



A presentation for the Probus
Club of Pickering

EVs:

**An Essential Part of our
Low Carbon Future.**

Are you ready for an EV?

By: Steve Lapp

Carbontakedown.com

20 Minutes

- Ontario's GHG Emissions

EVs

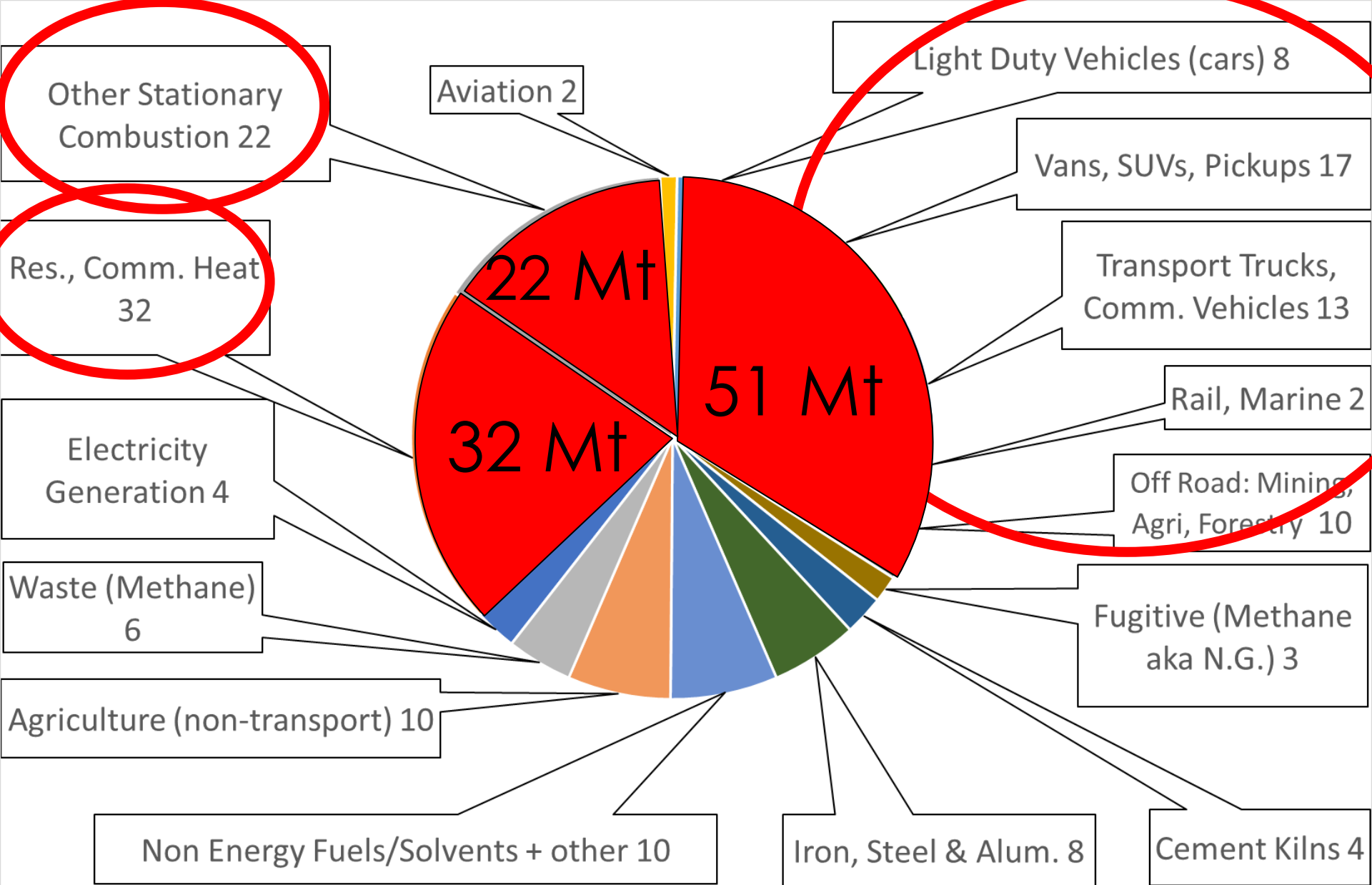
- EV Mythinformation!
- Range and Energy Costs
- Charging
- Ownership Economics
- Bigger Things - Life Cycle, Batteries, Recycling

Your Questions

A blue Chevrolet Bolt EV is parked at an ivy Charging Network station. The car is viewed from the rear quarter angle. The charging station is white and blue with the ivy logo. The background shows a brick building and trees under a cloudy sky. The text "Electric Vehicles: An Essential Part of a decarbonized 2050 Ontario" is overlaid in large yellow font.

**Electric Vehicles:
An Essential Part of
a decarbonized
2050 Ontario**

Ontario GHG Emissions

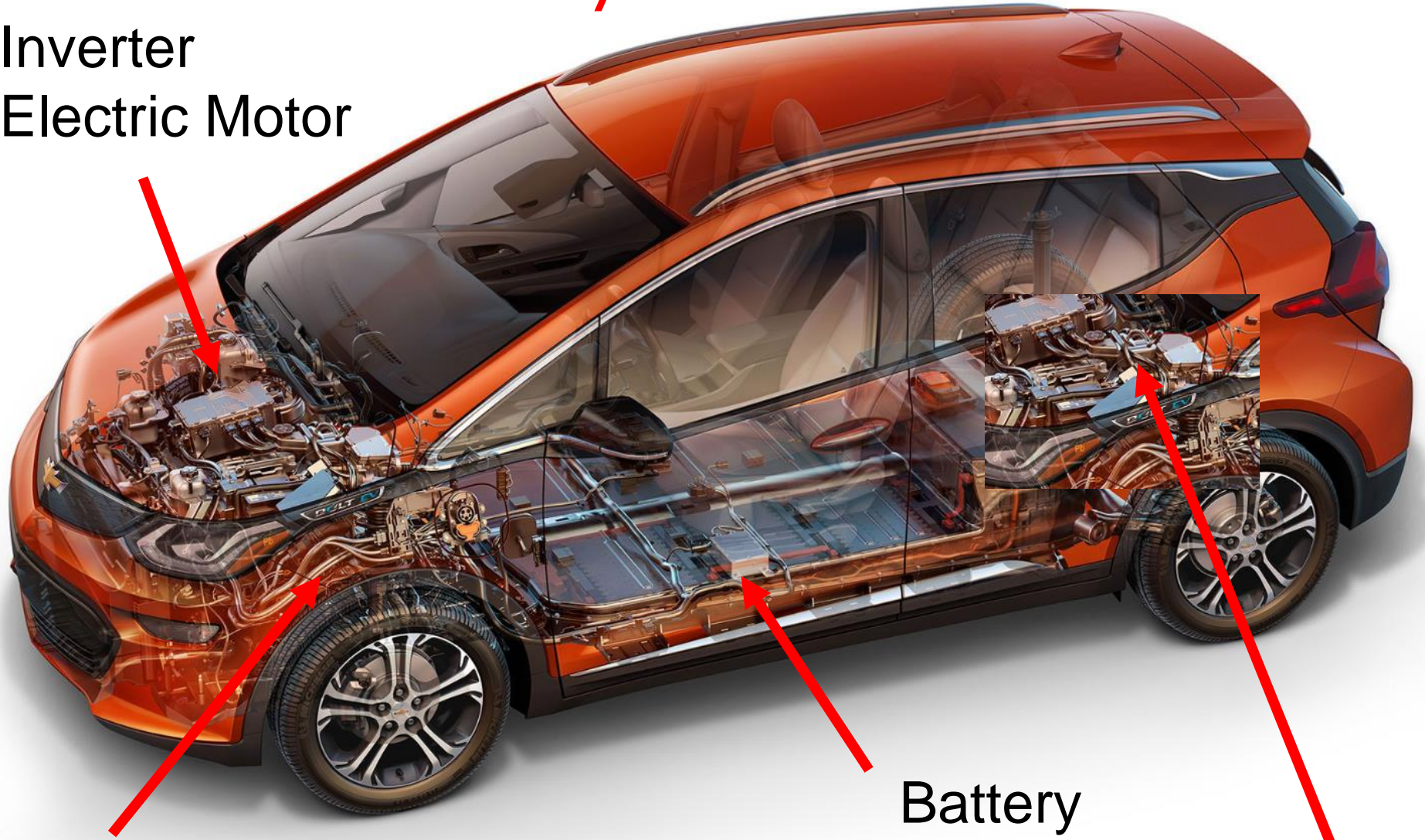


Ontario 2021 - 151 Mt GHG

What makes an
EV an EV?

BEV – Battery Electric Vehicle

Inverter
Electric Motor



Battery

Reducing gears and differential

4 Wheel Drive – add a motor

Mythinformation

EV Sales Plummeting?

FORD

Ford dramatically scales back EV plant amid plummeting sales in blow to Biden's green energy goals

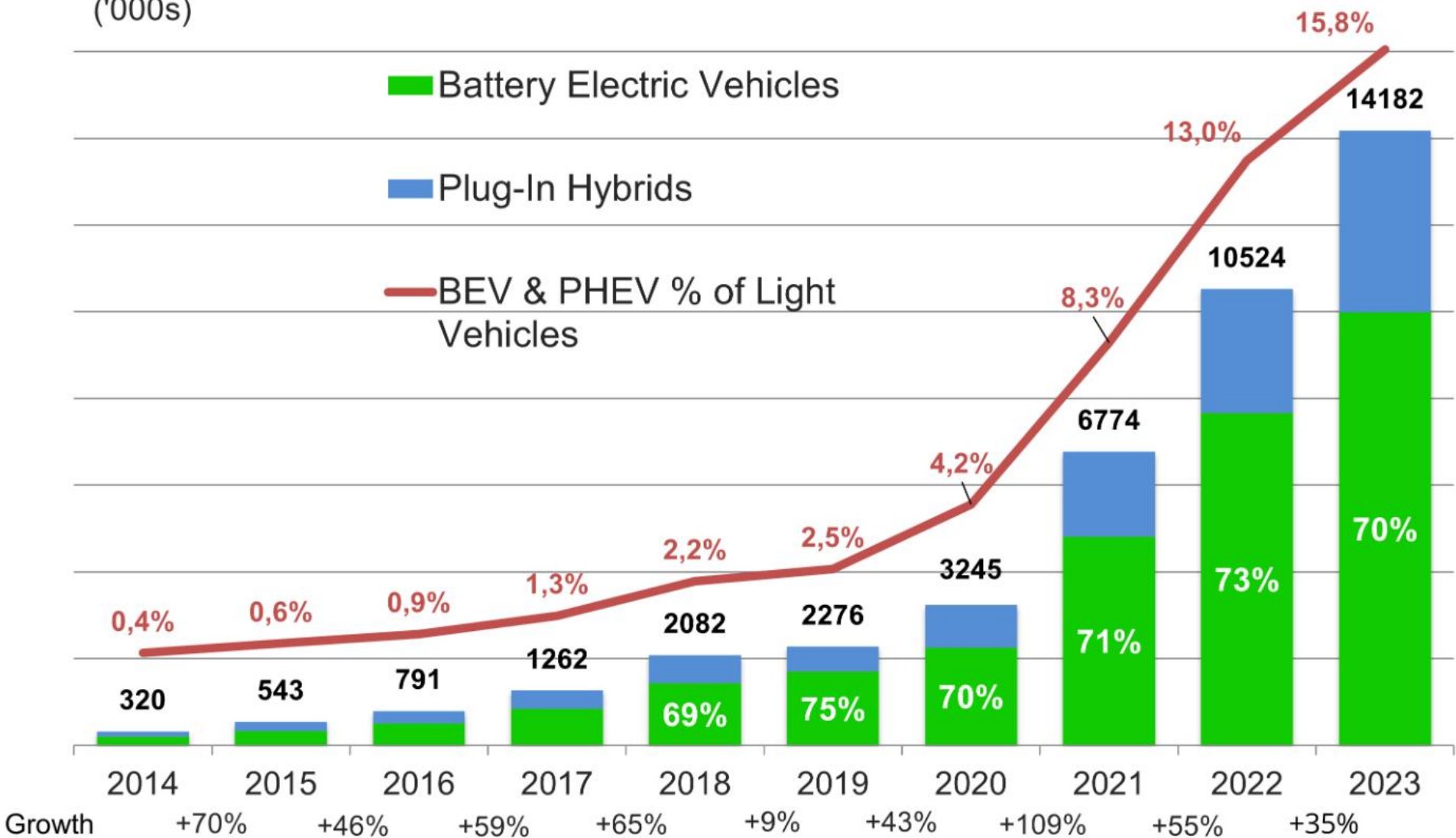
'This deal was a disaster from the start,' top Michigan Republican says



By Thomas Catenacci · Fox News

Published November 21, 2023 12:42pm EST

('000s)



Global EV (BEV) and PHEV Sales

EVs Will crash
the Grid!

- Quick fact: 1 Million EVs in Ontario will increase electricity demand by about 3%
- The IESO forecast 11.5 million EVs by 2050 requiring 40 TWh. Overall demand is forecast at 245 TWh by then*.
- The IESO has already started the process of procuring 5000 MW of “non-emitting” new generation. This will be mainly wind and solar photovoltaic.

Will my
EV battery fail?

- Outside of recalls, 1.5% of EVs in a study of 15,000 EVs have had battery replacements. The majority under warranty.
- In a 2013 UK study of 36 automakers by a warranty supplier, Fossil fuel engine failures rates were 0.29% to 7.88%

Is there an
EV for you?

\$250

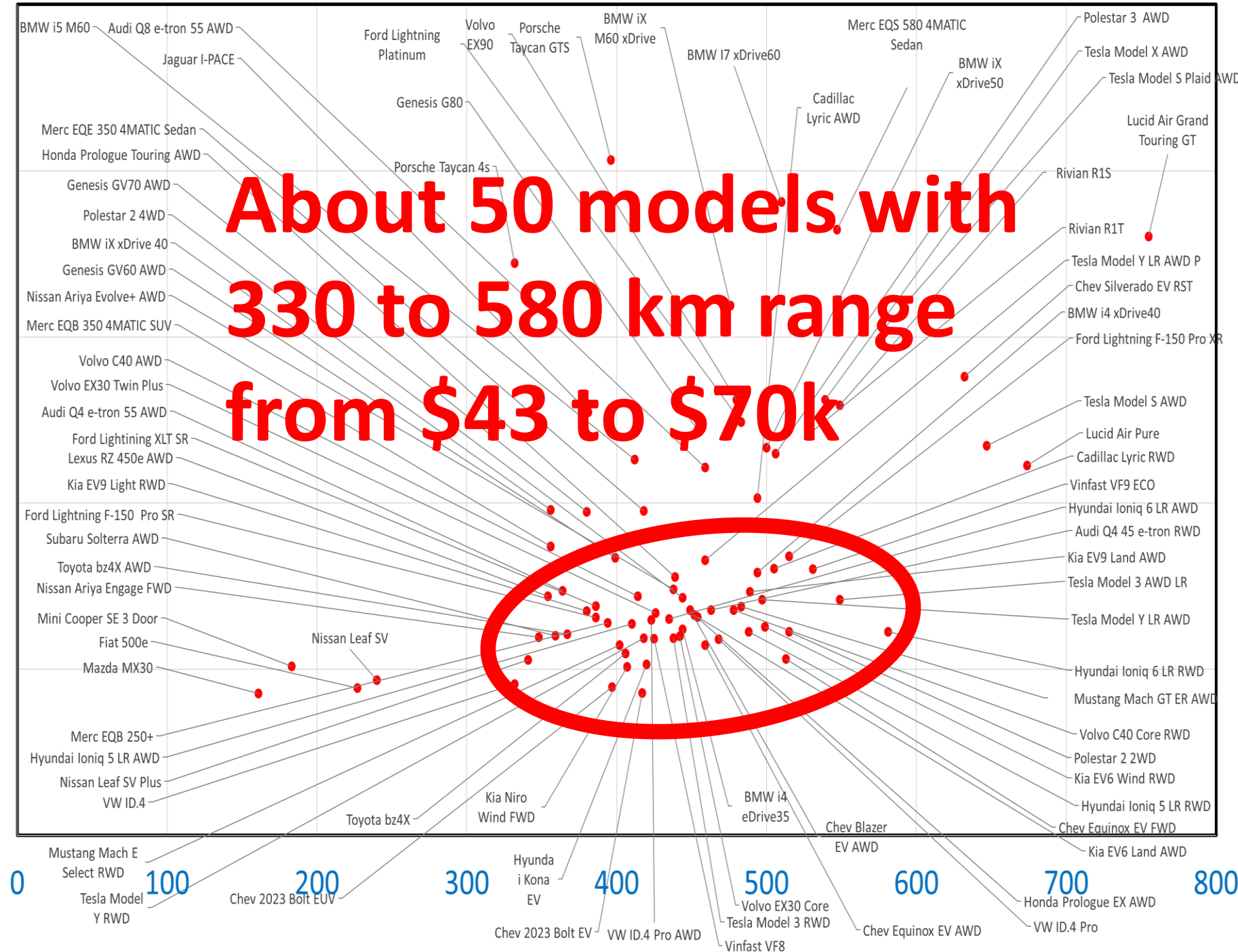
\$200

\$150

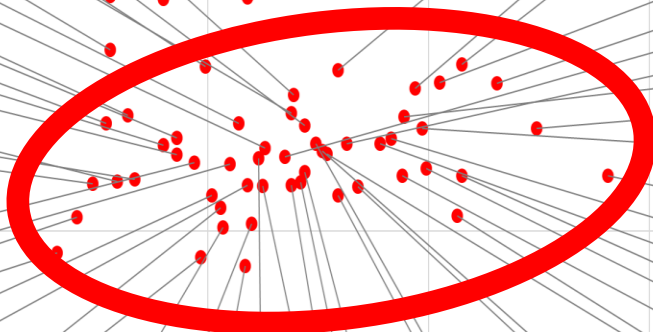
\$100

\$50

\$0



**About 50 models with
330 to 580 km range
from \$43 to \$70k**



0

100

200

300

400

500

600

700

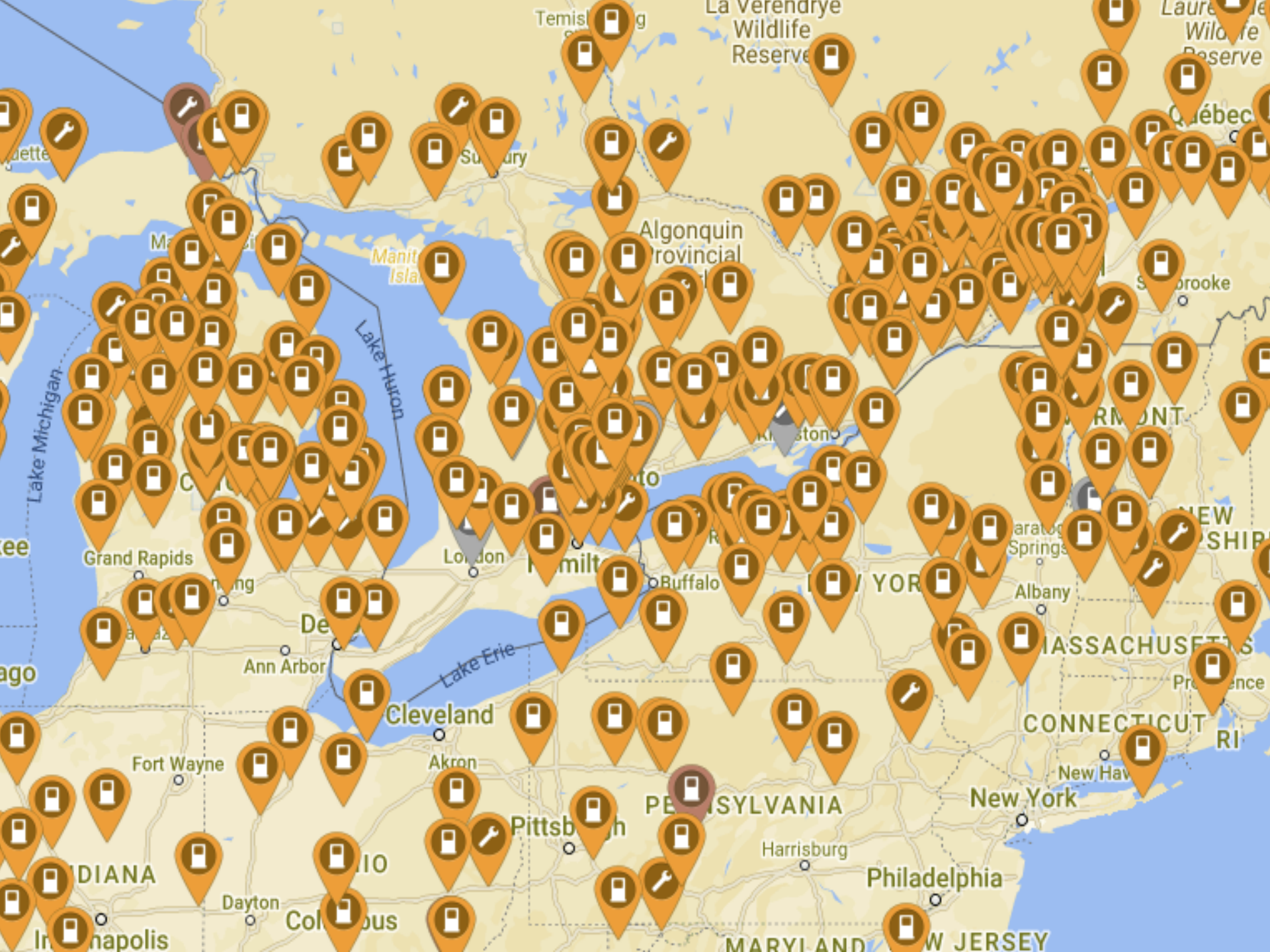
800

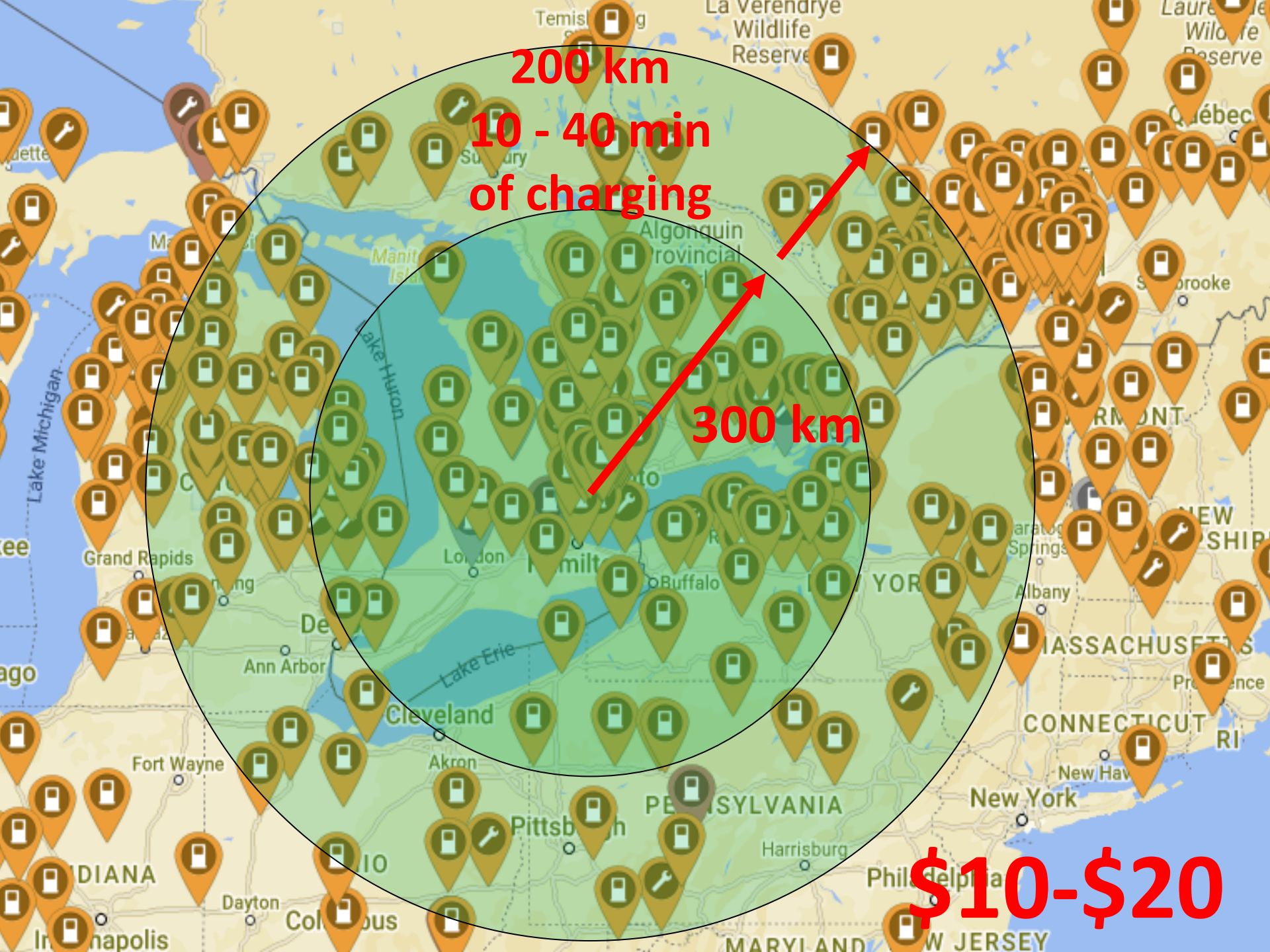
Charging

Charging time?

Long Distances?

- Often - long distance trips are repeats
 - you get to know the spots to charge.
- The number of charging apps needed is indeed not ideal, but workable.
- Not always being able to pay by credit card is annoying.
- Cost is about the same as driving a hybrid sedan.

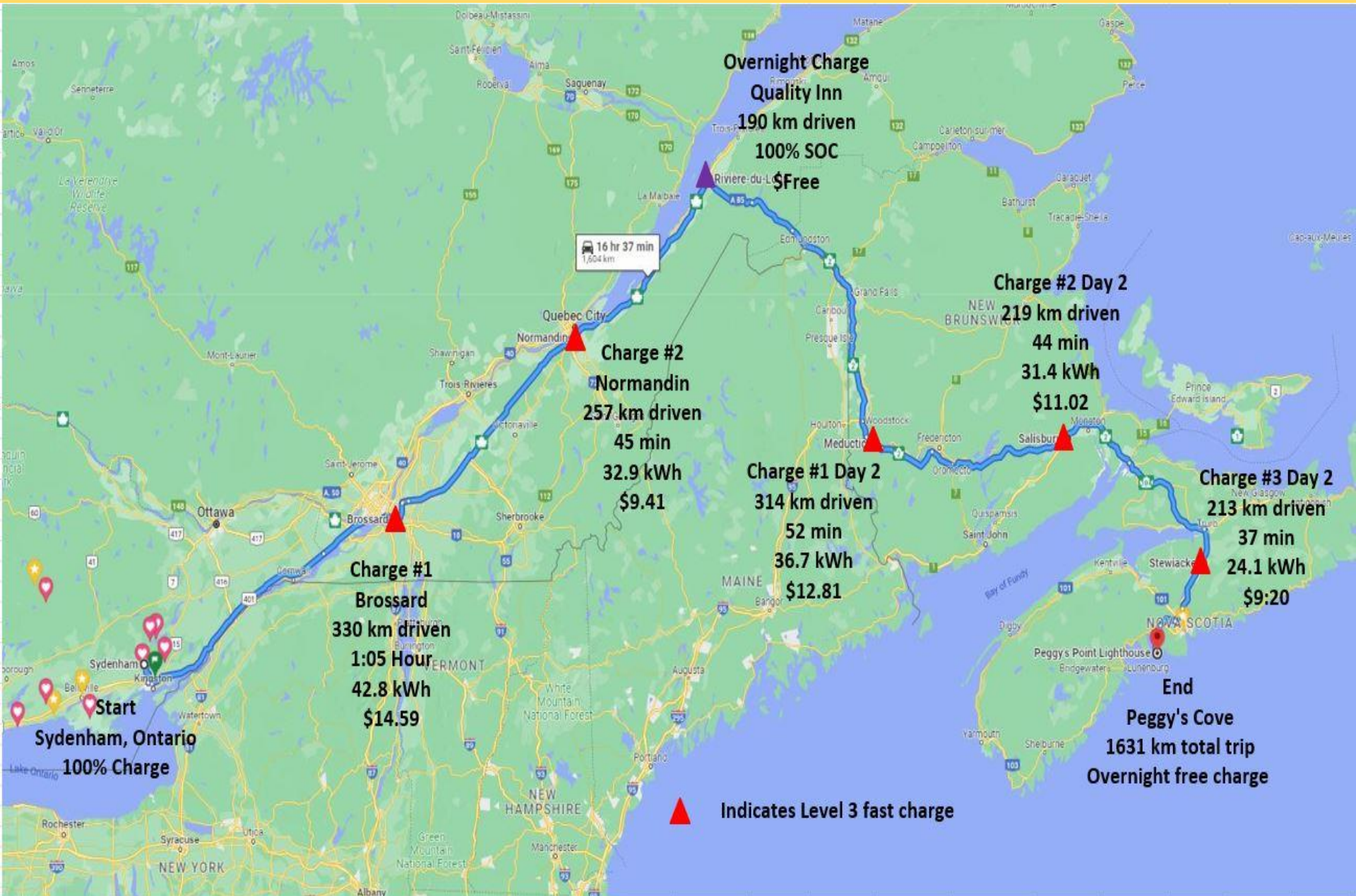




200 km
10 - 40 min
of charging

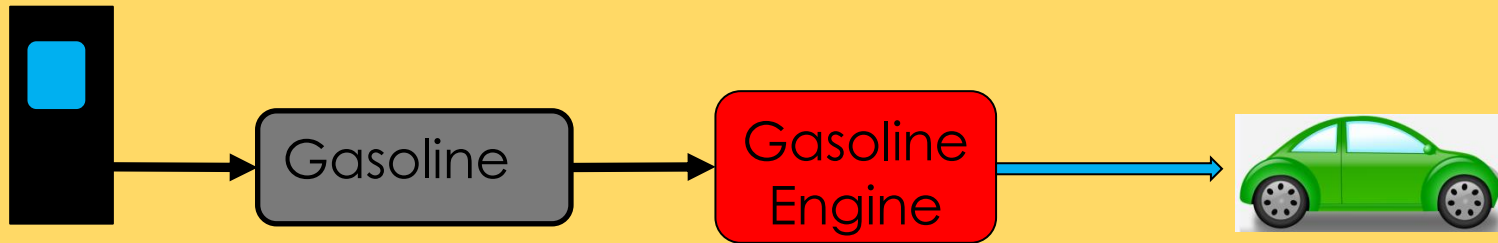
300 km

\$10-\$20



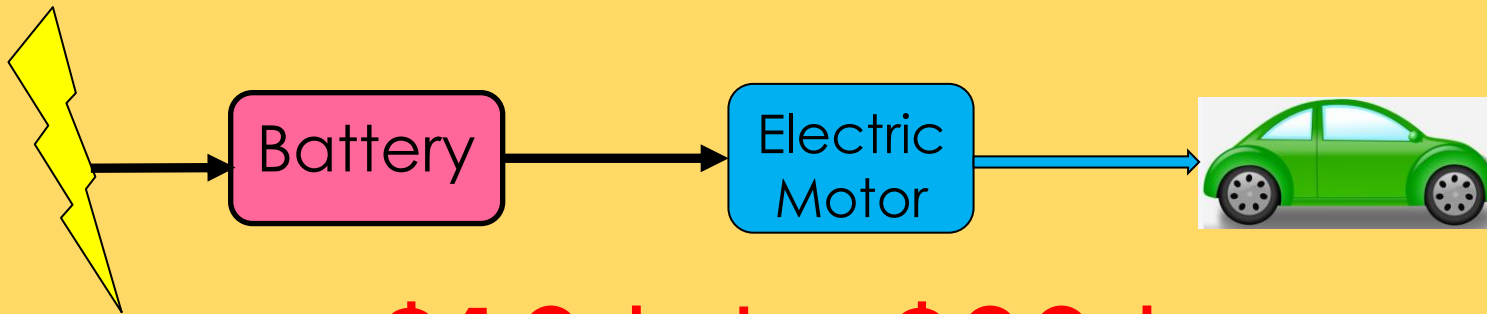
Ownership Economics

10 litres to go 100 km costs **\$13 - \$16**



At Home Charging

EV requires 20 kWh to go 100 km, costing **\$0.56 - \$5.72**



\$10 k to \$30 k

Savings over 200,000 km

	Gasoline Vehicle	Electric Vehicle
MSRP+Dest before federal EV rebate	\$ 28,000	\$ 43,000
Tax	\$ 3,640	\$ 5,590
Federal rebate	N/A	\$ 5,000
Cash price inc. tax and rebate	\$ 31,640	\$ 43,590
Loan amount	\$ -	\$ -
Total Loan Cost		\$ -
Total costs		
Price including rebate and taxes	\$ 31,640	\$ 43,590
Annual Energy, Maintenance and Insurance		
1	\$ 3,733	\$ 2,092
2	\$ 3,919	\$ 2,196
3	\$ 4,115	\$ 2,306
4	\$ 4,321	\$ 2,422
5	\$ 4,537	\$ 2,543
6	\$ 4,764	\$ 2,670
7	\$ 5,002	\$ 2,803
8	\$ 5,252	\$ 2,943
9	\$ 5,515	\$ 3,091
10	\$ 5,791	\$ 3,248
Total actual \$ cost for owned years	\$ 75,838	\$ 66,108
GHG tonnes emitted during ownership	32.2	4.00

Life Cycle Cost

(\$1.50/litre, \$0.13/kWh, 20,000 km/year, 7 l/100km, 20 kWh/100km, 5% infl.)

The Bigger Picture



People have concerns about EV Life Cycle Energy, Batteries and Recycling

There is a natural tendency to look at what change means (the EV) while minimizing or dismissing the impacts of the status quo (fossil fuels).

Change is hard – but the status quo is hardly nirvana

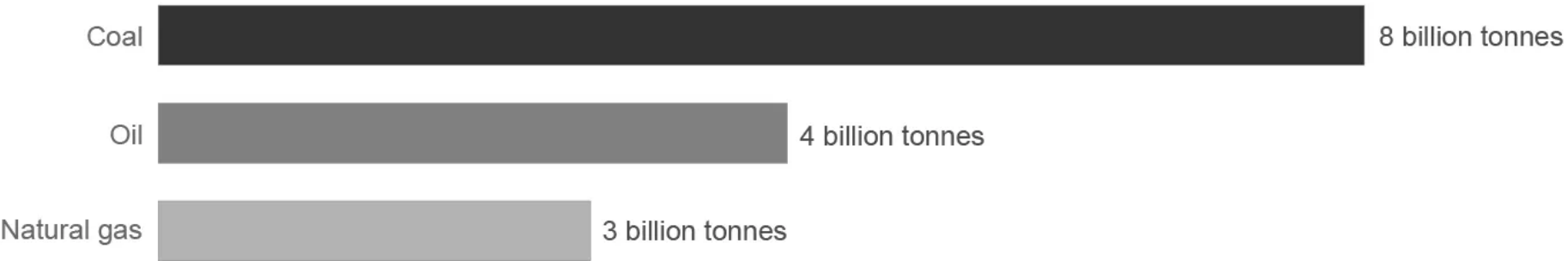
- Fossil Fuels - oil spills, leaks and ground contamination, fracking, 100,000's hectares in Canada for oil/tar sands, pipeline leaks and pipeline right of way and conflicts, air pollution from burning fossil fuels (est. 8 M deaths annually), 560 gasoline vehicle fire deaths in USA alone, 2018
- **37 Billion tonnes of CO₂ worldwide that we must stop creating**

- EVs do not require more energy to manufacture than they save, or create more Green House Gas emissions than they avoid.
- Various studies show one year to several years for Energy or GHG “payback”
- GHG payback of EVs gets better if we use low GHG emission electricity to build the EVs

Mining quantities for low-carbon energy are just a fraction of what we mine for fossil fuels

Fossil fuel production in 2019

The world mines an equivalent of 15 billion tonnes of fossil fuels every year.



Mineral mining for low-carbon energy*

The world mines 7 million tonnes of minerals for all low-carbon tech. In the IEA's Sustainable Development Scenario, which is a rapid deployment of clean energy, this will be 28 million tonnes in 2040.



*The total mineral production for solar, wind energy, geothermal, hydropower, electric vehicles, battery storage, nuclear, and grid networks.
Data sources: International Energy Agency (IEA); US Energy Information Administration (EIA); BP. **Author:** Hannah Ritchie.

Takeaways

- Continued use of fossil fuels untenable. Human suffering, extinctions and costs - **unacceptable**.
- The solutions are not perfect.
- EVs
 - Very low operating costs
 - EVs do reduce GHG emissions - Manuf./Use
 - There are enough minerals
 - You can travel long distances
 - Batteries have long lives
- “Mythinformation” stops or delays us from taking a better path.



**Thank You
for Your Attention**

Questions?

Steve Lapp

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