Appendix D.3 Greenhouse Gas Assessment

Environmental Review Report

York Energy Centre Upgrades Project

Capital Power Corporation

SLR Project No.: 241.030524.00024

July 2024

Greenhouse Gas Assessment

York Energy Centre Upgrades Project

Capital Power Corporation

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Revision Record

Revision	Date	Revision Description
0	July 2024	Report issued for public review

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Acronyms and Abbreviations

ATEP	Advanced Turbine Efficiency Package
BAU	Business-as-Usual
CEPA	*Canadian Environmental Protection Act, 1999*
CER	*Clean Electricity Regulations*
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CH_4	methane
C-SSPA-3	Countryside Site Specific Policy Area
DAIS	Direct Air Injection System
EA	Environmental Assessment
EA Act	*Environmental Assessment Act*
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
ESP	Environmental Screening Process
GHG	Greenhouse Gas
GTA	Greater Toronto Area
GWh	Gigawatt-hour
GWP	Global Warming Potentials
HFC	hydrofluorocarbon
HVAC	Heating, Ventilation, and Air Conditioning
IESO	Independent Electricity System Operator
IPCC	Intergovernmental Panel on Climate Change
MECP (MOE)	Ministry of the Environment, Conservation and Parks (formerly Ministry of the Environment)
MW	megawatt
MWh	megawatt-hour
Mt	megatonne
NF_3	nitrogen trifluoride
N_2O	nitrous oxide
NIR	National Inventory Report
O. Reg.	Ontario Regulation
PFCs	perfluorocarbons
SE	Siemens Energy
SF_6	sulphur hexafluoride

t	tonnes
TWh	terawatt-hour
WRI	World Resources Institute
YEC	York Energy Centre
yr	year

1.0 Introduction

1.1 Project Overview

Capital Power Corporation (Capital Power), through its affiliate York Energy Centre LP., owns and operates the York Energy Centre (YEC). The YEC is a natural gas-fired, simple cycle, peaking generation power plant that generates an average gross output of 425 megawatts (MW) of electrical power. The YEC has been in operation since 2012, and since April of 2017, has been owned and operated by Capital Power. The YEC is located on two parcels of land, municipally known as 18781 and 18765 Dufferin Street located in the Township of King, Regional Municipality of York, hereafter referred to as the YEC Property (**Figure 1-1**).

Capital Power is proposing equipment upgrades at the YEC, referred to as the YEC Upgrades Project (the Project). The Project will provide approximately 30 MW of additional electricity generating capacity compared to current operations, which is reflective of an approximate 7.0 percent (%) increase in generating capacity. The proposed modifications of the YEC include:

- installation of a turbine upgrade package that will increase operational performance and reduce emissions of nitrogen oxides (NO_x);
- installation of an inlet fogging system;
- installation of larger transformer cooling fans; and
- adjustments to control logic.

The Project will result in improved efficiency, increased generation capacity and reduced NO_x emissions at the YEC. Installation of the upgrades will not result in changes to the footprint of the existing YEC, and there will be no changes to current use or maintenance practices at the facility. Installation of the upgrades will consist of component delivery, installation, and performance testing. Limited ground disturbance will be required within the footprint of the existing facility pad, and no construction work will occur within undisturbed or naturalized areas.

1.2 Objective

The objective of this Greenhouse Gas (GHG) Assessment Report is to quantify the estimated GHG emissions in carbon dioxide equivalent units (CO_2e) per year associated with the Project. The assessment will evaluate the Project for compliance with applicable federal and provincial regulatory limits.

This report has been prepared in support of the Environmental Review Report (ERR) to meet the requirements of the Environmental Screening Process for Electricity Projects (ESP).

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Emma Rd

Bernhardt Rd

King St

Hamlet of Ansnorveldt

Hydro One Corridor

18781

18765

Ansnorveldt Creek

Holland River South Canal

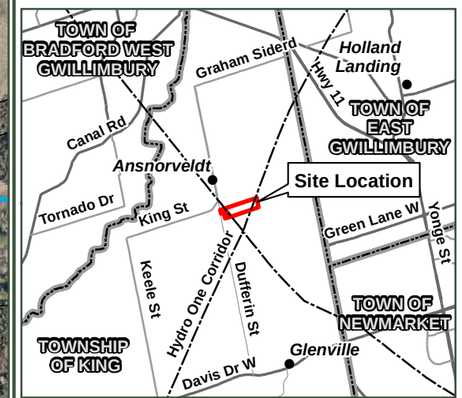
Dufferin St

Cawthra Mulock Nature Reserve

N

LEGEND:

- YEC Property
- Other CPC Owned Properties
- Parcel Fabric
- Watercourse/Drainage Feature
- Existing Utility Line



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YEC UPGRADES PROJECT

GHG ASSESSMENT

PROJECT LOCATION

SLR

FIGURE NO:
1-1

DATE: July 2024

PROJECT NO: 241.V30524.00026

2.0 Project and Site Context

2.1 Site Context

The YEC is located on two parcels, municipally known as 18781 and 18765 Dufferin Street, in the Township of King, Regional Municipality of York, just south of the Hamlet of Ansnorveldt and the Holland River. The generally rectangular property is approximately 15.3 hectares (ha) in size with approximately 80 metres (m) of frontage along Dufferin Street, and an approximate depth of 810 m. Located slightly east of the centre of the property is the main power generation facility and all of the associated infrastructure features including internal access roads and parking lots, high voltage substation and overhead transmission line for grid interconnection, natural gas supply and storage infrastructure, and stormwater management features. The remainder of the property predominantly features mowed lawn and open field areas. Ansnorveldt Creek extends along the south property line, intersecting the southwest portion of the property to feed into the Holland River South Canal located generally west of the YEC. The YEC's main site entrance is located in the northwest corner of the property. **Figure 2-1** provides context related to the location of the existing YEC and associated site features.

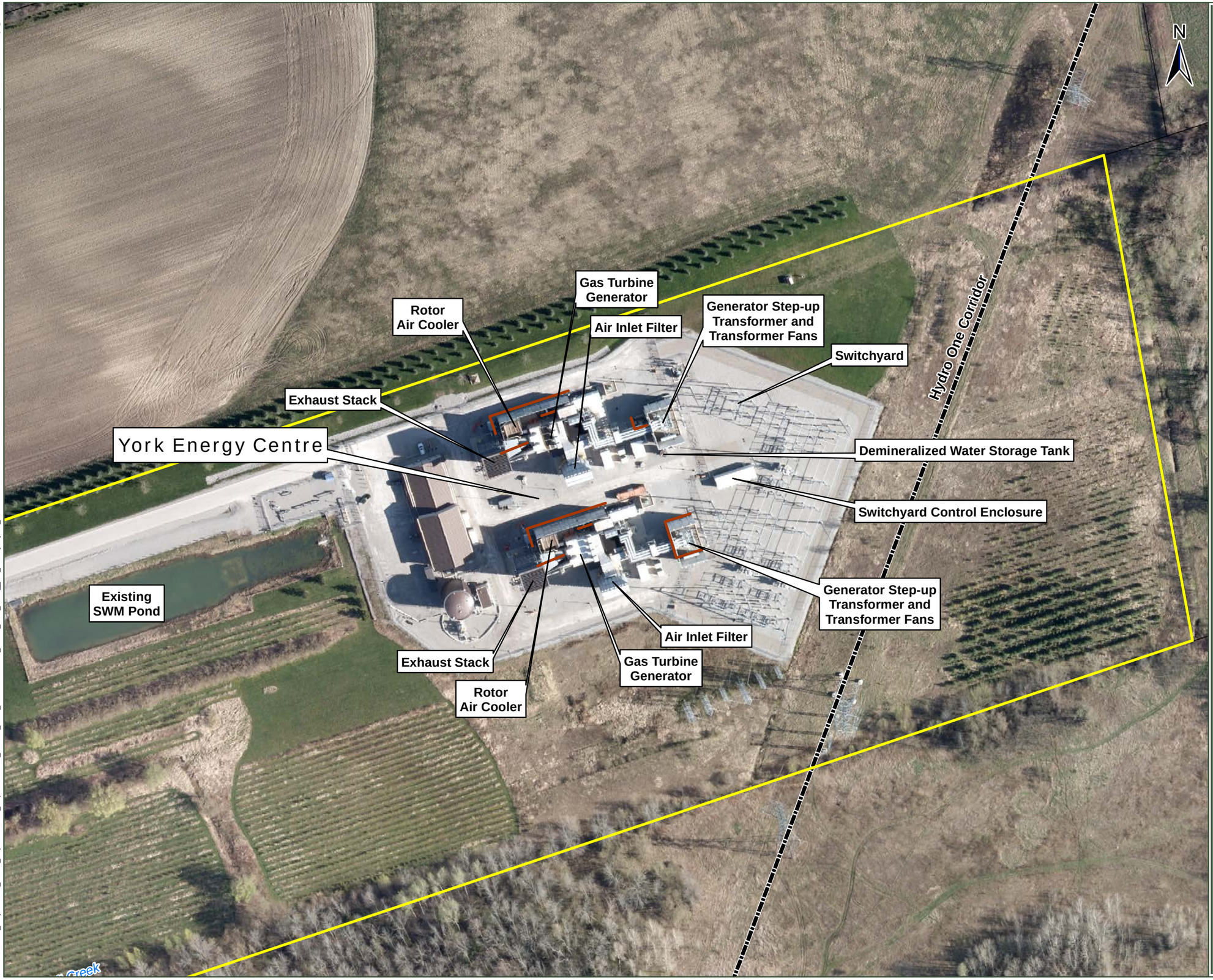
The YEC Property is exempt from the *Planning Act* as specified in Ontario Regulation 305/10 and is identified as a Countryside Site Specific Policy Area (C-SSPA-3) in the Township of King Official Plan. The YEC Property is not subject to the provisions of the Zoning Bylaw but is identified for descriptive purposes. Land use within approximately 500 m of the existing YEC include approximately 25 residences along Dufferin Street south of Bernhardt Road. Commercial and institutional land uses include the Ansnorveldt Public Library, Holland Marsh Christian Reformed Church, and several small businesses including King Firewood and Lonelm Construction Company (YorkMaps 2023 and Google Maps 2024). Other land uses include agriculture, the Cawthra Mulock Nature Reserve south of the YEC Property, and two Hydro One transmission lines bisecting the YEC Property.

2.2 YEC Context

The existing YEC has been in operation since 2012. It is a natural gas-fired, simple cycle, peaking generation power facility that primarily operates during intermediate and peak demand periods. The existing YEC consists of two combustion gas turbines and one standby diesel generator, and is equipped with emission control/reduction technologies including Ultra Low NOx combustors for the gas turbines. The YEC uses a Continuous Emissions Monitoring System (CEMS) to monitor emissions for compliance with regulatory limits.

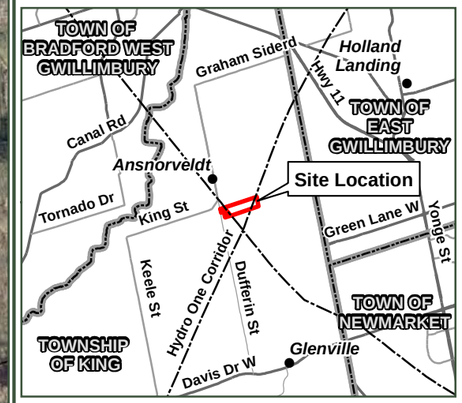
As a peaking facility, the YEC is dispatched by the IESO only when there is high (peak) demand for electricity or as a result of sudden system disturbances. Capable of coming online in under 30 minutes, the YEC has historically been dispatched to provide grid stability and power while other baseload facilities come online. Over the past five years, the YEC has been dispatched by the IESO an average of 146 hours annually, with an average run time of just under 3 hours per dispatch request. As a peaking facility, the YEC must operate for less than 1,500 hours annually.

The YEC operates in accordance with the facility's existing Environmental Compliance Approval (ECA) (Air & Noise) issued by the Ministry of the Environment, Conservation and Parks (MECP). The original YEC ECA was issued in March 2010 and has subsequently been amended, with the current version of ECA 7348-83GSVK issued in July 2014. The YEC's plant control and operation systems are currently programmed to limit each turbine's gross output in order to maintain compliance with the output value included in the facility's ECA.



LEGEND:

- YEC Property
- Parcel Fabric
- Existing Utility Line
- Existing Noise Barrier



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YEC UPGRADES PROJECT

GHG ASSESSMENT

EXISTING YEC FACILITY LAYOUT

SLR

FIGURE NO:
2-1

DATE: July 2024

PROJECT NO: 241.V30524.00026

2.3 Project Context

The proposed modifications of the YEC include installation of a turbine upgrade package, an inlet fogging system, larger transformer cooling fans, and adjustments to control logic. These modifications are summarized below.

- **Turbine Upgrades:** Both of the existing gas turbines will be modified through the installation of an upgrade package offered and installed by the turbine manufacturer, Siemens Energy (SE). The upgrade package includes three distinct modifications:
  - *Advanced Turbine Efficiency Package (ATEP):* this performance upgrade will improve power turbine aerodynamics, provide more efficient use of cooling and sealing air flows in the turbine section, and use improved thermal barrier coatings and manufacturing technologies for the hot-gas-path components, resulting in improved efficiency and power output of the units. The turbine upgrade will provide an increased YEC capacity and improve the heat rate by upwards of 4%. This realised improvement will result in an increase in the thermal efficiency of each turbine unit, which in turn will result in an improved carbon dioxide emission factor (CO_2e)/MW.
  - *Ultra-Low NO_X Combustion System (ULN 3.0):* this upgrade will replace the existing ULN 2.0 system which will result in an improvement of the emissions performance of the YEC. Design changes in the combustor pilot control of the ULN 3.0 allows finer tuning of the equipment which results in lower emissions, increased stability/control at higher loads.
  - *Direct Air Injection System (DAIS):* this modification will pump compressed air into the turbine during shutdown to help equalize the temperature and prevent turbine damage from occurring.
- **Inlet Fogging:** An inlet fogging power augmentation system will be installed to cool intake air entering each of the existing turbines. The cooling of the intake air prevents a decrease in power during times of higher ambient air temperature, which results in optimal power generation for both turbines.
- **Transformer Cooling Fans:** The existing transformer cooling fans need to be replaced with larger fans to accommodate the additional power generated from the upgraded YEC. The fans themselves aid in cooling of the transformer.
- **Gas Turbine Control Updates:** Control logic limitations currently in place at the YEC to limit each turbine's gross output would be removed to allow the upgraded YEC equipment to operate at the designed maximum gross output.

The upgrades to the YEC will not materially change how the facility is dispatched by the IESO as a peaking power plant. The YEC is expected to continue to run infrequently and below the regulated 1,500-hour annual limit for peaking facilities. Dispatch forecasting suggests that the facility may run less than 180 hours annually, while 2027 would see the largest number of operating hours at approximately 260.

3.0 Regulatory Framework

As part of the Ontario *Environmental Assessment Act* (the EA Act), the MECP requires proponents to consider climate change as part of an environmental assessment (EA) when evaluating potential environmental effects of a proposed project. MECP has issued the *Considering climate change in the environmental assessment process* guide for proponents and practitioners to consider the potential effects of a project on the atmosphere through the emission of greenhouse gases (Government of Ontario 2017). The MECP guidance document serves to outline the expectations for considering climate change in the preparation, execution, and documentation of environmental assessment studies and processes.

The guidance specifically notes that a quantitative assessment approach is warranted for projects where emissions of carbon dioxide are anticipated, with a natural gas-fired generating station provided as an example within the document.

3.1 Federal Regulations

Substances released from Canadian emission sources that have the potential to impact air quality are regulated under the *Canadian Environmental Protection Act*, 1999 (CEPA). Section 46 of the CEPA requires operators of facilities that emit ≥10,000 tonnes of GHGs (expressed as CO_2e) per year to report their emissions to Environment and Climate Change Canada (ECCC). The federal GHG Reporting Program collects information on GHG emissions annually from facilities across Canada to inform decision makers on Canada's overall emission levels.

The federal government has established *Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity* (SOR/2018-261; GOC 2018). Under these regulations, natural gas-fired electricity generation units have emission intensity compliance limits. The prescribed emission intensities are expressed in tonnes of CO_2 per gigawatt-hour (GWh) of electricity produced.

The federal draft Clean Electricity Regulations (CER) are currently being developed, with an anticipated release date targeted for 2024. The CER will have statutory authority under CEPA and aim to transition the Canadian electricity sector to net-zero as an enabler for broader decarbonization of the economy. When implemented, the CER would limit carbon emissions produced by electricity generated using fossil fuel and ultimately eliminate emitting sources of supply connected to public electricity grids in Canada. During the transition to net zero by 2050, natural gas-fired electricity generation projects are able to support the transition in the short term by meeting the electricity demand as a result of population growth in urban areas as renewable energy projects are developed.

3.2 Provincial Regulations

Ontario Regulation (O. Reg.) 390/18 – Greenhouse Gas Emissions: Quantification, Reporting and Verification has statutory authority under Ontario's Environmental Protection Act, 1990. Ontario facilities that emit >10,000 tonnes of CO_2e per year are subject to the GHG emission reporting requirements of the regulation.

As of January 2022, industrial facilities in Ontario that emit >50,000 tonnes of CO_2e per year or are a designated "Industry" in Schedule 2 of the Regulation. These industrial facilities are subject to the requirements of O. Reg. 241/19 – Emissions Performance Standards, with statutory authority under the Ontario Environmental Protection Act, 1990.

The Emissions Performance Standards Program is intended to determine GHG emissions limits as defined in Schedule 2 of O. Reg. 241/19, that the facilities must meet annually. The standards become stricter every year and require emitters to either reduce their emissions or pay for exceeding the limits. Facilities that emit between 10,000 and 50,0000 tonnes of CO_2e per year may opt into the program.

4.0 Provincial Context

Ontario's Independent Electricity System Operator (IESO) has identified a significant need for new power supply in the province (IESO 2022a, 2024). At the system level, the IESO is projecting a generation capacity deficit starting in 2025. After many years of stable supply, and at times, a surplus, the projected shortfall is being driven by 1) increasing demand due to expanding electrification and increasing business investment in the province, 2) refurbishment of the Pickering Nuclear Generating Station (Government of Ontario 2024) and refurbishment schedules at the Bruce and Darlington nuclear facilities, and 3) expiring IESO contracts (IESO 2022a, 2024). While the need for new generating capacity is clear at the system wide level, the IESO has also identified several regions of the province with particularly pressing needs for new power supply, which includes the Greater Toronto Area (GTA). The GTA and surrounding area need significant capacity additions, with the IESO forecast suggesting local demand will outstrip capacity by 2027.

The IESO's Resource Eligibility Interim Report, dated October 7, 2022, stated that without a limited amount of new natural gas generation in the near term, the IESO would be reliant on emergency actions such as load curtailments or blackouts (IESO 2022b). The IESO's Pathways to Decarbonization (IESO 2022c) and Resource Eligibility Interim Report indicate that a moratorium on new natural gas generation would not be possible under the current demand forecast. The IESO has recommended procurement of a limited amount of natural gas-fired generation to help fuel the energy transition and maintain system reliability.

In response to the projected regional and system wide shortfalls, the IESO launched a series of programs in 2022 to secure new capacity to meet the growing needs of the province. Leveraging existing natural gas facilities by providing new or extended contracts, as well as upgrading and expanding capacity was identified by the IESO as critical for maintaining reliability over the medium term. The IESO's Same Technology Upgrades procurement program aimed to procure 300 MW of capacity through improvements to existing facilities across Ontario. Facilities proceeding under this procurement process will upgrade existing equipment to provide additional generating capacity to meet the growing provincial energy demand. The IESO has extended contracts with expiry dates prior to 2032 to 2035 to provide continued flexibility to the broader system and to meet local needs.

Overall, the use of natural gas for electricity purposes from 2025 through 2035 is projected to increase GHG emissions from the electricity generation sector. An increase in electricity sector emissions does not necessarily translate to an increase in economy wide provincial GHG emissions. **Table 4-1** and **Figure 4-1** compare the IESO-forecasted electricity sector GHG emissions to the net provincial emissions associated with the implementation of future electrification initiatives. The IESO forecasts that two major electrification initiatives will impact the broader economy emissions: 1) increased usage of electric vehicles, and 2) electrification of industrial equipment (IESO 2022a, 2024). As a result of these initiatives, the overall GHG emissions for the Province are projected to decrease with increased electricity usage.

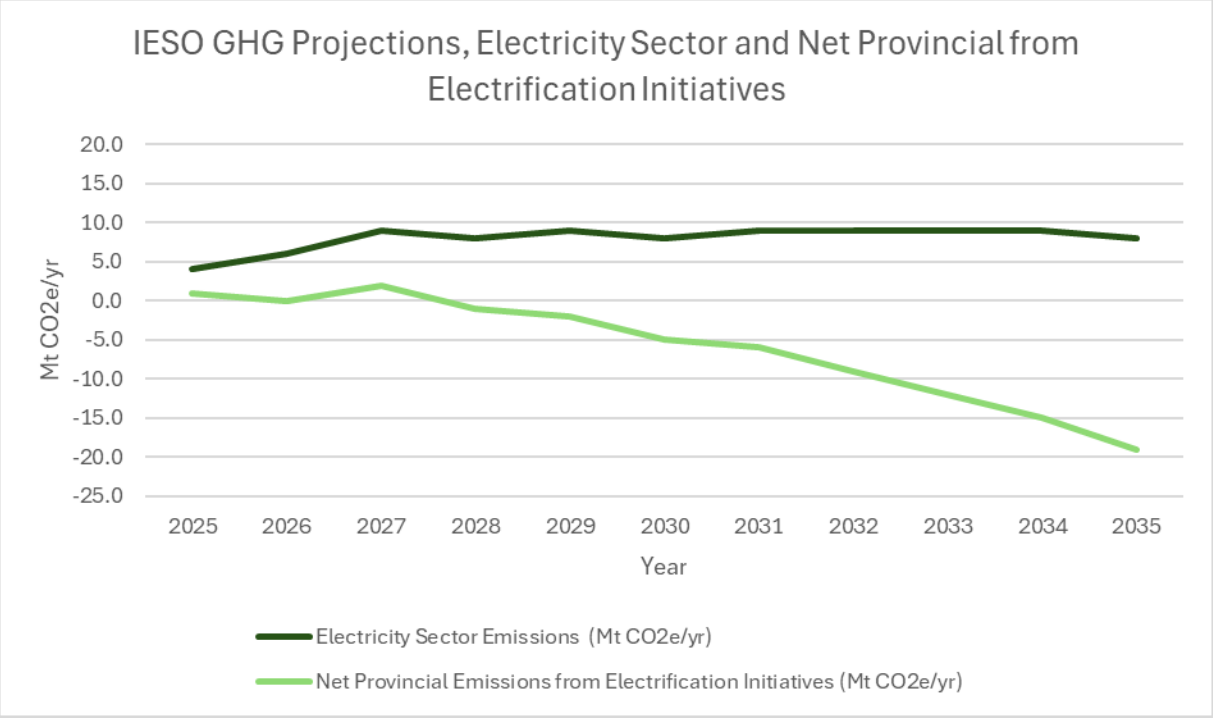
Therefore, even though emissions associated with electricity generation are forecasted to increase, there will be an overall, Province-wide, decrease in GHG emissions associated with the switch to using more electricity in vehicles and industrial equipment (IESO 2022c).

Table 4-1: IESO's 2025-2035 Electricity Sector and Net Provincial GHG Emissions

Year	Projected Ontario GHG Emissions*	
	Electricity Sector GHG Emissions (Mt CO2e year)	Net Provincial GHG Emissions from Electrification Initiatives (Mt CO2e year)
2025	4	1
2026	6	0
2027	9	2
2028	8	-1
2029	9	-2
2030	8	-5
2031	9	-6
2032	9	-9
2033	9	-12
2034	9	-15
2035	8	-19

* IESO 2024

Figure 4-1: Greenhouse Gas Emissions for the Ontario Electricity Sector 2025 - 2035 (IESO 2024)



5.0 Methods

The methods used to quantify GHG emissions (CO_2e) for the Project were based on IESO demand forecast, followed O.Reg. 390/18 - Greenhouse Gas Emissions - Quantification, Reporting and Verification (MECP, 2022); and Canada's Greenhouse Gas Quantification Requirements (ECCC, 2022). These quantification methodologies used for the Project align with the GHG Protocol developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WRI 2015) and ISO-14064-1 and 14064-2.

Annual GHGs, expressed as CO_2e, associated with the Project were quantified using the Project-specific dispatch profile (developed by Capital Power) which is based on the IESO-forecasted demand. For the Project-specific dispatch profile, analytical software was utilized to account for a variety of complex market inputs to predict how the Project will be dispatched by the IESO under future market conditions. Market inputs to the Project-specific dispatch profile include supply, demand, gas prices, carbon prices, and imports/exports.

5.1 Assessment Boundaries

The GHG assessment quantified direct emissions of GHG from the Project, using the methods described in **Section 5.0**. The assessment of GHG emissions considered the Project's direct GHG emissions from sources that are owned or controlled by Capital Power and within the YEC Property for the operational phase of the Project. For the purpose of the assessment, direct emissions are referenced to as Scope 1 (direct) emissions (WRI 2015). Direct GHG Scope 1 emissions were selected as the appropriate comparative within the context of the projected Ontario GHG emissions for the Electricity Sector, and regulatory reporting requirements.

Scope 2 (indirect) and Scope 3 (value chain) emissions have not been included in this assessment as they are not required under Provincial or Federal reportable GHG emissions regulations and are captured under other facility or activity Scope 1 emissions. No carbon sinks have been identified as being modified/affected in relation to this Project. No GHG removals have been identified for this assessment.

All GHG emissions originate within the YEC Property, therefore the spatial boundary for GHG quantification aligns with the extents of the YEC Property (**Figure 1-1**). To assess the net GHG emissions, the Ontario electricity sector GHG emissions were used to compare against the Project GHG (CO_2e) emissions.

For the purposes of this assessment, temporal boundaries assume that the Project will be operational by 2025. The forecasted demand for the Project is presented to the year 2035, which is the duration of the contract for electricity generation under the IESO contract. GHG emissions associated with construction equipment were not assessed as they are significantly less than operational emissions. Operational emissions were the focal point of the assessment to determine the incremental change in GHG emissions compared to Business-as-Usual (BAU) emissions.

5.2 Selected Parameters

A GHG is any atmospheric gas that absorbs and re-emits infrared radiation, thereby, acting as a thermal blanket for the planet and warming the lower levels of the atmosphere. GHGs are released to the atmosphere from several natural and anthropogenic (human activity) sources (IPCC 2021). The Project is an industrial activity (generating electricity using fossil fuels) defined in Schedule 2 of O. Reg. 241/19, and therefore GHG quantification is required.

As per the MECP Guideline, the GHG assessment considered all GHGs tracked through the Canadian National Inventory Report (NIR), including:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Perfluorocarbons (PFCs)
- Hydrofluorocarbons (HFCs)
- Sulphur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)

CO_2, CH_4, and N_2O were parameters selected for inclusion in this assessment. The remaining gases listed above have been excluded as they will not be emitted during operation of the Project.

Final reported emissions were converted into CO_2e by multiplying each GHG by their global warming potentials (GWP) from the 2023 provincial and federal reporting guidance (ECCC 2023; Government of Ontario 2023). The GWP for each GHG used in this assessment are summarized in **Table 5-1.**

Table 5-1: Global Warming Potential Multiplier Used

GHG	GWP
CO_2	1
CH_4	28
N_2O	265

5.3 Emission Sources

The two natural gas-fired turbine generators operating in simple cycle mode are the only significant sources of emissions associated with the YEC and the Project; only emissions from the gas turbines have been assessed. The YEC does have Heating, Ventilation, and Air Conditioning (HVAC) systems and emergency generators; however, these sources are not directly related to the process, are intermittent, and not significant in terms of GHG emissions. As such, these sources have been excluded from the assessment. The GHG emissions assessment considered the YEC's direct GHG emissions from sources that are owned or controlled by Capital Power and within the YEC Property. No carbon sinks have been identified as being modified/affected in relation to this Project which fall under Capital Power's control. As per the GHG Protocol, direct emissions are also commonly referenced as Scope 1 emissions (WRI, 2015). No GHG removals have been identified for this assessment.

5.4 GHG Emissions Data Sources and Calculations

Estimates of GHG emissions resulting from the Project (when in operation) were prepared based on information provided by Capital Power and calculated based on the number and type of equipment, fuel consumption, and gas composition. Estimated Project GHG emissions from 2025 to 2035 were modelled against the Project-specific dispatch profile (developed by Capital Power) and the IESO-forecasted facility demand.

5.5 Assumptions and Limitations

Assumptions for the projected GHG emissions from the Project include:

- Projected GHG emissions based on an intensity of 0.051 tCO_2e/GJ, which is derived from ECCC emission factors and typical gas composition supplied to the site.
- Project GHG emissions from 2025 to 2035 are based on forecasted fuel consumption/energy needs to meet IESO targets, as forecasted by Capital Power.

6.0 Results

6.1 Forecasted BAU Emissions

Project GHG emissions were assessed against comparable and functionally equivalent GHG emissions that would occur in the absence of the upgrades at the YEC. This is referred to as the BAU scenario which was used to determine if the operation of the Project would result in a net increase or decrease in GHG emissions. The BAU scenario assumes that the Project (upgrades) did not proceed, but that the YEC continued to operate.

Analytical software was utilized to account for a variety of complex market inputs to predict how the YEC will be dispatched by the IESO market under future market conditions. Market inputs include supply, demand, gas prices, carbon prices, and imports/exports. The BAU emissions scenario assumed the existing YEC would continue to operate in its current configuration, without the proposed upgrades, under future IESO dispatch conditions.

As the YEC dispatch profile is not anticipated to differ between the BAU and Project operating scenarios, the BAU emissions are represented by the Project-specific dispatch profile developed by Capital Power. This dispatch profile is used to forecast direct GHG emissions from the BAU operations at the existing YEC and compare them against those modelled for the Project.

The 2025-2035 forecasted GHG emissions for the BAU scenario are presented in **Table 6-1**.

Table 6-1: 2025-2035 BAU GHG Emissions

Year	Estimated BAU GHG Emissions ($t CO_2e$/year)
2025	21,896
2026	22,733
2027	24,439
2028	12,983
2029	14,507
2030	13,285
2031	12,369
2032	10,064
2033	8,542
2034	8,640
2035	8,628

6.2 Project GHG Emissions

The 2025-2035 projected Scope 1 (Direct) GHG emissions for the operation phase of the Project are presented as tonnes of CO_2e per year in **Table 6-2**.

Table 6-2: 2025-2035 Project GHG Emissions

Year	Project – GHG Emissions (t CO_2e/year)
2025	21,753
2026	22,412
2027	24,462
2028	12,871
2029	14,458
2030	13,210
2031	12,281
2032	9,758
2033	8,225
2034	8,320
2035	8,308

As the existing YEC exceeds the 10,000 tonnes of CO_2e per year threshold identified in Ontario's EPA and the CEPA, as described in Section 3.0, the facility is required to report emissions. Based on the analysis undertaken and presented in this GHG Assessment Report, the Project will continue to exceed the 10,000 tonnes of CO_2e per year threshold until approximately 2032, as such, reporting will continue to be required. Additionally, since the YEC is an electricity generation facility, it is a designated facility under Schedule 2 under Ontario Regulation 241/19 under the Environmental Protection Act and is required to report GHG emissions under the Provincial requirements, including the EPS Program.

6.3 Net Effects

The upgrades to the YEC would allow the facility to produce electricity more efficiently. The turbine upgrades will result in an improvement of the heat rate by upwards of 4% over existing conditions, leading to increased thermal efficiency, meaning that 4% less fuel is used to produce the same amount of energy output. The increased thermal efficiency results in decreased GHG emission intensity (tCO_2e per MWh produced) and overall projected GHG emissions. **Table 6-3** shows the reduction in GHG emission intensity associated with the Project. The difference in Project and BAU emission intensity does not equate to the 4% improvement in fuel usage as the dispatch profiles for each case differs as the result of the increased capacity for the Project case.

Table 6-3: Net Change in GHG Emissions Intensity

Year	GHG Emissions Intensity (t CO_2e/MWh)		
	BAU	Project	Net Change
2025	0.601	0.583	-0.018
2026	0.599	0.576	-0.023
2027	0.591	0.568	-0.023
2028	0.595	0.572	-0.023
2029	0.591	0.568	-0.023
2030	0.595	0.571	-0.023
2031	0.595	0.572	-0.023
2032	0.603	0.580	-0.023
2033	0.599	0.577	-0.022
2034	0.600	0.578	-0.022
2035	0.599	0.577	-0.022

As the facility would be more efficient with the associated decrease in GHG emission intensity, the increase in power output (from increased demand) from the upgraded YEC would not result in an increase of GHG emissions but rather a reduction. The yearly breakdown of net change in GHG emissions in comparison to the BAU scenario is presented in **Table 6-4.** As with GHG intensity, overall emissions do not directly decrease by 4%.

Table 6-4: Net Change in GHG Emissions

Year	Total GHG Emissions (t CO_2e/year)			
	BAU	Project	Net Change	Net Change (%)
2025	21,896	21,753	-143	-0.7
2026	22,733	22,412	-321	-1.4
2027	24,439	24,462	22	0.1
2028	12,983	12,871	-112	-0.9
2029	14,507	14,458	-49	-0.3
2030	13,285	13,210	-75	-0.6
2031	12,369	12,281	-88	-0.7
2032	10,064	9,758	-306	-3.0
2033	8,542	8,225	-317	-3.7
2034	8,640	8,320	-320	-3.7
2035	8,628	8,308	-320	-3.7

This GHG assessment quantified the emissions for the proposed upgrades at the YEC compared to the BAU scenario, where the upgrades would not be implemented. Overall, GHG emissions associated with the YEC upgrades are expected to decrease over the BAU scenario due to the efficiencies resulting in lower GHG emission intensity. Overall, there is an anticipated decrease in GHG emissions over the 2025-2035 period between the BAU and Project scenario.

The increased thermal efficiency associated with the performance upgrades packages would result in an improved CO_2e emissions intensity at YEC.

6.4 Uncertainty

The primary uncertainty in this assessment relates to the estimated GHG emissions based on the IESO projections. The GHG emissions estimated for this assessment are based on projected IESO demand; however, future demands are subject to change (lower or higher) and dependent on local and regional constraints of the provincial electricity grid. These constraints may include, but are not limited to, changes in electricity sources, climate changes, and population changes. Future demand is based on IESO projections which are independent of Capital Power operations.

7.0 Summary of Findings

The proposed upgrades will add capacity to the grid and allow Capital Power to respond to the increased demand as projected by the IESO. The facility will produce power more efficiently after the Project has been implemented.

The upgrades associated with the Project are expected to reduce the projected GHGs generated by YEC due to the improved thermal efficiency of the two existing natural gas-fired simple cycle turbines.

8.0 Closure

Should you have questions on the above report, please contact the undersigned.

Sincerely,

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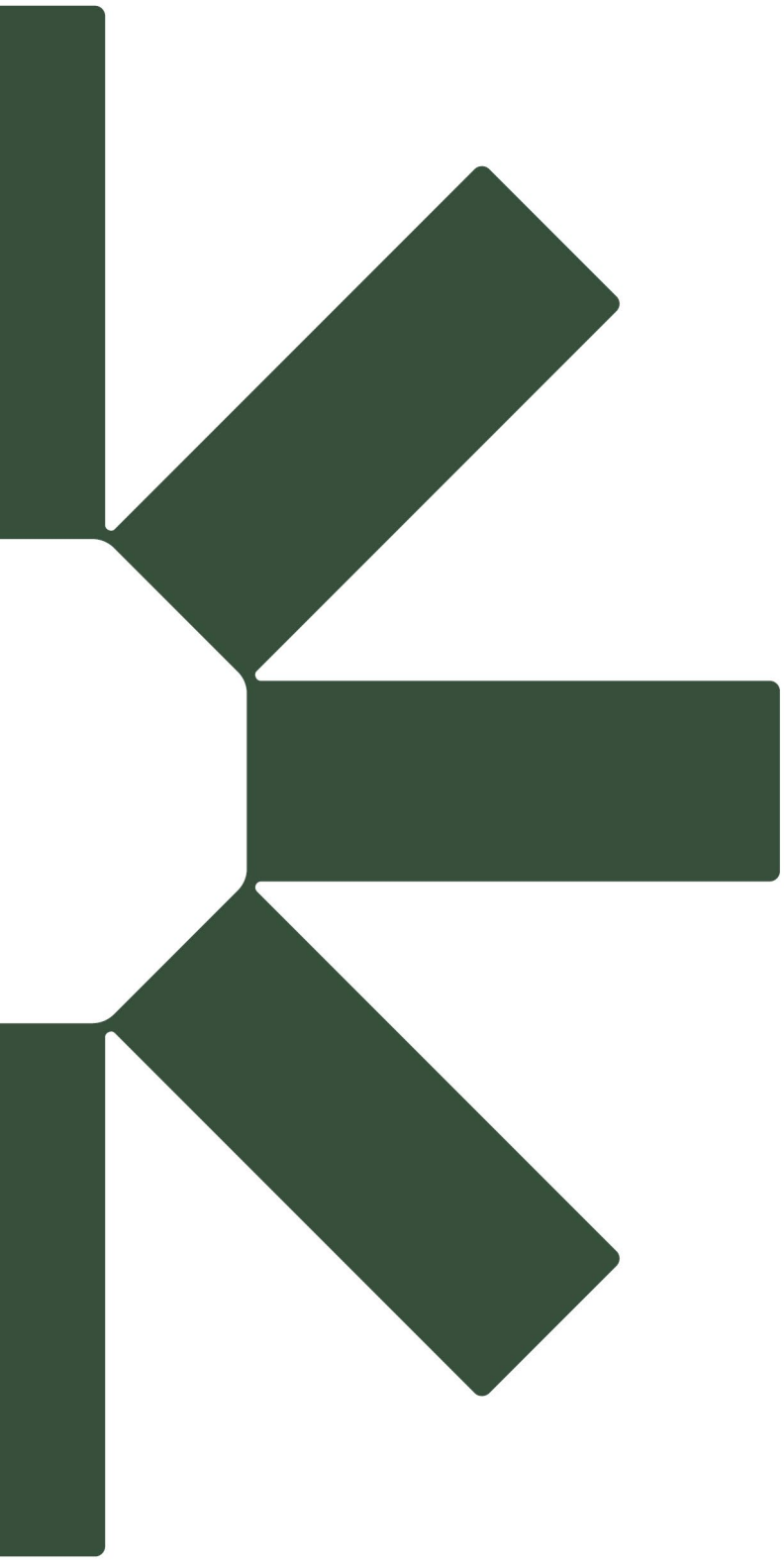

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