PRODUCTION FORECAST AND METHODOLOGY – REGULATED HYDROELECTRIC

1.0 PURPOSE

This evidence provides the production forecast for the regulated hydroelectric facilities and a description of the methodology used to derive the forecast. It also presents an overview of outage planning for the regulated hydroelectric facilities. Consistent with the OEB's letter dated September 17, 2024, issued in EB-2024-0136, OPG has included nine years of historical data for its regulated hydroelectric business below, for the period 2016-2024.

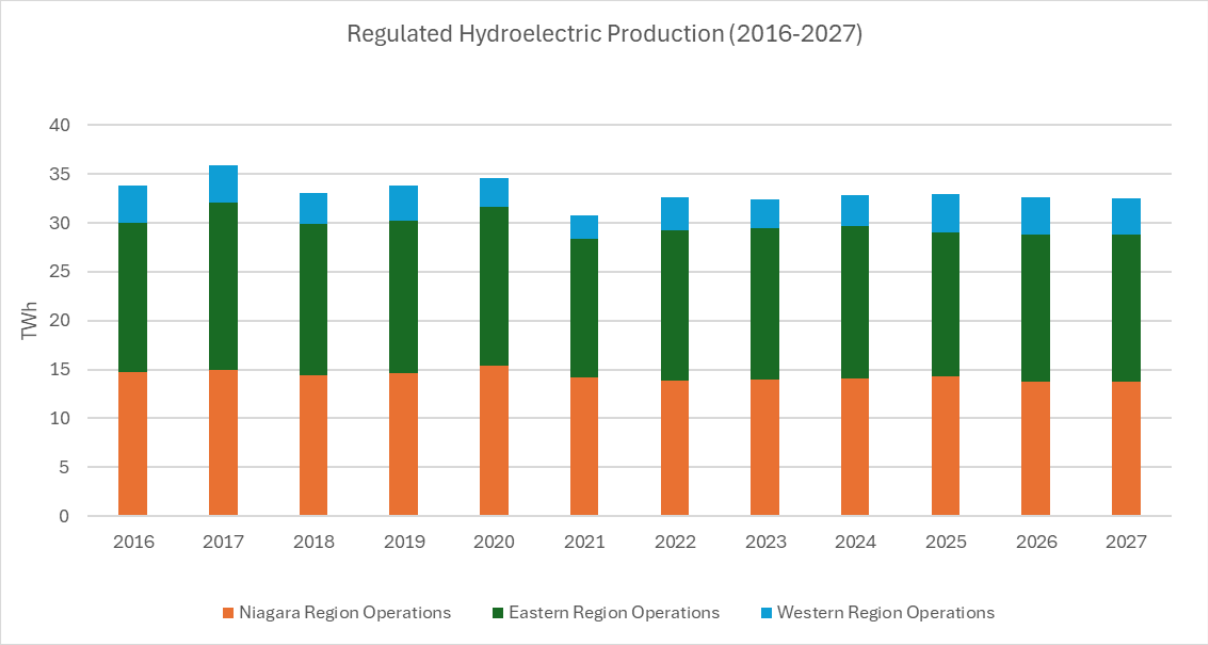
2.0 OVERVIEW

The actual regulated hydroelectric production for the years 2016-2024 and the forecast production for the bridge years (2025-2026) and test year (2027) is presented in Ex. E1-1-1, Table 1 and summarized below in Figure 1. OPG is seeking approval of a planned production forecast of 32.5 TWh in 2027 for the regulated hydroelectric facilities. Annual changes in production are primarily due to unit and water availability. Detailed analysis of year-over-year changes in actual and forecast production is provided in Ex. E1-1-2. Forecast monthly production data for the test period are presented in Ex. E1-1-1, Table 2.

The methodologies used to determine the flow and production forecasts for the Sir Adam Beck Complex, DeCew Falls generating stations, and R.H. Saunders GS are presented in Sections 3.2, 3.3, and 3.4, respectively. The forecast methodologies for the remaining regulated facilities are presented in Section 3.5.

A brief description of outage planning for the regulated hydroelectric facilities is presented in Section 4.0.

Figure 1 – Pre-SBG Spill Regulated Hydroelectric Production (2016-2027)



3.0 REGULATED HYDROELECTRIC PRODUCTION FORECAST

3.1 Forecast Methodologies

Hydroelectric production is impacted by water availability, which is affected by meteorological conditions, particularly precipitation and evaporation. OPG seeks to optimize the use of available water while meeting safety, environmental, applicable laws, and electrical system operational requirements. The forecast methodologies account for operational strategies used to maximize the use of available water for production and minimize hydroelectric spill (i.e., unutilized water).

Computer models are used to derive production forecasts for the 27 of the 54 regulated dispatchable hydroelectric stations that are connected to the IESO-controlled grid – a list of these stations is provided in Attachment 1.[1] Forecast monthly water flows, generating unit efficiency ratings, and planned outage information are used to convert forecast water availability into forecast energy production. These values are adjusted to reflect losses

[1] Calabogie GS is not dispatchable, but is modelled as part of the Madawaska River.

associated with electrical system operational requirements (e.g., regulation service, operating reserve, condense-mode operations, and system constraints) based on a historical impact assessment. The production forecast methodology used in this application was modified to also account for estimated losses that are not expected to be eligible for recovery in the Hydroelectric Surplus Baseload Generation Variance Account ("SBGVA").

For the other 27 regulated hydroelectric stations that are connected to local distribution systems and are non-dispatchable, OPG uses average historical production to determine the production forecast – a list of these stations is provided in Attachment 2.

The production forecast methodology has been updated to reflect spill that is not eligible for recovery under the SBGVA as described in Ex. E1-2-1, Section 4.3. With the exception of this change, there are no deductions made for global and local Surplus Baseload Generation ("SBG") where OPG expects that losses due to SBG will be addressed by the SBGVA as approved in EB-2010-0008 and modified in EB-2023-0336. This approach is consistent with the OEB's Decisions with Reasons in EB-2010-0008 and the forecasting approach in EB-2013-0321, which stipulated that no deductions are made for the impact of SBG. Details of the SBGVA are discussed further in Ex. E1-2-1 and Ex. H1-1-1.

3.2 Sir Adam Beck Complex Flow and Production Forecast

The models underlying the flow forecasting methodology for the Sir Adam Beck Complex have been updated since EB-2013-0321, though the methodology itself remains consistent. In December 2023, OPG fully transitioned from using the Hydrological Response Model for the Great Lakes and the Advanced Hydrological Prediction System[2] to the Residual Net Basin Supply ("RNBS") model maintained and run by the U.S. Army Corps of Engineers Great Lakes Hydraulics and Hydrology Office. The RNBS model is a statistical model which uses a long history of observations as a basis to forecast future conditions and uses.

[2] The Advanced Hydrologic Prediction System was superseded by the development of the Great Lakes Seasonal Hydrological Forecasting System ("GLSHFS") in 2017; while the data processing code was updated to standardize file formats, the underlying model components of the two systems were the same. The U.S. Army Corps of Engineers ceased providing the GLSHFS forecast as of December 1, 2023.

OPG uses the RNBS 50% (median) forecast of monthly average Niagara River inflow into the Grass Island Pool ("GIP"). The GIP is the section of the Niagara River upstream of the International Niagara Control Works and Horseshoe Falls which influences how much water is diverted through the tunnels and open cut canals to the hydroelectric generating stations. Short-term forecasts consider current Great Lake watershed conditions, seasonal precipitation outlooks, flows forecast by the U.S. Army Corps of Engineers RNBS model, and seasonal water availability trends. The flow forecast is adjusted to gradually align with long-term average conditions, using historical data analyses and comparing the forecast with other forecasting models, as a basis for this adjustment.

As with EB-2013-0321, the forecasted GIP inflows, along with the forecasted DeCew Falls diversion (detailed in Section 3.3), are inputs to the Niagara Utilization Monthly Model, which uses generating unit efficiency ratings, planned outage information, and forecasted regulation service[3] utilization to calculate the monthly energy production for the Sir Adam Beck complex.[4] Incremental production increases anticipated as a result of the Sir Adam Beck complex refurbishment projects completed by the test year have been incorporated into the forecasted energy production.

3.3 DeCew Falls Diversion Flow and Production Forecast

Water is diverted from the Welland Seaway Canal and routed to the DeCew Falls generating stations (DeCew 1 GS and DeCew 2 GS) for hydroelectric production. Forecasts of monthly DeCew diversion flow are prepared based on historical diversion flow, which is dependent on prevailing Lake Erie levels and considerations of planned Seaway Canal maintenance, planned unit outages at the DeCew generating stations, and flow variations, such as during major scheduled rowing regatta events held downstream of the generating stations.

[3] Formerly referred to as Automatic Generation Control.
[4] No adjustment has been made to the Sir Adam Beck complex production forecast volumes to account for station service used by Niagara Hydrogen Centre.

Forecast DeCew diversion flows are used with unit availability information and generating unit efficiency ratings to calculate the monthly energy production forecast for the DeCew Falls generating stations.

3.4 St. Lawrence River Flow and R.H. Saunders GS Production Forecast

Prior to 2019, OPG used all available historic flows in its forecasting methodology for R.H. Saunders GS. Beginning in 2019, in order to align with changes to international standards and known watershed conditions, OPG transitioned to a 30-year[5] median in its forecasting methodology; this change reflects that flow trends on some river systems, including the St. Lawrence River, have remained consistent over time.

Monthly energy production for the R.H. Saunders GS is based upon St. Lawrence River flow and Lake Ontario water levels. R.H. Saunders GS planned outage information and generating unit efficiency ratings are used in conjunction with the expected flows and levels to calculate the monthly energy production forecast. The expected incremental production increases due to refurbishment projects at R.H. Saunders GS have been incorporated into the forecast energy production.

3.5 Production Forecast for the Remaining Regulated Hydroelectric Generating Stations

Energy production forecasts for the remaining 21 dispatchable regulated hydroelectric generating stations, located on nine river systems (see Attachment 1), are produced using computer models and are based upon the methodology documented in EB-2013-0321. Similar to the R.H. Saunders GS production forecast methodology described in Section 3.4, in 2019 OPG transitioned to a 30-year median in its forecasting methodologies for these regulated hydroelectric generating stations, consistent with changes to international standards. These models convert water availability to forecast energy production using generating unit efficiency ratings and planned outage information. The methodology used in this application has been modified from the one used in EB-2013-0321 to also account for spill due to unplanned

[5] In 2015, the World Meteorological Congress revised the definition of a climatological standard normal to the most recent 30-year period.

outages. OPG began tracking unplanned outage spill in 2019 to improve the accuracy of its hydroelectric forecasts for these stations and has used a five-year historical average to estimate associated losses.

Ottawa River flow may be augmented at times with water diverted from Québec to the Ottawa River basin upstream of Lake Temiskaming (referred to as the “Cabonga diversion”). The production forecasts for the four Ottawa River stations are based on historical median flow data that includes the Cabonga diversion flow. OPG benefits from additional energy produced at the four stations due to the Cabonga water. By agreement, a portion of the additional energy generated is returned to Hydro-Québec (referred to as “Cabonga payback”). Cabonga payback typically amounts to less than 1% of total production from the Ottawa River stations. The Eastern Region’s production totals presented Ex. E1-1-1, Table 1 reflect the forecasted Cabonga payback amounts.

Energy production forecast methodologies for the remaining 27 non-dispatchable regulated hydroelectric stations (located on twelve river systems, see Attachment 2) remain unchanged from EB-2013-0321. These forecasts are based on historical mean monthly production values, adjusted to account for planned outages. These small generating stations are run-of-the-river and account for less than 5% of the total production from the remaining regulated hydroelectric facilities and less than 2% of total production from all regulated hydroelectric facilities. These 27 small stations are excluded from the Hydroelectric Water Conditions Variance Account (see Ex. H1-1-1).

The production impacts of redevelopment and refurbishment projects completed by the test year are reflected in forecast energy production.

4.0 OUTAGE PLANNING

OPG’s hydroelectric outages are generally planned to conduct the following:

- Refurbishment, redevelopment, or concrete work
- Preventative maintenance
- Condition-based maintenance

- Inspection and testing

In addition to regularly scheduled maintenance outages, refurbishment and overhaul work is planned at select hydroelectric facilities (details on refurbishment projects are provided in Ex. D1-1-2). These major planned outages are accounted for in the 2027 test year production forecast, including anticipated incremental production increases.

In addition to planning outages around the key pillars of safety, environment, and applicable laws/regulations, OPG continues to optimize the timing and duration of its outages where possible. Outage optimization involves, but is not limited to:

- Scheduling outages[6] during periods of low water flow and/or demand to minimize the impact on generation. The normal cyclical patterns of river flow within a year are considered when scheduling outages in order to minimize hydroelectric spill.
- Seeking opportunities to reduce unit outage durations by nesting shorter maintenance/project outages within longer refurbishment outages where possible.
- Utilizing operational strategies (e.g., storing water where possible, running remaining online units at maximum gate) to maximize water usage and minimize hydroelectric spill. This helps to ensure optimal efficiency during planned outages.
- Collaborating with stakeholders, including Hydro One and the IESO, to coordinate outages. This bundling of work, where possible, helps reduce downtime and increase overall generation production.

[6] OPG outages are subject to assessment and final approval by the IESO as per Market Manual 7: System Operations, Part 7.4: IESO-Controlled Grid Operating Policies. The IESO has the discretion to reschedule, reject, or revoke an outage request if it risks operations or reliability of the IESO-controlled grid. See: <https://www.ieso.ca/-/media/Files/IESO/Document-Library/Renewed-Market-Rules-and-Manuals/market-manuals/system-operations/ieso-so-controlled-grid-operating-policies.pdf>.

ATTACHMENT 1

REGULATED STATIONS WITH MODELED PRODUCTION FORECASTS

River System	Generating Station
Niagara	Sir Adam Beck 1 Sir Adam Beck 2 Sir Adam Beck Pump Generating Station
Welland	DeCew Falls 1 DeCew Falls 2
St. Lawrence	R.H. Saunders
Madawaska	Mountain Chute Barrett Chute Calabogie Stewartville Arnprior
Ottawa	Otto Holden Des Joachims Chenaux Chats Falls
Abitibi	Abitibi Canyon Otter Rapids
Montreal	Lower Notch
Nipigon	Pine Portage Cameron Falls Alexander
Aguasabon	Aguasabon
Kaministiquia	Silver Falls Kakabeka Falls
English	Manitou Falls Caribou Falls
Winnipeg	Whitedog Falls

ATTACHMENT 2

REGULATED STATIONS WITHOUT MODELED PRODUCTION FORECASTS

River System	Generating Station
Montreal	Chute
Matabitchuan	Matabitchuan
Mississippi	High Falls
Rideau	Merrickville
Trent	Lakefield Auburn Seymour Ranney Falls Hagues Reach Meyersburg Sills Island Frankford Sidney
Beaver	Eugenia
Muskoka	Trethewey Falls Hanna Chute South Falls Ragged Rapids Big Eddy
Severn	Big Chute
South	Elliott Chute Bingham Chute Nipissing
Sturgeon	Crystal Falls
Wanapitei	Stinson Coniston McVittie

Numbers may not add due to rounding.

Table 1
Production Trend - Regulated Hydroelectric (TWh)

Line No.	Operating Region[1]	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget[3]	2026 Budget	2027 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
1	**Niagara Region**	12.0	11.3	12.0	12.4	12.2	12.5	12.7	13.2	13.7	14.3	14.0	13.8
2	**Eastern Region[2]**	14.2	16.1	14.8	14.8	15.3	14.0	15.1	15.3	15.5	14.8	14.8	15.0
3	**Western Region**	3.3	3.4	3.0	3.3	2.8	2.4	3.4	2.9	3.2	3.9	3.9	3.7
4	**Total**	29.5	30.7	29.8	30.5	30.3	29.0	31.1	31.4	32.5	33.0	32.8	32.5

Notes:
1 Operating Region descriptions effective 2021 (see Ex. A1-4-2).
2 Eastern Region totals reflect energy delivered to Hydro-Québec via R.H. Saunders GS and Chats Falls GS.
3 2016-2024 production values are net of SBG spill. 2025-2027 production values are on a pre-spill basis, i.e., there are no deductions made for SBG as per Ex. E1-1-1, Section 3.1.

Numbers may not add due to rounding.

Table 2
Monthly Production - Regulated Hydroelectric (TWh)
2027 Test Year

Line No.	Operating Region[1]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
	2027 Plan[3]:													
1	**Niagara Region**	1.2	1.1	1.3	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.2	1.2	13.8
2	**Eastern Region[2]**	1.3	1.2	1.3	1.5	1.7	1.3	1.1	1.0	0.9	1.1	1.2	1.3	15.0
3	**Western Region**	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.4	3.7
4	**Total**	2.9	2.7	2.9	2.9	3.2	2.7	2.6	2.4	2.2	2.4	2.6	2.9	32.5

Notes:

1 Operating Region descriptions effective 2021 (see Ex. A1-4-2).

2 Eastern Region totals reflect energy delivered to Hydro-Québec via R.H. Saunders GS and Chats Falls GS.

3 2027 production values are on a pre-spill basis, i.e., there are no deductions made for SBG as per Ex. E1-1-1, Section 3.1.

COMPARISON OF PRODUCTION FORECASTS – REGULATED HYDROELECTRIC

1.0 PURPOSE

This evidence presents period-over-period comparisons of total regulated hydroelectric production based on actuals for 2016-2024 and forecasts for the bridge period (2025-2026) and test year (2027), as detailed in Ex. E1-1-2, Table 1, and supports the approval of the regulated hydroelectric production forecast presented in Ex. E1-1-1.

Consistent with the OEB's letter dated September 17, 2024, issued in EB-2024-0136, OPG has included nine years of historical data for its regulated hydroelectric business below, for the period 2016-2024. As there is no OEB-approved regulated hydroelectric production information for 2015 onwards, OPG has provided only year-over-year variance analysis for the historical period (2016-2024), bridge period (2025-2026), and test year (2027).

2.0 PERIOD-OVER-PERIOD CHANGES – TEST YEAR

Hydroelectric production is impacted primarily by water availability, unit availability, or a combination thereof. As detailed in Ex. E1-1-1, historical median monthly flows are used for determining the monthly energy production forecast for many regulated generating stations, and a long-term average for the Sir Adam Beck and DeCew Falls facilities. Therefore, the year-over-year changes in the bridge period and test year are mainly attributed to forecast outage differences and forecast production increases expected from refurbishment and redevelopment projects. The production forecast is inclusive of outages to accommodate the ongoing refurbishment program and other life extension activities across the fleet, and also reflects anticipated energy from the completed refurbishment and redevelopment projects, as described in Ex. F1-1-1 and Ex. D1-1-2.

The forecast methodology for the 2027 test year accounts for operational strategies used to maximize the use of available water for production and minimize hydroelectric spill (i.e., unutilized water) as detailed in Ex. E1-1-1, Section 4.0.

2027 Plan versus 2026 Forecast

The total regulated hydroelectric production forecast for 2027 is 1% (0.3 TWh) lower than the forecast for 2026.

The total production forecast for Niagara Region in 2027 is 2% (0.2 TWh) lower than the forecast for 2026 primarily due to changes in unit availability. Variances in unit availability are due to differences in maintenance outage schedules and the reduced availability of Sir Adam Beck 2 GS due to the refurbishment program.

The total production forecast for Eastern Region in 2027 is 1% (0.1 TWh) higher than the forecast for 2026. Period-over-period variances in Eastern Region are due to differences in maintenance, refurbishment and redevelopment outage schedules and forecast production increases expected from refurbishment and redevelopment projects. The majority of this variance is due to the return to service of redeveloped stations, namely Coniston GS, Stinson GS, and Bingham Chute GS.

The total production forecast for Western Region in 2027 is 5% (0.2 TWh) lower than the forecast for 2026. Period-over-period variances in Western Region are due to differences in maintenance outage schedules, namely at Caribou Falls GS in 2027.

3.0 PERIOD-OVER-PERIOD CHANGES – BRIDGE YEARS

2026 Forecast versus 2025 Forecast

The total regulated hydroelectric production forecast for 2026 is 1% (0.2 TWh) lower than the forecast for 2025. Lower production at Niagara Region is partially offset by higher production from Eastern Region.

The total production forecast for Niagara Region in 2026 is 2% (0.3 TWh) lower than the forecast for 2025 primarily due to an expected reduction in flow in 2026, changes in unit availability, and impacts from Sir Adam Beck 1 GS and Sir Adam Beck 2 GS refurbishment programs. Niagara River flows are expected to return to long-term average in 2026, and

continue into the test year and beyond. Niagara River flows are forecasted to reduce in 2026 compared to 2025 given the trend towards long-term average.

The total production forecast for Eastern Region in 2026 is 0.5% (0.1 TWh) higher than the forecast for 2025. Period-over-period variances in Eastern Region are attributed to differences in maintenance and refurbishment outage schedules, namely the return to service of Abitibi Canyon GS units from maintenance by 2026.

The total production forecast for Western Region in 2026 is 0.5% (0.02 TWh) lower than the forecast for 2025. Period-over-period variances in Western Region are attributed to refurbishment work at Cameron Falls GS and Manitou Falls GS, and the redevelopment of Kakabeka Falls GS.

4.0 PERIOD-OVER-PERIOD CHANGES – HISTORICAL YEARS

2025 Forecast versus 2024 Actual

The total regulated hydroelectric production forecast for 2025 is 1% (0.5 TWh) higher than 2024 actual production. Actuals up until and including 2024 are net of Surplus Baseload Generation ("SBG") losses. The 2025 budget year is on a pre-SBG spill basis as per Ex. E1-1-1, Section 3.1. Differences in production that are due to SBG conditions are captured after-the-fact in the Hydroelectric Surplus Baseload Generation Variance Account (see Ex. E1-2-1 and Ex. H1-1-1 for further SBG breakdowns).

The total production forecast for Niagara Region in 2025 is 4% (0.5 TWh) higher than the actual production in 2024. This is due to increased unit availability at DeCew Falls 1 GS and DeCew Falls 2 GS in 2025, resulting in a 0.5 TWh increase in DeCew Falls facility forecasted production. Sir Adam Beck 2 GS had 0.3 TWh of SBG in 2024, however this was offset by forecasted lower flow conditions in 2025.

The total production forecast for Eastern Region in 2025 is 5% (0.7 TWh) lower than 2024 actuals. This is due to lower forecasted flow conditions along the Ottawa and Montreal Rivers in 2025.

The total production forecast for Western Region in 2025 is 22% (0.7 TWh) higher than 2024 actuals due to higher forecasted flow conditions and fewer maintenance outages at Manitou Falls GS and Cameron Falls GS.

2024 Actual versus 2023 Actual

The total production for 2024 was 4% (1.1 TWh) higher than production for 2023. Production during 2024 was 5% (0.6 TWh) higher in Niagara Region, 1% (0.2 TWh) higher in Eastern Region, and 10% (0.3 TWh) higher in Western Region. Lower SBG conditions due to higher electricity demand contributed to this increased production.

Niagara River flow was comparable between 2024 and 2023; lower production losses due to reduced SBG spill and increased unit availability compared to 2023 resulted in higher production from Niagara Region. Higher unit availability at both Sir Adam Beck GS 1 and 2 is attributed to a decrease in maintenance outages and Hydro One Switchyard Project work in 2024.

Although Eastern river flows were lower in 2024, lower production losses due to reduced SBG spill compared to 2023 resulted in higher production from Eastern Region.

Higher flow conditions along Western river systems and lower production losses due to reduced SBG spill in 2024 resulted in higher production compared to 2023.

2023 Actual versus 2022 Actual

The total regulated hydroelectric production for 2023 was 1% (0.3 TWh) higher than 2022. Production during 2023 was 4% (0.5 TWh) higher in Niagara Region, 2% (0.2 TWh) higher in Eastern Region, and 13% (0.4 TWh) lower in Western Region.

Niagara River flow was comparable between 2023 and 2022. However, lower production losses due to reduced SBG spill compared to 2022 resulted in higher production from Niagara Region.

Higher flows along Eastern rivers, namely the Madawaska River, and lower production losses due to reduced SBG spill compared to 2022 resulted in higher production from Eastern Region in 2023.

Lower flow conditions in 2023 along Western river systems resulted in lower production in Western Region compared to 2022.

2022 Actual versus 2021 Actual

The total regulated hydroelectric production for 2022 was 7% (2.1 TWh) higher than 2021. Production during 2022 was 1% (0.1 TWh) higher in Niagara Region, 7% (1.0 TWh) higher in Eastern Region, and 40% (1.0 TWh) higher in Western Region. Higher flows across most of Ontario and lower SBG conditions due to higher electricity demand contributed to this increased production.

Although Niagara River flow conditions were lower in 2022, lower production losses due to lower SBG spill resulted in higher 2022 production from Niagara Region compared to 2021.

Higher total production from Eastern Region in 2022, compared to the 2021 production, is attributable to higher annual mean flow conditions across the Ottawa, Abitibi, and Montreal Rivers.

Higher annual mean flow conditions were observed along all Western Rivers, most notably along the English and Winnipeg rivers. Higher flow conditions in 2022 along Western Rivers and fewer refurbishments and maintenance outages, namely at Cameron Falls GS and Aguasabon GS, resulted in higher production from Western Region compared to 2021.

2021 Actual versus 2020 Actual

The total regulated hydroelectric production for 2021 was approximately 4% (1.3 TWh) lower than the actual production achieved in 2020. Production during 2021 was 3% (0.4 TWh) higher in Niagara Region, 8% (1.3 TWh) lower in Eastern Region, and 13% (0.4 TWh) lower in Western Region.

Although Niagara River flow was lower in 2021, lower production losses due to lower SBG spill compared to 2020 resulted in higher 2021 production from Niagara Operations.

Lower flow conditions in 2021 along the Eastern river systems and an increase in planned maintenance and project activities that had previously been deferred from 2020 due to the COVID-19 pandemic resulted in lower production for Eastern Region compared to 2020. Lower annual mean flow conditions were most notable along the Ottawa, St. Lawrence, and Montreal rivers.

Lower flow conditions in 2021 along the English and Winnipeg rivers and an increase in refurbishment and maintenance outages at Aguasabon GS resulted in lower production from Western Region compared to 2020.

5.0 PERIOD-OVER-PERIOD CHANGES – EXTENDED HISTORICAL YEARS

Pursuant to the OEB's letter dated September 17, 2024, issued in EB-2024-0136, OPG has included four additional years of historical data.

2020 Actual versus 2019 Actual

The total regulated hydroelectric production for 2020 was approximately 1% (0.3 TWh) lower than 2019 actual production. Lower production in 2020 reflected greater production losses due to higher SBG spill as a result of the impact of the COVID-19 pandemic on Ontario electricity demand. Production during 2020 was 2% (0.2 TWh) lower in Niagara Region, 4% (0.5 TWh) higher in Eastern Region, and 17% (0.6 TWh) lower in Western Region.

Although higher mean annual flows were observed along the Niagara River, total annual production in Niagara Region was lower in 2020 as a result of higher production losses due to higher SBG spill in 2020.

Higher mean flow conditions were observed in 2020 along the St. Lawrence River for the year. The second half of 2020 in particular saw increased flow conditions on the Ottawa, Madawaska, Abitibi and Montreal Rivers. Higher flow conditions year-over-year coupled with deferral of project and planned maintenance work due to the COVID-19 pandemic resulted in increased production from Eastern Region in 2020. This was partially offset by higher production losses due to higher SBG spill.

Lower total annual production from Western Region was observed in 2020 due to lower flow conditions along Western River systems and increased production losses due to higher SBG spill.

2019 Actual versus 2018 Actual

The total regulated hydroelectric production for 2019 was approximately 3% (0.8 TWh) higher than the actual production achieved in 2018. Production during 2019 was 3% (0.4 TWh) higher in Niagara Region and 13% (0.4 TWh) higher in Western Region. There were negligible year-over-year differences in actual production in Eastern Region.

Total annual production in Niagara Region was greater in 2019 due to higher flow conditions along the Niagara River compared to 2018. Lower production in 2018 also reflected greater production losses due to higher SBG spill.

Higher mean annual flow conditions were observed along all Eastern rivers in 2019. Higher mean annual flow conditions were offset by higher production losses due to SBG spill in 2019, resulting in negligible year-over-year differences in total production from Eastern Region.

Higher total annual production from Western Region was observed in 2019 primarily due to higher flow conditions along the Kaministiquia, English, and Winnipeg rivers. This was partially offset by production losses due to higher SBG spill.

2018 Actual versus 2017 Actual

The total regulated hydroelectric production for 2018 was approximately 3% (0.9 TWh) lower than the actual production achieved in 2017. Production during 2018 was 7% (0.7 TWh) higher in Niagara Region, 8% (1.3 TWh) lower in Eastern Region, and 12% (0.4 TWh) lower in Western Region.

Although Niagara River flow conditions between the two years were comparable, higher production losses due to higher SBG spill in 2017 resulted in higher production from Niagara Region in 2018.

Lower flow conditions in 2018 along the Madawaska and Ottawa Rivers resulted in lower production compared to 2017 in Eastern Region. This lower production was slightly offset by production along the St. Lawrence River which was comparable in flows and production to 2017.

Lower flow conditions in 2018 along Western river systems resulted in lower production in Western Region compared to 2017.

2017 Actual versus 2016 Actual

The total regulated hydroelectric production for 2017 was 4% (1.2 TWh) higher than the actual production achieved in 2016. Production during 2017 was 6% (0.8 TWh) lower in Niagara Region, 13% (1.9 TWh) higher in Eastern Region, and 3% (0.1 TWh) higher in Western Region.

Annual mean flow in 2017 for the Niagara River was higher than the 2016 flow conditions. However, production from Niagara Region was lower than in 2016 due to increased SBG spill at the Sir Adam Beck Complex as well as lower unit availability at DeCew Falls 2 GS due to a one-unit refurbishment.

Significantly higher total production from Eastern Region in 2017, compared to the 2016 production, is attributable to higher annual mean flow conditions across the Madawaska, Ottawa, and St. Lawrence Rivers.

Marginally higher total production for Western Region in 2017 compared to 2016 is attributable to higher unit availability and lower production losses due to lower SBG spill in 2017.

Numbers may not add due to rounding.

Table 1
Comparison of Production Forecast - Regulated Hydroelectric (TWh)

Line No.	Operating Region[1]	2016 Actual	(c)-(a) Change	2017 Actual	(e)-(c) Change	2018 Actual	(g)-(e) Change	2019 Actual	(i)-(g) Change	2020 Actual	(k)-(i) Change	2021 Actual	(m)-(k) Change	2022 Actual
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	**Niagara Region**	12.0	(0.8)	11.3	0.7	12.0	0.4	12.4	(0.2)	12.2	0.4	12.5	0.1	12.7
2	**Eastern Region[2]**	14.2	1.9	16.1	(1.3)	14.8	(0.0)	14.8	0.5	15.3	(1.3)	14.0	1.0	15.1
3	**Western Region**	3.3	0.1	3.4	(0.4)	3.0	0.4	3.3	(0.6)	2.8	(0.4)	2.4	1.0	3.4
4	**Total**	29.5	1.2	30.7	(0.9)	29.8	0.8	30.5	(0.3)	30.3	(1.3)	29.0	2.1	31.1

Line No.	Operating Region[1]	2022 Actual	(c)-(a) Change	2023 Actual	(g)-(e) Change	2024 Actual	(i)-(g) Change	2025 Budget[3]	(k)-(i) Change	2026 Budget	(k)-(i) Change	2027 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
5	**Niagara Region**	12.7	0.5	13.2	0.6	13.7	0.5	14.3	(0.3)	14.0	(0.2)	13.8
6	**Eastern Region**	15.1	0.2	15.3	0.2	15.5	(0.7)	14.8	0.1	14.8	0.1	15.0
7	**Western Region**	3.4	(0.4)	2.9	0.3	3.2	0.7	3.9	(0.0)	3.9	(0.2)	3.7
8	**Total**	31.1	0.3	31.4	1.1	32.5	0.5	33.0	(0.2)	32.8	(0.3)	32.5

Notes:

1 Operating Region descriptions effective 2021 (see Ex. A1-4-2).

2 Eastern Region totals reflect energy delivered to Hydro-Québec via R.H. Saunders GS and Chats Falls GS.

3 2016-2024 production values are net of SBG spill. 2025-2027 production values are on a pre-spill basis, i.e., there are no deductions made for SBG as per Ex. E1-1-1, Section 3.1.