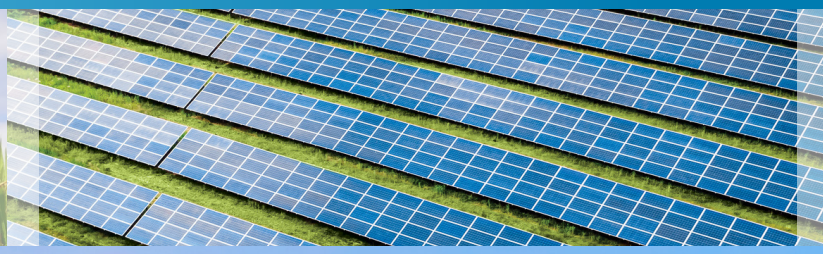


Grow Fuel OR Grow Power

McDIARMID Climate Consulting

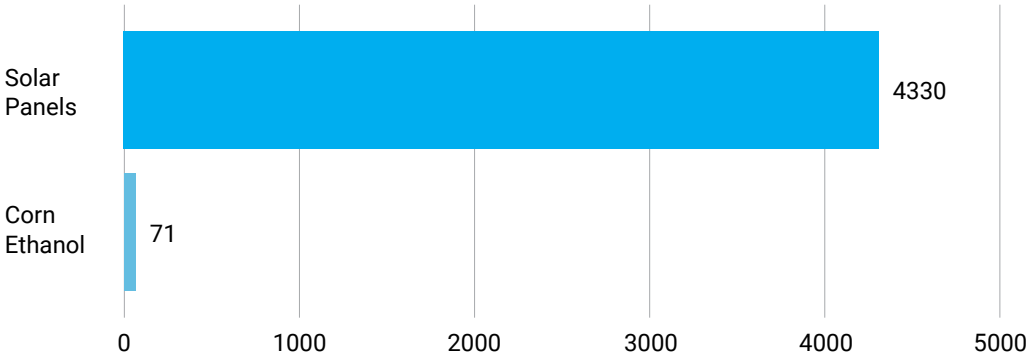
Prepared by
Heather McDiarmid, Ph.D

Prepared for
Ontario Clean Air Alliance Research

Mar 08, 2026

ONTARIO CLEAN AIR ALLIANCE

Figure 1 | **Number of Ontario Cars Powered by 100 Acres: Corn Ethanol vs Solar**



100 acres
of land with solar panels can power
60 times
more cars than one hundred acres of corn grown for ethanol

Overview

Ontario's corn fields are doing double duty as fuel pumps, but they are producing far less energy than they could. As the above chart shows, one hundred acres of land with solar panels can power 60 times more cars than one hundred acres of corn grown for ethanol (see Appendix A).

Each year, roughly 600,000 acres of prime agricultural land is devoted to growing corn for ethanol in Ontario (see Appendix B), a fuel blended into gasoline for internal combustion engine (ICE) vehicles. Ontario's gasoline currently contains 11% ethanol, rising to 13% in 2028 and 15% in 2030[1], a policy designed to lower the emissions from transportation. But as a climate solution, ethanol is limited by a hard technical ceiling because most internal combustion vehicles (ICE) are not designed to take more than 15% ethanol content in gasoline[2].

Ethanol as a fuel for vehicles is a sunset industry. Demand for gasoline is expected to decline in Ontario as electric vehicle (EV) adoption accelerates[3], a trend recently boosted by the federal government's decision to restore EV purchase incentives[4] and tighten vehicle emission standards. EV sales grew by 25% globally from 2023 to 2024 indicating huge momentum for what is simply better technology[5].

Ontario could power the same number of vehicles with just 1.7% of the land if solar replaced corn and modern EVs were prioritized over polluting ICEs.

Appendix A

Vehicles powered by 100 acres of corn for ethanol

- 38.8 GJ/acre/yr = (tonnes corn)*(1000kg/tonne)*(L/kg)*(MJ/L)/(10^3 MJ/GJ)/(acres/yr)
  - Tonnes corn: 9.627 million metric tonnes grain corn harvested/yr (Ontario field crop area and production estimates by county - Grain corn - Ontario Data Catalogue)
    - assuming tonnes of grain corn includes the grain portion of the plant only.
  - L/kg: 0.4 L ethanol/kg grain corn (From Crop to Fuel: Understanding the Ethanol Production Process)
  - MJ/L: 21.2 MJ/L for ethanol (Fossil vs. Alternative Fuels - Energy Content)
  - Acres/yr: 2.106 million acres of grain corn harvested/yr (Ontario field crop area and production estimates by county - Grain corn)
  - Note: 38.8 GJ/acre/yr = 11 MWh/acre/yr
- 71 vehicles powered by ethanol/yr from 100 acres = (GJ/acre/yr)*(100 acres)*(10^3 MJ/GJ)/((L/100km)/(100)*(km/yr)*(MJ/L))
  - GJ/acre/yr: 38.8 GJ/acre/yr (see above)
  - L/100km: Average 8.8 L/100km fuel efficiency (Fuel economy in Canada – Analysis - IEA)
  - Km/yr: Average 20,000 km/vehicle/yr (2025 Fuel Consumption Guide)
  - MJ/L: 31.08 MJ/L for 11% ethanol gasoline (Fossil vs. Alternative Fuels - Energy Content)

Vehicles powered by solar/yr

- 202 MWh/acre/yr = (MWh/MW/yr)/(acres/MW)
  - MWh/MW/yr: Average 1166 MWh/MW/yr for solar in Ontario (Solar Energy Maps Canada 2023)
  - Acres/MW: Average 5.8 acres/MW for fixed tilt solar panels (https://doi.org/10.1109/JPHOTOV.2021.3136805, Land-Use Requirements for Solar Power Plants in the United States, Landowner-Guide_FINAL.pdf)
- 4330 EVs powered by solar/yr from 100 acres = (MWh/acre/yr)*(100 acres)*(1000 kWh/MWh)/((kWh/100km)*(100)*(km/yr))
  - MWh/acre/yr: 202 MWh/acre/yr (see above)
  - kWh/100km: Average 23.3 kWh/100km for EVs (Avg of Fuel consumption ratings - Battery-electric vehicles)
  - km/yr: Average 20,000 km/vehicle/yr (2025 Fuel Consumption Guide)

Appendix B

600,000 acres of corn for ethanol = (L/yr)*(MJ/L)/(10^3 MJ/GJ)/(GJ/acre/yr)

- L/yr: Ontario produces 1.1 billion L/yr fuel ethanol (Energy for Generations), assuming all ethanol for blending comes from corn grown in Ontario
- MJ/L: 21.2 MJ/L for ethanol (Fossil vs. Alternative Fuels - Energy Content)
- GJ/acre/yr: 38.8 GJ/acre/yr (see above)

Acknowledgements

The Ontario Clean Air Alliance Research gratefully acknowledges the generous financial support that it has received for this report from:

Clean Economy Fund

Echo Foundation

Green Sanderson Family Foundation

Kiessling/Isaak Family

Noor Cultural Centre

Stanley-Horn Charitable Trust

Taylor Irwin Family Foundation at the Toronto Foundation

Sources

1 Ontario, Powering Ontario's Growth: Ontario's Plan for a Clean Energy Future, p31

2 Standards Council of Canada

3 Ontario, Powering Ontario's Growth: Ontario's Plan for a Clean Energy Future, p31

4 Goodbye EV sales mandate, hello purchase rebates. Carney shakes up Canada's auto industry | Radio-Canada.ca

5 Trends in electric car markets – Global EV Outlook 2025 – Analysis - IEA