A Brighter Future

The Case for Grid-Scale Solar at Wesleyville

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Overview

The Independent Electricity System Operator (IESO) is projecting a 5,000 MW and 15 TWh supply shortfall by the mid-2030s.[1] Ontario must consider its options for new generation and prioritize solutions that can be deployed rapidly, economically and with minimal impact on the environment and our climate. Ontario Power Generation (OPG) already owns a site near Wesleyville that is zoned for generation and is close to transmission lines. Although OPG is currently exploring the new nuclear generation potential for the site, it could take 20 to 25 years before such a project could add electricity to our grid.[2] Solar projects on the other hand, could generate clean, low carbon electricity within just a few years. Ontario simply does not have decades to meet growing electricity demands. Faster and more economic energy solutions need to be considered now.

This report outlines the potential of solar energy and its advantages at OPG's Wesleyville.

Solar Potential at OPG's Wesleyville Site

Owned and maintained by OPG, the Wesleyville site is 1,333 acres (5.4 km^2) in Port Hope on the shore of Lake Ontario. OPG's Wesleyville Generating Station site has been dormant for 45 years. It was the site of a proposed oil-fired power plant but construction was stopped after the 1979 oil shock and a recession. The site is zoned for power generation and has transmission access.[2]

According to the Municipality of Port Hope, 53% of the site is environmentally sensitive and should not be developed.[3]

Excluding environmentally sensitive areas, 634 acres (2.56 km^2) can be used for grid-scale solar with a capacity of up to 83 MW and 106 GWh of annual electricity generation (Table 1).[4] This has the potential to power approximately 11,770 homes in a year.[5]

Grid-scale solar at the Wesleyville site can help to manage Ontario's peak demand. To keep the lights on, Ontario must have the generation capacity to meet the annual peak demand. Conventional gas-fired peaker plants that are designed for these peaks are expensive to run because they sit idle for much of the time. Solar generation in contrast has low operating costs[6] and naturally produces most of its electricity when it is needed most. Ontario's peak power demands are typically during hot, humid days, such as during a heatwave when air conditioners are working full tilt. A full one third of the utility-scale solar generation potential at the Wesleyville site (35 GWh/year) occurs during summer on-peak times.

Table 1 | Solar Energy Potential at OPG's Wesleyville Site

Site	Total area for solar (m^2)	MW of potential	GWh/year	Summer peak GWh/year
Wesleyville	2,565,798	83	106	35

Advantages of Grid-Scale Solar Power at Wesleyville

Solar energy is renewable and clean with zero emissions

Mitigating climate change and building a sustainable future requires an accelerated transition to clean energy. Solar power is renewable and clean, thus helping to reduce greenhouse gas (GHG) emissions. Also importantly, solar energy is a safe solution; it does not contribute to polluting the air and it does not pose health risks. Indeed, solar power generation can offset and displace GHG and air pollution from gas-fired power plants. Solar energy-generating systems can displace gas-fired generation and the associated air pollution such as nitrogen oxides and sulfur dioxide.[7] These pollutants have serious health and environmental impacts, especially in vulnerable populations, such as children, elderly people, and those with respiratory illnesses.[8] Solar also does not carry any of the risks associated with nuclear power plants. Ontarians need both safe and sustainable energy solutions which solar energy can fulfill.

Faster lead times on solar development

The average lead time on solar energy projects is fast, ranging from months to a few years. According to CanREA's clean energy procurement calendar in January 2025, three solar projects of 100 to 200 MW in Saskatchewan have estimated lead times of 2.5 to 3 years from contract award date to target in-service date.[9] New nuclear plants, in contrast, can take decades to build and are among the projects most likely to see time delays and cost overruns.[10] With Canada and Ontario's growing population and electrification demands, it is essential that Ontario plan to add new, clean generation to its grid in the near term.

Solar energy generation does not disrupt vital ecosystems

The calculations for solar potential presented in this report accounted for the land area at the Wesleyville site and excluded wetlands and areas evaluated as environmentally sensitive lands. Grid-scale solar energy can be generated while preserving wetlands that are critical for storing carbon, mitigating floods, improving water quality, and adapting to climate change.[11]

Methodology

The spreadsheets used to perform this analysis can be found on the Ontario Clean Air Alliance web site.

- Available area for grid-scale solar was obtained from Ontario Power Generation maps.[12] According to a new release from the Municipality of Port Hope, 53% of lands are considered environmentally sensitive and 634 acres are available for development.[3]
- Solar panels were assumed to have 32.5 W/m^2.[13]
- PVWatts[14] was used to estimate the kWh/kW for ground-mount solar systems in Port Hope using default parameters and no production in January (due to snow coverage). Tilt angle was optimized (30°) and 180° azimuth were used.[15]
- Annual generation during time of use blocks was calculated from Engineering Climate Datasets for Toronto.[16]

Sources

1 IESO Annual Planning Outlook, 2024, page 3.

2 OPG news (Jan 15, 2025). OPG set to begin working with Port Hope, First Nations to explore new nuclear generation at Wesleyville site

3 Municipality of Port Hope. (2022). Council Votes Unanimously to Purchase Lands in Wesleyville

4 See the Methodology for the percentage area classified as environmentally sensitive.

5 Assuming the average residential energy use is 750 kWh per month (OEB).

6 Independent Electricity System Operator. (2024). IESO Annual Planning Outlook Resource Costs and Trends, March 2024. https://www.ieso.ca/-/media/Files/IESO/Document-Library/planning-forecasts/apo/Mar2024/Resource-Costs-and-Trends.pdf

7 NREL. (2008). Improving Air Quality with Solar Energy. https://www.nrel.gov/docs/fy08osti/42169.pdf

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9 Lam V. (2025) CanREA clean energy procurement calendar

10 Flyvbern B. & Gardner D. (2023) How Big Things Get Done: The Surprising Factors that Determine the Fat of Every Project, from Home Renovations to Space Exploration and Everything in Between. *Crown Currency*.

11 Government of Canada. (2024). Wetlands.

12 Email to Jack Gibbons, Ontario Clean Air Alliance from Steven Troup, Freedom of Information Coordinator, Ontario Power Generation (January 9, 2025).

13 Average for fixed angle grid-scale PV based on NREL values

14 NREL's PVWatts® Calculator

15 Ontario Clean Air Alliance. (2024). Making the most of rooftop solar.

16 Government of Canada. (2023). Canadian Weather Energy and Engineering Datasets. https://collaboration.cmc.ec.gc.ca/cmc/climate/Engineer_Climate/CWEEDS_FMCEG/CWEEDS_FMCEG_v_2020/CWEEDS-FMCEG_by_par_prov.CSV/