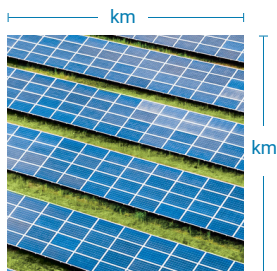


Ontario's Potential Solar Electricity Generation

FACT SHEET

Solar Electricity Generation per Square Kilometre



A solar photovoltaic (PV) system in Ontario generates 1,100 to 1,200 kilowatt-hours (kWh) of electricity per kilowatt (kW) of capacity per year, assuming a fixed, south-facing panel at latitude tilt.¹ This value applies to grid-connected systems without battery storage and accounts for real-world losses and long-term performance degradation.¹ This analysis uses 1,150 kWh/kW as the provincial average.

According to the National Renewable Energy Laboratory, one square kilometre (km²) of total land area is needed for 32,000 kW of small PV ($\geq 1,000$ kW, $\leq 20,000$ kW) and 33,000 kW of large PV ($> 20,000$ kW) electricity generating capacity.² These metrics account for all land area enclosed by the site boundary of solar farms with fixed arrays.² This analysis uses 32,500 kW/km² as a midpoint estimate.

In Ontario, each square kilometre of land used for solar electricity generation will produce 37.375 million kWh per year:

Annual generation per km²	=	Capacity density	x	Output
37.375 million kWh/km ² /year		32,500 kW/km ²		1,150 kWh/kW/year

Footprint of Solar Generation Equivalent to 100% of Ontario's Electricity Generation in 2025

Ontario consumed 145.6 billion kWh of electricity in 2025.³ Solar farms with a total area of 3,895.65 km² can produce as much electricity as Ontario consumed in 2025:

Required footprint	=	Provincial electricity consumption	÷	Annual generation per km²
3,895.65 km ²		145.6 billion kWh/year		37.375 million kWh/km ² /year

The province's total land area is 1,076,395 km².⁴ **Solar farms with a total footprint smaller than 4/10ths of 1% of Ontario's total area could produce as much electricity as Ontario consumed in 2025:**

Percent of Ontario's land required	=	(Required footprint ÷ Ontario's land area)	x	100
0.362%		(3,895.65km ² ÷ 1,076,395 km ²)		

Footprint of Solar Generation Equivalent to 100% of Ontario's Electricity Generation in 2050

Ontario's Independent Electricity System Operator (IESO) forecasts that Ontario's annual electricity consumption in 2050 will be between 207 and 297 billion kWh.⁵ **Solar farms with a total footprint of 5,538.46 to 7,946.49 km² could produce as much electricity as Ontario is forecast to need in 2050:**

Required footprint	=	Forecasted electricity consumption	÷	Annual generation per km²
5,538.46 km ²		207 billion kWh/year		37.375 million kWh/km ² /year
7,946.49 km ²		297 billion kWh/year		37.375 million kWh/km ² /year

Solar farms with total footprints of 0.515 to 0.738% of Ontario's land area could produce as much electricity as Ontario is forecast to need in 2050

Percent of Ontario's land required	=	(Required footprint ÷ Ontario's land area)	x	100
0.515% of Ontario's land		(5,538.46 km ² ÷ 1,076,395 km ²)		
0.738% of Ontario's land		(7,946.49 km ² ÷ 1,076,395 km ²)		

References

- 1 Natural Resources Canada, "Photovoltaic potential and solar resource maps of Canada," 2020, <https://natural-resources.canada.ca/energy-sources/renewable-energy/photovoltaic-potential-solar-resource-maps-canada>
- 2 National Renewable Energy Laboratory, *Land-Use Requirements for Solar Power Plants in the United States*, 2013, <https://www.nrel.gov/docs/fy13osti/56290.pdf>, pp. 2, 19.
- 3 Independent Electricity System Operator, *2025 Year in Review*, <https://www.ieso.ca/corporate-ieso/media/year-end-data>
- 4 Britannica, "Ontario", May 2026, <https://www.britannica.com/place/Ontario-province>
- 5 IESO, *Annual Planning Outlook: Ontario's electricity system needs: 2027-2050*, March 2026, p. 24, <https://www.ieso.ca/en/Sector-Participants/Planning-and-Forecasting/Annual-Planning-Outlook>