Investments in Data Analytics & Technology
6.4	Third parties with business models centered around market arbitrage or market insights (e.g. accurate load forecasting or peak period predictions) may benefit from expanded TPA to SME data as they may now have a more comprehensive dataset that represents residential and small commercial customers across the province. This enriched dataset can enhance the strategic decision-making capabilities of market participants, allowing them to submit more effective bid and offer strategies, ultimately leading to increased revenue and profits.	Minor	Possible	Low	Energy Market & Grid Data, Census & Demographic Data	Investments in Data Analytics & Technology
6.5	The IESO and ratepayers may benefit from expanded TPA to SME data as new and enhanced datasets (such as the aggregated SME data) that the IESO provides may attract new investment in the energy sector. In particular, areas such as renewable energy, energy storage, smart grid technology investments and capital project planning may leverage aggregated SME data to forecast demand profiles for given zones across the province and more strategically position future assets across the grid to meet the forecasted demands.	Minor	Possible	Low	Energy Market & Grid Data, Census & Demographic Data	Investments in Data Analytics & Technology
7. Financial & Economic Opportunities						
7.1	Expanding TPA to SME data provides third parties who are interested in residential consumer energy consumption an opportunity to gain more granular insights on disposable income that households in a given area have. By combining aggregated SME data with electricity prices and LDC delivery charges, third parties can extract how much a household is likely to spend on their electricity utilities and infer disposable income levels per region, when combined with sociodemographic data such as household income, net spend and housing and mortgage insights.	Moderate	Possible	Medium	Energy Market & Grid Data, Census & Demographic Data	Establishment of Strategic Partnerships

7.2	Expanding TPA to SME data provides third parties with improved zonal level insights as they relate to inferred individual household electricity consumption patterns. This allows for further studies such as customer segmentation, the impact of time-of-use (TOU) rates on consumption, energy saving validation programs, etc. to take place.	Moderate	Possible	Medium	Energy Market & Grid Data	Development of Targeted Programs
7.3	Aggregated SME data provides an opportunity for third parties to better identify vacant homes. Whereas the CRA (who may already have access to the aggregated SME data in the current edition of the SME data release program) may use the aggregated SME data to infer vacant homes for their vacant home tax program, third parties may use it to help target customers. These customers may benefit from home rental services that may circumvent the homeowners from having to pay the vacant home tax.	Minor	Possible	Low	Census & Demographic Data	Establishment of Strategic Partnerships

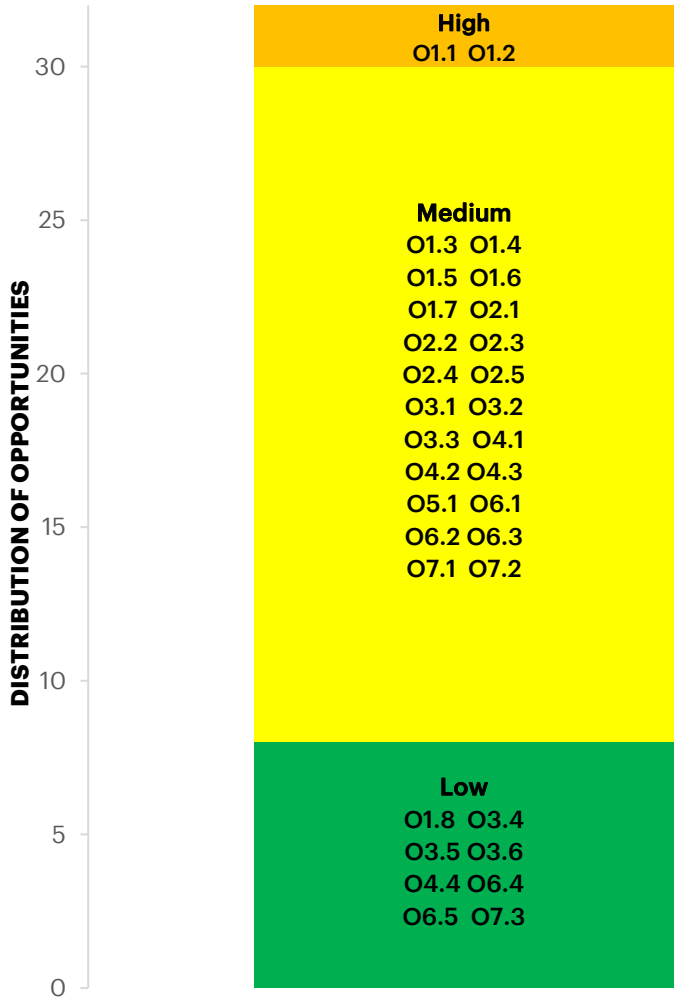


Figure 10: The detailed opportunities that have been uncovered as part of this study.

5.3 Recommendations to Capitalize on the Opportunities

Expanding TPA to SME data presents unique opportunities that can be strategically capitalized to drive significant improvements in the Ontario energy market. The following strategies are recommended to help the IESO maximize the value of the many potential opportunities that exist associated with aggregated SME data.

- **Investment in Data Analytics & Technology**
  It is recommended that the IESO continues to make investments in its data analytics and technology capabilities to support initiatives such as the expansion of TPA to SME data with leading-edge capabilities. By investing in talent, tools and process improvements around data, the IESO can help itself as well as third parties gain deeper insights into energy consumption patterns, local demand forecasts, and energy distribution optimization opportunities. Technologies such as AI and GenAI can play a crucial role in allowing the IESO and/or third parties to draw insights from aggregated SME data, by analyzing diverse datasets including weather, energy market & grid, and census and demographic data to generate predictive models and actionable insights for the grid. These insights can tailor energy-saving recommendations to specific weather conditions and specific community characteristics, enhancing grid stability and supporting Canada's 2030 net-zero goals in the long run. Additionally, AI-driven analytics can also refine demand response systems, improve market strategies, and identify high-consumption areas for strategic deployment of DERs. This approach would contribute to a more resilient and efficient energy system provided by the IESO, fostering a greater consumer participation and optimizing resource allocation. By integrating SME data with external data sources and leveraging AI's analytical capabilities, the IESO can drive smarter energy management and advance sustainability efforts across the province, either by itself or in partnership with third parties who have access to the aggregated SME datasets.

- **Development of Targeted Programs**
  It is recommended that the IESO continues in its development of targeted energy programs based on insights gathered from SME (and other IESO) data. Specific to the expansion of TPA to SME data, however, the IESO has the potential here to leverage third party insights to significantly enhance energy efficiency and conservation efforts. For example, third parties may provide the IESO with insights to help design dynamic pricing strategies and develop targeted demand response programs, optimizing load distribution and reducing grid strain during peak times. Personalized (or neighborhood-level) energy-saving recommendations can also be given out to customers based off aggregated SME data that may enhance customer engagement and participation in energy efficiency programs, rebates and incentives. These measures would also support broader sustainability goals and federal net-zero goals over the long run. By focusing on the development of these targeted energy programs, the IESO can drive significant energy savings and foster a culture of energy conservation among consumers and Ontarians alike.

- **Establishment of Strategic Partnerships**
  It is recommended that the IESO look to establish strategic partnerships with technology companies, research institutions, and market participants for maximizing the benefits of the SME data. These relationships can facilitate the development of innovative solutions for urban planning, EV infrastructure, and DER placement. Collaborating with EV companies and LDCs

can help anticipate peak loads and incentivize off-peak charging offers for electric load distribution and reducing grid strain during peak times. Partnerships with real estate development firms, for example, can leverage SME data to inform zoning and infrastructure development decisions, aligning with population growth and trends. Additionally, alliances with academia and research institutions can drive innovation and research in the electricity sector, market design, and net-zero initiatives. By fostering a collaborative ecosystem, the IESO can position themselves as leaders in the market enhancing influence in the energy sector.

6. Concluding Remarks

The expansion of TPA to SME data presents both important opportunities as well as notable risks for the IESO, the SME, Ontario electricity market participants, ratepayers and the general public. Ultimately, the expansion of TPA to SME data is an endeavor for the IESO and SME that must entertain a balanced approach; one that both holds promise for advancing the electricity sector in Ontario while also safeguarding consumer interests, ensuring data integrity and promoting fair competition for Ontario electricity market participants.

From an opportunistic perspective, expanding TPA to aggregated SME data may help drive innovation, improve energy efficiency and foster a more competitive and economically efficient electricity market within the province of Ontario. Third parties can leverage SME data to develop new products and services, help residential and small commercial customers optimize their energy consumption and provide Ontario ratepayers and electricity consumers with more personalized and cost-effective energy solutions based on the insights garnered from historical consumption patterns that may be uncovered within the SME dataset.

On the other hand, expanding TPA to SME data comes with inherent risks that must be carefully managed and mitigated where necessary by both the IESO and SME. Data privacy and information security are important concerns, as unauthorized access or distribution of SME data may compromise Ontario residential and small commercial customer information and erode public trust in the IESO and SME, irrespective of data use agreements (DUAs) that may be in place between the IESO and trusted third parties. By expanding TPA to SME data, the IESO and SME may also potentially venture into establishing these DUAs with foreign entities that and international territories that abide by different regulatory landscapes, data privacy laws (e.g. the GDPR on information privacy in the European Union) and compliance frameworks.

6.1 Summary of Findings & Addressing Key Concerns

This section provides an overview of the key insights and conclusions that have been derived from the assessment into the risks and opportunities associated with expanding TPA to SME data. This assessment has uncovered 6 key risk themes and 7 key opportunity themes, each with a handful of detailed examples to help illustrate the impact, likelihood and severity of the risks and opportunities that have been uncovered. The key themes are as follows:

Key Risk Themes

1. Privacy & information security;
2. Financial & economic;
3. Operational & infrastructure management;
4. Market dynamics & competition;
5. Data utilization & integrity; and
6. Compliance & regulatory.

Key Opportunity Themes

1. Energy efficiency & conservation;
2. Operational & infrastructure management;
3. Innovation & technological advancement;
4. Compliance & regulatory;
5. Stakeholder engagement & satisfaction;
6. Market dynamics & competition; and
7. Financial & economic.

The findings highlight critical areas of vulnerability, threat and emerging risk with expanded TPA to SME data, as well as the core focal points of potential, growth and innovation, for both the IESO and SME. The strategies used to mitigate the risks and capitalize on the opportunities have

been described as well. The assessment of the risks within the context of the IESO's existing risk framework provide the IESO with a starting point to continue with conducting an introspective study and triaging each of the uncovered items accordingly.

The key questions that were mentioned earlier in this report and identified to be top of mind for the IESO and its Board of Directors are once more addressed:

- **Key Risk Questions:**
    1. *"Can third parties use aggregated SME data to better model the power flows on the grid and find vulnerabilities?"*

       Likelihood: unlikely. Aggregated and anonymized smart meter data in and of itself does not provide significant value to the virtual recreation of a holistic digital grid. Using aggregated SME data in isolation to have better demand forecasts and better model the power flows undermine the complexity of grid control systems in place at the IESO (security, access credentials, regulatory requirements, control mechanisms, etc). The probability of third parties wrestling control of the grid away from the IESO based solely on expanded TPA to aggregated SME data is rather low, and expanding TPA to SME data does not significantly increase the risk profile of this existing risk to the IESO.

    2. *"Can third parties use the SME data to gain an unfair market advantage by understanding zonal constraints?"*

       Likelihood: unlikely. This report has explored several edge cases where market participants can exert market power or leverage their influence over transmission-constrained zones in the province to favorably benefit their market settlement based on accurate demand forecasts. While aggregated SME data may provide insights into historical zonal demand patterns across the province, the information that is provided does not include real-time insights and would be of limited value for real-time decision making such as entering bids and offers in the settlement process. Furthermore, the IESO's Market Assessment and Compliance Division (MACD) regularly provides market oversight and compliance to market rules and activity of market participants. As a result, the likelihood of market participants exerting market power, gaming settlement prices or holding back supply to influence electricity spot prices based on expanded TPA to SME data remains quite low.

    3. *"Can third parties who have access to sophisticated AI and existing personal data leverage the aggregated SME data to re-personalize data?"*

       Likelihood: unlikely. While modern AI and GenAI solutions have the capability to analyze large datasets and generate insights that may not be as readily apparent through more traditional analysis methods, they still often require a human-in-the-loop to act upon these insights and enable their outcomes (ie. AI systems do not tend to operate in autonomous, unregulated manners in modern society and application). Meanwhile, the use of AI and GenAI has been coming under greater public scrutiny as of late, which has led to more stringent regulatory oversight and global laws to ensure responsible and ethical AI practices and prevent the misuse of such AI and GenAI solutions. From this perspective, expanding TPA to aggregated SME does not appear to increase the risk profile of the IESO to the

misuse (or malintent use) of AI systems on aggregated SME data, further than what the current risks exists today for the IESO and its data as a whole. Furthermore, it should be noted that third parties who receive access to the SME data would still require to be triaged through the TPA request process and enter into a DUA, two mechanisms that would ultimately help control how the SME data can and can't be used once it's made available to third parties.

- **Key Opportunity Questions to Address:**

1. *"Can expanding TPA to SME data spur new business opportunities within Ontario (e.g. new energy programs for residential customers) and put money back into ratepayer pockets?"*

   Likelihood: almost certain. Expanding TPA to SME data has a high potential to accelerate new business initiatives across the province and provide rate relief through incentive programs and customized energy solutions to Ontario electricity ratepayers. Access to SME data can enable the development of new smart home technologies, energy efficiency programs and incentives and cost savings opportunities for residential and small commercial customers. In addition, investments in energy efficiency technologies based off more accurate, zonal demand forecasts can lead to long-term savings and lower electricity rates for consumers. Overall, the likelihood of this key opportunity question is high.

2. *"Can expanding TPA to SME data drive further competition amongst market participants in the Ontario electricity market and help drive down electricity prices for customers?"*

   Likelihood: possible. Access to aggregated SME data at the zonal level can help incentivize current market participants to enhance their bid and offer strategies in the market settlement process. With information that can lead to more accurate demand forecasts at the residential and small commercial level, suppliers (and large consumers) of electricity can optimize energy generation and usage and help implement more precise demand response initiatives. In turn, this should help lower operational costs and thus electricity prices. The likelihood of expanded TPA to SME data driving further competition amongst market participants and helping lower electricity prices for customers is very possible.

3. *"Can expanding TPA to SME data help the IESO maintain business relevance within the evolving and dynamic power, energy & utilities sectors in Canada and across North America?"*

   Likelihood: likely. The IESO and SME are in a unique position with the expansion program to foster innovation, promote industry collaboration and position themselves as leaders in the ecosystem when it comes to data sharing and empowering utility market players with a customer-centric approach. The IESO can leverage the expansion program as a means to extend its influence and relevance across the Ontario energy sector, particularly as it strives to encourage new development and investment in a more modern grid. The likelihood of this initiative to increase the prominence of the IESO within the Canadian utility sector is probable.

6.2 Additional Considerations

In addition to the recommendations that have been provided earlier in this report to help mitigate any risks (Section 4.3) and capitalize on any opportunities (Section 5.3) associated with the expansion of TPA to SME data, it is recommended that the IESO and SME consider the following additional, corporate-level recommendations.

- **Further Developing SME Data Access within the Enterprise Data & AI Strategy**
  It is recommended that the IESO continues to develop its strategy around providing TPA to SME data within the context of the broader enterprise data & AI strategy at the IESO. Fundamentally, this effort would help ensure that i) proper controls are in place at the IESO to maintain accurate and reliable data quality for the SME data; and ii) robust data governance mechanisms are in place at the IESO to standardize access control and maintain data privacy for SME data. An overarching data & AI strategy would also help ensure that decisions being made around SME data are consistent with how data is created, stored, processed, analyzed, used, shared and ultimately disposed of, elsewhere and across the IESO. An enterprise data & AI strategy would also help the IESO ensure that a responsible AI framework is in place and ready to monitor, assess and mitigate any risks (as well as opportunities) associated with AI and GenAI, specific to SME data and broader IESO data more broadly. Such a responsible AI framework can better prepare the IESO for dealing with AI and GenAI systems that are developed both internally and external to the IESO. It ensures that the AI and GenAI systems are developed and deployed at the IESO with strategic and operational considerations in mind to maximize benefit while minimizing various societal, ethical, business-level, financial, reputational and other such risks. These include the moral implications of data, AI and GenAI use; policy and regulatory compliance; data and AI governance protocols in place as lines of defense for the IESO and SME; and risk management mechanisms that expand traditional risk detection and mitigation practices to address the risks and harms unique to AI and GenAI, as an evolving field. Deploying an enterprise data & AI strategy with a comprehensive responsible AI framework as the backbone not only safeguards the IESO and SME from the inherent risks associated with AI and GenAI, but also provides confidence in driving innovation and leveraging emerging technologies such as AI in a responsible and ethical manner while being able to reap its rewards.

- **Legal Services & Evolution of the SME Data Use Agreement**
  It is also recommended that the IESO and SME consider continually evolving the data use agreement (DUA) that is currently in place to grant TPA to SME data, in order to account for emerging technologies such as AI and GenAI and their effect on third party SME data use, as well as international data privacy laws and regulations (e.g. the GDPR on information privacy at the European Union) and the shipment of data across Canadian borders. Modern AI and GenAI systems have the capability to process significantly larger datasets in a much faster timeframe than humans can, which allows AI and GenAI systems to analyze data more deeply, make faster predictions and even automate decisions across organizations. This brings up new legal and ethical issues that must be accounted for when the IESO and SME are preparing DUAs with third parties. The current SME's DUA may not cover all of the complexities around AI and GenAI, such as ensuring data privacy associated with AI, avoiding bias in AI and GenAI algorithms that use SME data and maintaining transparency and accountability of the effects of the AI and GenAI system

outputs. Furthermore, should the SME data be provided to third parties that operate internationally, the IESO and SME may face scenarios where they are entering into DUAs with international third parties who are subject to international policies and regulations. This includes, but may not be limited to: the AI Act within the European Union that is expected to come into force in 2024 and be fully applicable around 2026; consumer data privacy acts such as various state-level data privacy laws that are currently in place across various states in the United States; the General Data Protection Regulation (GDPR) data privacy law in the European Union; as well as various other international and country-specific laws and regulations. By keeping the DUA at the IESO and SME up to date and regularly evolving, the IESO and SME help mitigate the risks associated with its terms and conditions becoming subject to international scrutiny and can help ensure compliance with various evolving regulatory standards around data and AI.

- **Integrating SME Data Risks within Existing Enterprise Risk Management**
  Lastly, it is recommended that the IESO and SME also consider integrating various risks associated with SME data and the expansion of TPA to SME data from this assessment into the IESO's existing enterprise risk management framework. By doing so, the IESO can not only enhance its ability to identify and mitigate potential risks associated with expanded TPA to SME data, but also understand these perceived risks in the context of the IESO's corporate agenda. This effort would entail looking at the findings of this report and further refining the impact level, likelihood and perceived severity of the risks that have been captured in this assessment—*as well as those that may not have been and will continue to emerge through time*—and analyzing them from strategic, operational and project-level perspectives for both the IESO and SME. There is an opportunity for the IESO and SME to further build out its awareness of the risks and opportunities around data sharing (beyond just expanded TPA to SME data) with this assessment and continue to ensure that both the IESO and SME have a solid foundation and strong protections in play to maintain a net-neutral change in risk profile once the expansion of TPA to SME data takes place.