



Electric Vehicles (EVs) Busting the Myths!

**A presentation for the
Canadian Federation of University
Women - Northumberland**

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30 Minutes - EV Mythology

- Consumer choice impacts
- Today's EVs
- EVs and the World
 - The Electricity Grid
 - Manufacturing Impacts
- EVs and You
- Your Questions

GHGs

A photograph of Earth from space, showing the curvature of the planet and the atmosphere. The sun is visible in the upper right corner, creating a bright lens flare. The Earth's surface is covered in clouds and landmasses. A white double-headed arrow indicates a vertical distance of 50 km from the surface to the top of the atmosphere.

50 km

EV - Electric Vehicle

GHG – Greenhouse Gases,
mainly CO₂. GHGs trap extra heat
on the planet

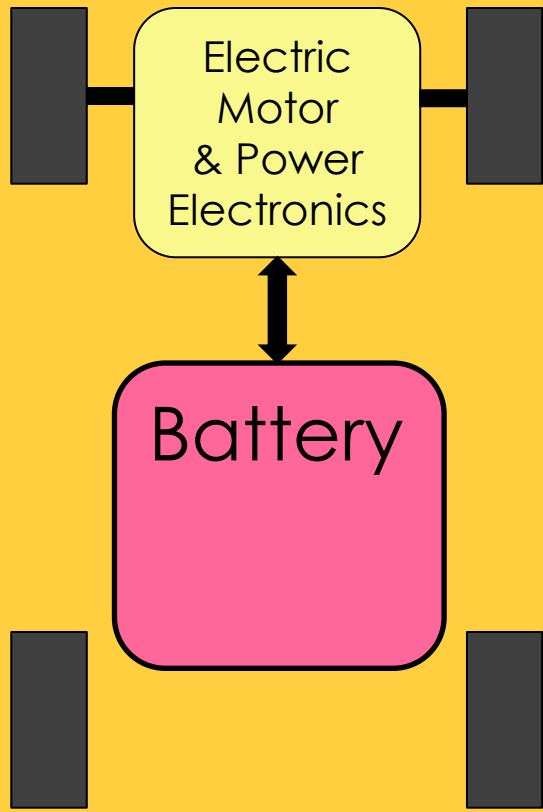
Tonnes of GHG – units of 1,000
kg each. Typically referred to as
annual emissions.
(e.g. 10 tonnes of GHG = 10,000 kg
of GHG)

We must stop adding greenhouse gases (GHG) to our finite atmosphere



The path to zero carbon utilizes:

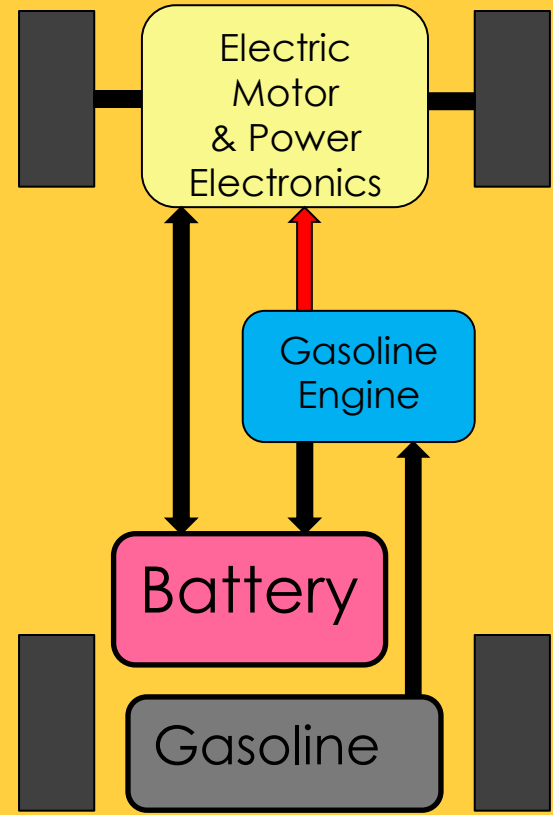
- EVs
- Heat Pumps
- Wind
- Biomass
- Geothermal
- Solar
- Hydrogen
- Smart Grids
- Storage
- Sequestration
- Nuclear?
- Policy
- Finance



BEV

Battery Electric Vehicle

EV



PHEV

Plug-In Hybrid Electric Vehicle

Common reasons to not buy an EV

- Concerns around resources for batteries and mining/recycling
- Concerns surrounding range and charging
- Initial cost too high
- Incorrect information on energy required to make an EV
- You want 4WD/crossover – 2022!

Let's not let consumer
impact concerns only be
applied to EVs....

Impacts as Consumers

- There are upstream and downstream impacts from:
 - Purchases: Clothes, plastics, foods, electronics, gasoline, natural gas, electricity, paper, water, travel, etc. etc.
 - Resource extraction: Mining, refining, waste, energy, worker abuse, and many more...
- We can choose lower (not zero) impact products and services

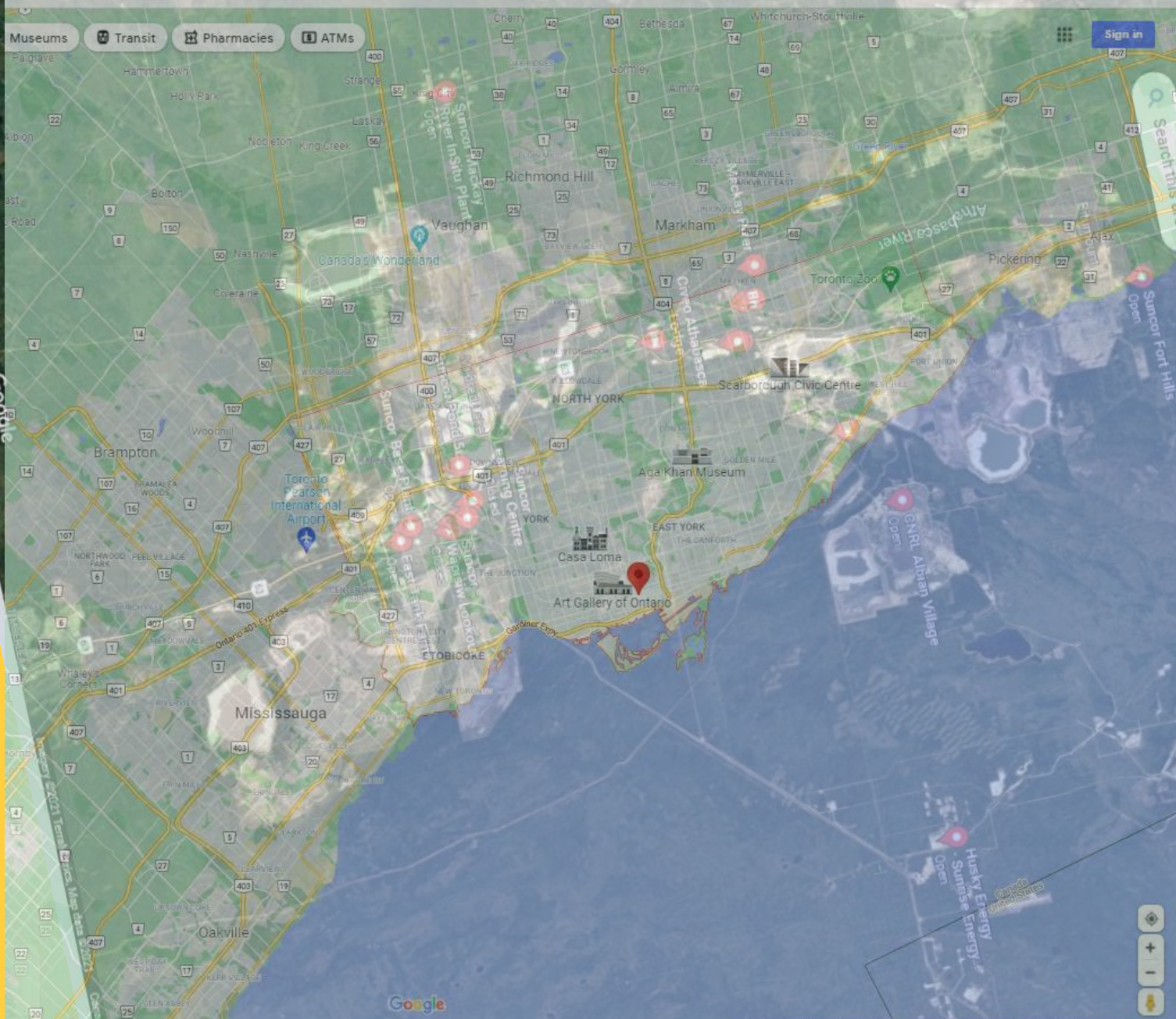
Driving a fossil (gasoline or diesel) fueled vehicle? We are part of:

- Emitting annual 37 Billion tonnes of CO₂ worldwide
- Offshore oil rig fires/spills, oil tanker spills, fracking – water usage, water table contamination, tar sands boreal forest removal (100,000's hectares), pipeline leaks, oil tanker accidents, gas station storage tank ground contamination, pipeline right of way conflicts, etc.....
- 212,500 US (2018 NFPA) vehicle fires, 560 dead
- An estimated 2,500,000 deaths (World Health Organization) each year from PM2.5 air pollution from fossil fuels, (Env. Epidemiology, Aug. 2019, est. 6,500,000 deaths)
- Imported oil to Canada - abuse of workers and other people in global fossil fuel extraction, processing and shipping activities

Museums Transit Pharmacies ATMs

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EVs are not a zero
impact choice, but
do effectively
address GHG and
oil related impacts



2 - 6 t GHG/year

*20,000 km/year

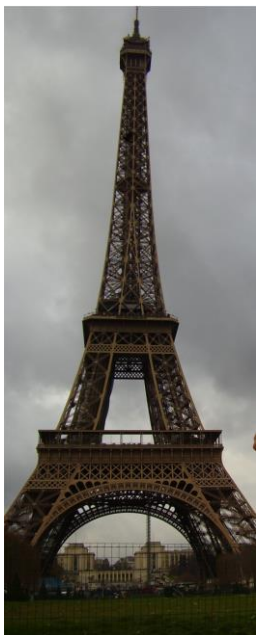


4 - 12 t GHG/year



2 t GHG/person
(return)

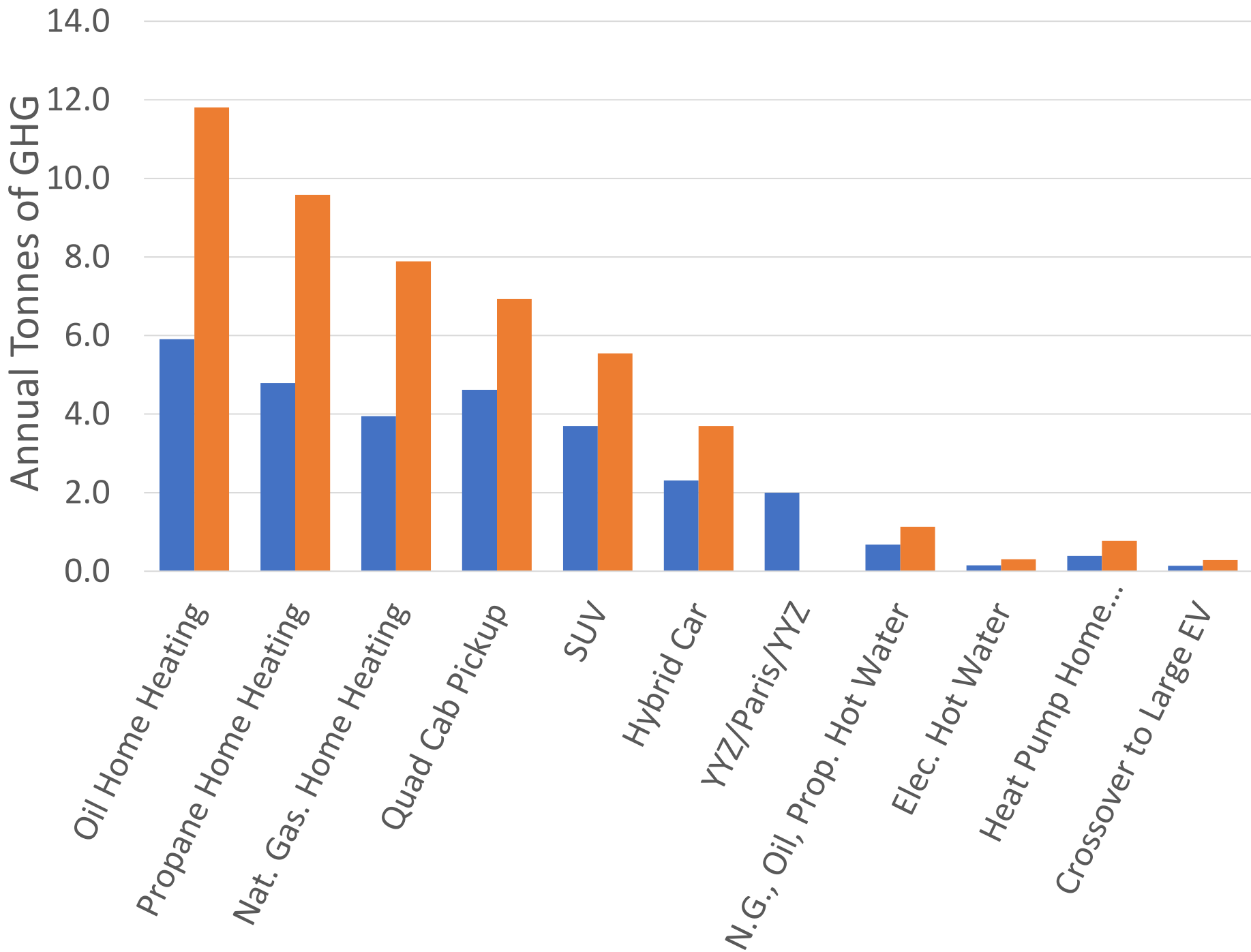
1 - 3 t GHG/year
(messy)



Total 9 - 23 t GHG/year

Ontario 11.3 t GHG/person/year**

** 2017 NIR



Range and Price

70,000 EV Vehicles in Ontario

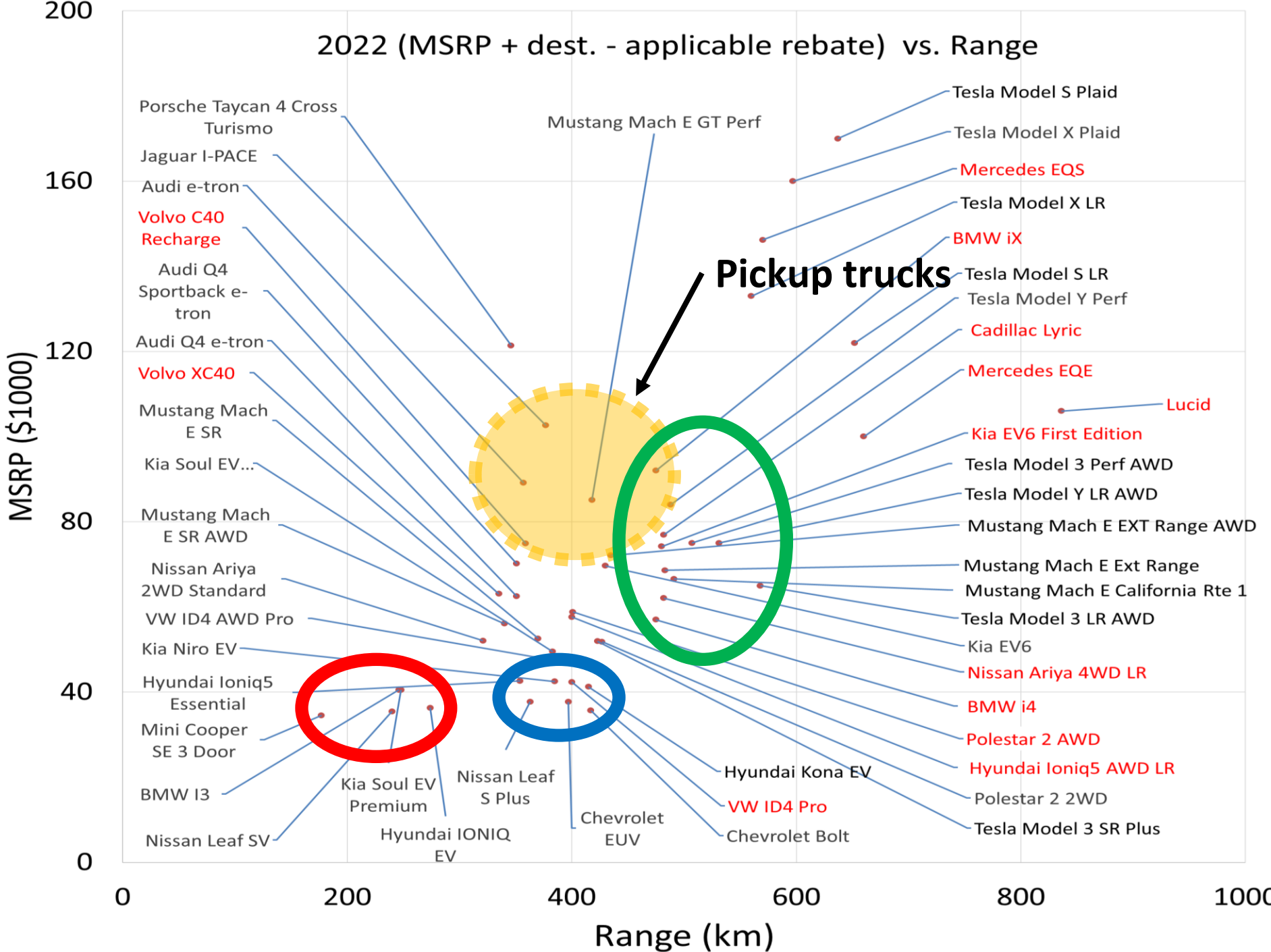
(IEA estimates 250 M
Worldwide by 2030)



2022 BEV 42+ models



2022 (MSRP + dest. - applicable rebate) vs. Range



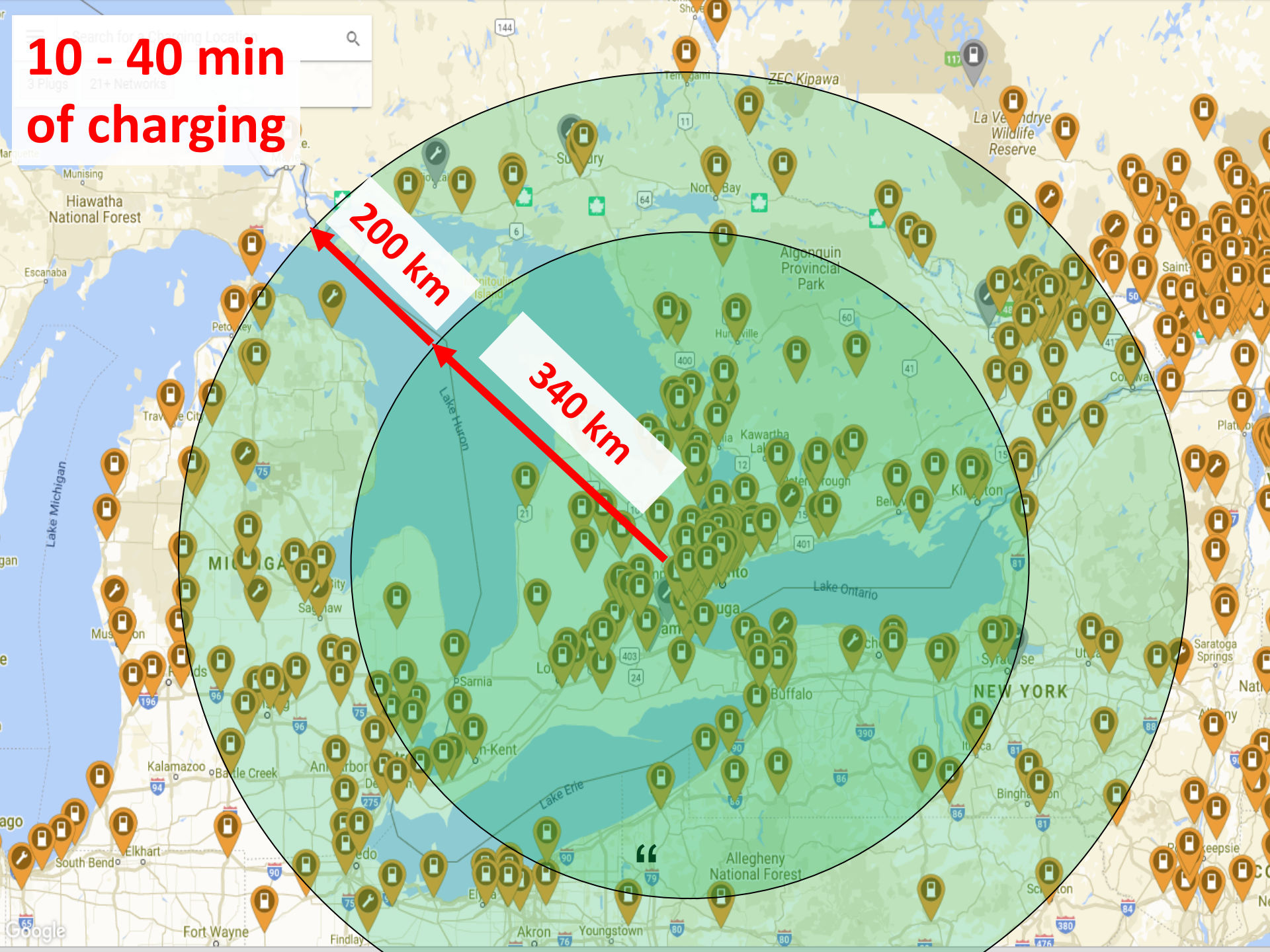
Long Trip - High Rate Charging



Search for Charging Location

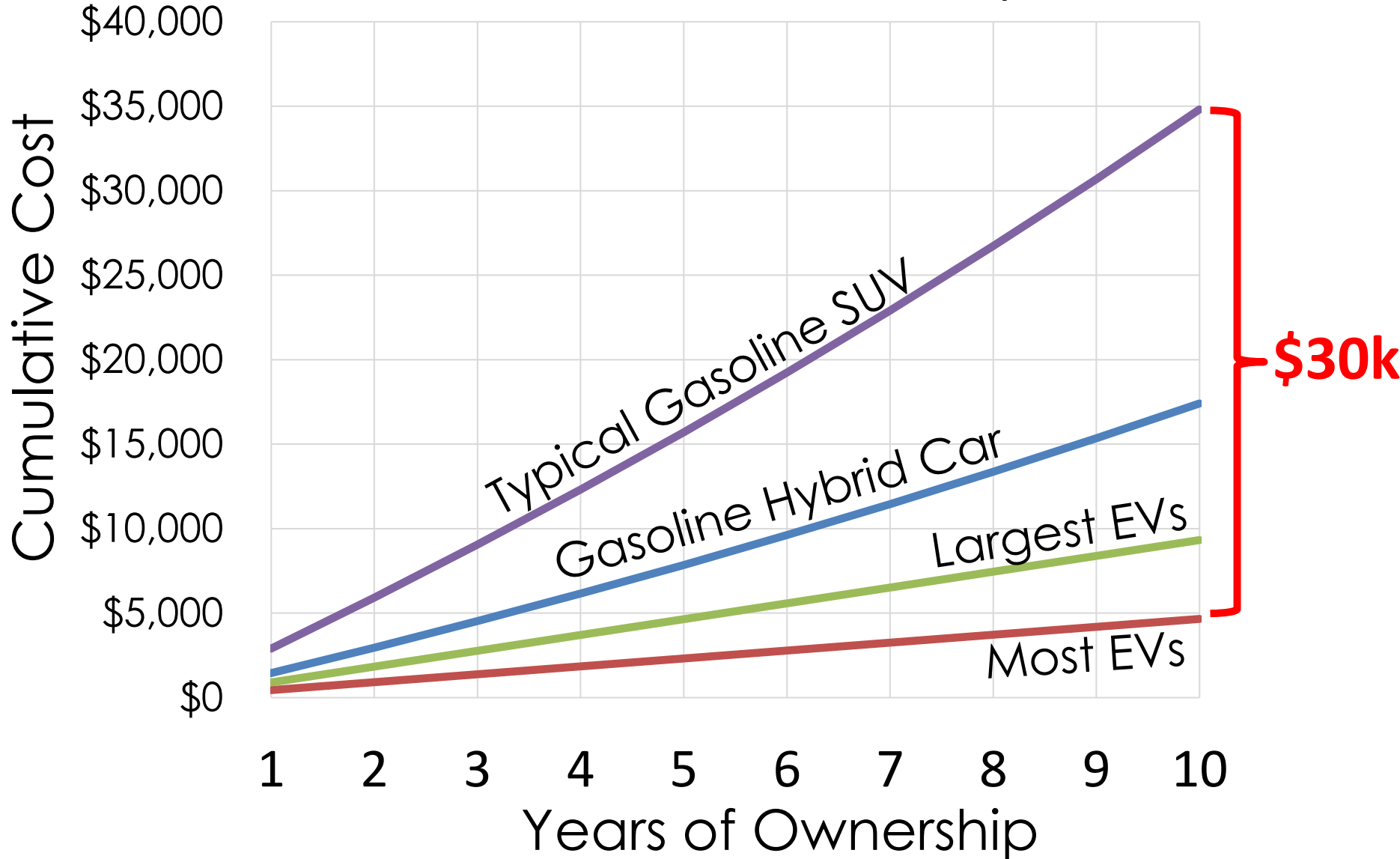
**10 - 40 min
of charging**

3 Plugs 21+ Networks



Cost and Electricity Use

Cumulative Fuel/Electricity Cost



(\$1.45/litre, \$0.15/kWh, 20,000 km/year, 4% infl.)

5 Year Net Vehicle Cost

	Kona Gas	Kona EV
MSRP+Dest.	\$ 26,154	\$ 45,651
Tax	\$ 3,400	\$ 5,935
Federal rebate	\$ -	\$ 5,000
Energy (Gasoline or Electricity)		
1st Year	\$ 2,212	\$ 513
2nd "	\$ 2,300	\$ 533
3rd "	\$ 2,392	\$ 555
4th "	\$ 2,488	\$ 577
5th "	\$ 2,588	\$ 600
5 year insurance	\$ 4,000	\$ 5,000
5 year maintenance	\$ 5,000	\$ 2,500
Trade in Value	\$ 13,299	\$ 21,374
Net Expense	\$37,236	\$36,402
5 Year GHG tonnes Emitted	18.2	0.68

Plus \$1000 to \$1500 one time \$ for a charger at home

Back to
the
Bigger
Picture



Batteries Manufacturing, Energy and Recycling



=



3,000 to 4,000 kWh/year

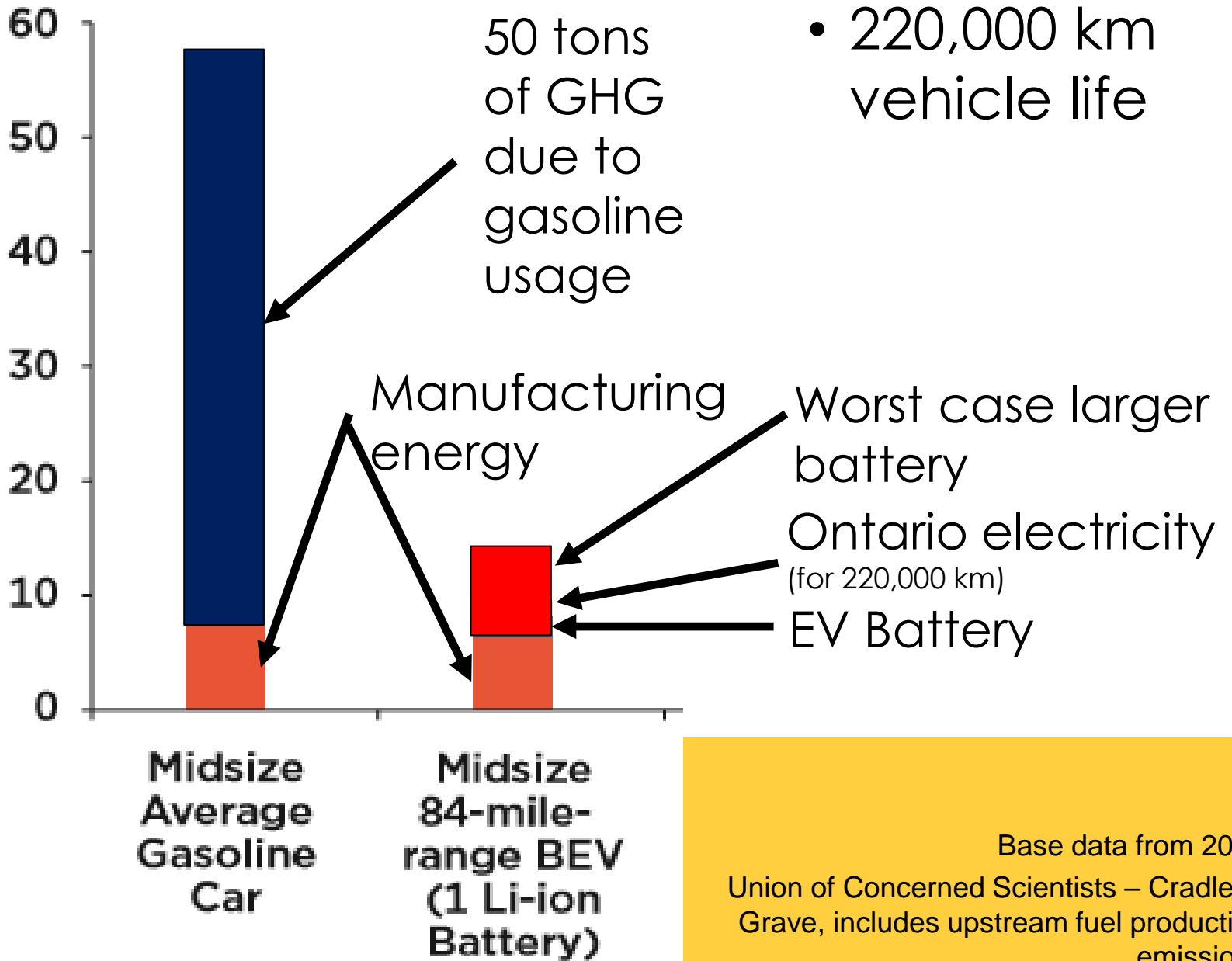
1,000,000 EVs each going 20,000
km/year would create a

2.5%

increase in Ontario's total 137
TWh of electricity generation

The vast majority of charging
can be programmed at night in
off peak nighttime periods

Life Cycle Global Warming Emissions (tons CO₂e)



Base data from 2015
Union of Concerned Scientists – Cradle to Grave, includes upstream fuel production emissions

Batteries

- Enough lithium for 5.3 billion batteries
- New energy storage chemistries will emerge

Human Rights / Environmental Impact

- Fossil fuel extraction/use:
 - **MUST** be reduced dramatically to reduce GHG emissions
 - Already has climate change plus human rights and environmental impacts
- Mining of battery minerals has negative impacts and they can be addressed with policy, laws and through activist pressure and corporate action – all happening
- Virtually every EV maker has ethical supply chain policies
- Recycling being developed in many places – not enough volume of batteries yet to see mass recycling

Wrap-up

EVs and the World

- We humans must virtually eliminate the burning of fossil fuels, that is **job one**.....EVs address the existential and critical timeline pressure of global warming and local pollution
- EVs, like all consumer purchases, have impacts, they do not solve every problem, they are part of the solution to the existential problem of burning fossil fuels
- Global deployment of EVs using low carbon electricity will eliminate **Billions** of tonnes of GHG
- Automakers are working to source conflict free minerals and commercialize new electricity storage chemistries, Cobalt already eliminated in some batteries.

EVs and You

- Driving an EV in Ontario offers a **dramatically reduced** (e.g. reduction from 5 tonnes to less than 1 tonnes GHG/year lifecycle) personal vehicle GHG footprint
- EVs have similar total ownership cost to equivalent fossil fuel cars
- No gas station visits, no oil changes, no tune-ups
- Make your EV last as long as possible = less resource extraction (Use your gas or electric car as little as possible, walk, bike, public transport)
- Long distance travel entirely feasible, requires cell phone app use and time (10 - 40 minutes) to charge, charging times are reducing dramatically



**Thank You
for Your Attention**

Questions?

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