Climate Reality Chicago Metro Electric Vehicle Summary Presentation



College of Complexes Saturday, October 30, 2023







Electric Vehicle Agenda

1. EV History 2. Pollution/Emissions 3. EV Availability 4. Fueling/Charging 5. Ownership Costs 6. Conclusion 7. Ref: EV Misunderstanding



Ford Mustang Mach-E

1832 Anderson Motorize Carriage



1923 Detroit Electric



1901 President William McKinley Ambulance





1971 Electric Vette (Chevette)

1977 Apollo 15 mission



2008 Tesla Roadster (2011 Model Pictured)



1996 GM's EV1



2011 Nissan Leaf



2012 Tesla Model S

2017 Chevrolet Bolt EV



2017 Tesla Model 3





2022 Chevrolet Bolt EUV



Electric Freight Vehicles









E-Transit Electric Cargo Van -2022 126 mile range C





GenH2 hydrogen -621 miles begin trials 2023 in Europe. "eActros" all electric 310 mile range 2021



Semi goes into production 2021 150 miles of range







Building 500 Electric Delivery Vans for FedEx in 2021 -more to follow in 2022



10,000 on the road by 2022. 100,000 by 2030 expected range 150 miles



eCascadia-80,000 max CGW - 250 mile range –recharge to 80% -90 mins eM2 26,00 combined gross weight -230 miles range-recharge to 80% -60 mins



E Garbage trucks Two stage regenerative brakescurrently one in service in NYC for testing-Mack taking orders now

Largest Electric Bus Order in North America

Jun 7 2023 – 1,800 Buses in Quebec + 1,229 more...



Blue Bird's new Georgia Bus facility is anticipated to produce 5,000 all-electric yellow school buses each year. May 26, 2023

JC JCH

Lion Electric Joliette IL



Monarch Electric Tractors

2





Niagara Falls' Maid Of The Mist Goes Pure Electric



EV Essentials – Engine Vs Motor



2,000 parts in the drive system \$1.00 of \$5.00 spent turns the wheels

Oil, radiator and anti-freeze, filters, spark plugs, belts, tune-ups, automatic transmission and fluid, muffler, catalytic converters, fuel injection, tailpipes, radiator, air filters, smog tests



20 parts in the drive system Main part: Motor, Battery Instant Torque Regenerative braking

Greenhouse Gas Emissions Priorities Percentage Percentage Other Rai 5% **Residential &** Commercial Aircraft Transportation, 10% 28% Agriculture, 10% 50+ GT* Light Duty Medium+ 59% 24% Electricity Generation, 25% ■ Light Duty ■ Medium+ ■ Aircraft ■ Rail ■ Other EPA 2019 (USA) EPA 2021 (USA) *** BROOKINGS INSTITUTE**





We are spewing 162 million tons of manmade global warming pollution into the thin shell of our atmosphere every 24 hours — as if it were an open sewer.

The Greenhouse Effect

Some of this outgoing infrared radiation is trapped by the Earth's atmosphere and warms it

Some energy is radiated back into space by the Earth in the form of infrared waves

"Skin of a peach"



The 2H out test of 2AH bit as Beans the Rast Minta Vears Occurred Since the Year 2002



Noxious Emissions from Vehicles

3. Chicago's South and West Sides





Scientific Consensus on Climate Change (97%)



American Medical Association

"Our AMA ... supports the findings of the Intergovernmental Panel on Climate Change's fourth assessment report and concurs with the scientific consensus that the Earth is undergoing adverse global climate change and that anthropogenic contributions are significant." (2013)⁶



INDUSTRY .

American Association for the Advancement of Science

"The scientific evidence is clear: global climate change caused by human activities is occurring now, and it is a growing threat to society." $(2006)^3$



U.S. National Academy of Sciences "The so sufficie greenh

The "S

45.8%

Ameri

levels.



American Lung Association. What about McKinsey? What about Deloitte? What about Forbes? What about Bloomberg? What about Stanford, Harvard, MIT? What about fossil fuel companies?

American Meteorological Society

extensive scientific evidence that the dominant pid change in climate of the past half century is t increases in the amount of atmospheric ses, including carbon dioxide (CO2), bons, methane, and nitrous oxide." (2012)⁷

mental Panel on Climate Change

climate system is unequivocal, and since the the observed changes are unprecedented over ennia. The atmosphere and ocean have rounts of snow and ice have diminished, and

ce on the climate system is clear, and recent missions of greenhouse gases are the highest nt climate changes have had widespread nan and natural systems."¹⁴

impacts on human and natural systems."

American Geophysical Union



"Human-induced climate change requires urgent action. Humanity is the major influence on the global climate change observed over the past 50 years. Rapid societal responses can significantly lessen negative outcomes." (Adopted 2003, revised and reaffirmed 2007, 2012, 2013)⁵



U.S. Global Change Research Program

"The global warming of the past 50 years is due primarily to human-induced increases in heat-trapping gases. Human 'fingerprints' also have been identified in many other aspects of the climate system, including changes in ocean heat content, precipitation, atmospheric moisture, and Arctic sea ice." (2009, 13 U.S. government departments and agencies)¹²



40%

60%

80%

Chart: Canary Media • Source: IEA Global EV Outlook 2022

20%

0%

Ford sold out of the all-electric F-150 Lightning pickup—more than 200,000 vehicles—before production began in April 2022.

OUR ELECTRIC FUTURE IS NOV

General Motors has announced it will phase out gasoline- and diesel-powered passenger vehicles by 2035.



Chevy Bolt EUV – \$27,800 (247 mi)



Tesla Model 3 - \$40,240 (272 mi)



Kia Niro EV - \$39,550 (253 mi)



Audi Q4 - \$49,800 (265 mi)





Hyundai Ioniq 5 SE - \$45,500 (303 mi)



Hyundai Kona EV - \$33,500 (258 mi)

VW ID.4 - \$38,995 (275 mi)



Ford Mustang Mach-E – \$44,795 (250 mi)

New EVs coming soon/already here from General Motors



Chevy Blazer EV



Chevy Silverado EV



Chevy Equinox EV



GMC Sierra EV

Top Electric Vehicle 2022/2023

IRA Federal Tax credit of \$3,750 to \$7,500 is available to all vehicles except * vehicles; however, vehicles may be leased.

EVs Below Avg Car Price of \$49,000 (19)

\$20,000 to \$30,000

- 1. Chevrolet Bolt EV or Bolt EUV 247/259 mi (\$27,800)
- 2. Nissan Leaf S- 149 mi (\$27,800)*

\$30,000 to \$40,000

- 1. Mazda MX-30 100 mi (\$33,470)*
- 2. Hyundai Kona Electric 258 mi (\$33,500)*
- 3. Mini Cooper SE Electric 115 mi (\$34,225)*
- 4. VW ID.4- 275 mi (\$38,995)
- 5. Ford F-150 Lightning Pro 230 mi (\$39,974)
- 6. Kia Niro EV 253 mi (\$39,550)*

\$40,000 to \$49,500

- 1. Tesla Model 3 272 mi (\$40,240)
- 2. Kia EV6 Light 232 mi (\$41,400)*
- 3. Toyota bZ4X XLE 252 mi (\$42,000)*
- 4. Nissan Ariya 216 mi (\$43,190)*
- 5. Ford Mustang Mach-E 250 mi (\$44,795)
- 6. Subaru Solterra 220 mi (\$44,995)*
- 7. Hyundai Ioniq 5 SE 303 mi (\$45,500)*
- 8. Hyundai Ioniq 6 240 mi (\$41,600)*
- 9. Tesla Model Y LR 279 mi (\$47,490)
- 10. Polestar 2 300 mi (\$48,400)*
- 11. Kia EV6 Wind RWD 310 mi (\$48,700)*

EVs above \$49,000 (22)

- 1. Audi Q4 e-tron 265 mi (\$49,800)
- 2. BMW i4 eDrive35-256 mi (\$52,000)*
- 3. Volvo XC40 Recharge 223 mi (\$53,550)*
- 4. Volvo C40 Recharge 226 mi (\$55,300)*
- 5. Tesla Model 3 LR 334 mi (\$57,990)*
- 6. Genesis GV60 248 mi (\$58,890)*
- 7. Lexus RZ 230 mi (\$59,650)*
- 8. Cadillac Lyriq (\$61,795)
- 9. Audi e-tron & Sportsback 222 mi (\$66,800)*
- 10. Rivian R1T 260 mi (\$67,500)
- 11. Jaguar I-Pace 234 mi (\$71,300)*
- 12. Rivian R1S 316 mi (\$72,500)
- 13. Lucid Air 451 mi (\$77,400)*
- 14. Polestar 3 300 mi (\$83,900)*
- 15. BMW iX 324 mi (\$84,100)*
- 16. Porsche Taycan 200 mi (\$86,700)*
- 17. Tesla Model S 375 mi (\$87,490)*
- 18. Tesla Model X 332 mi (\$97,490)*
- 19. Porsche Taycan Cross Turismo 215 mi (\$97,800)*
- 20. Mercedes EQS 350 mi (\$102,310)*
- 21. Audi e-tron GT 238 mi (\$102,400)*
- 22. GMC Hummer EV 329 mi (\$108,700)*

Electric Vehicles Will Reach Price Parity...

• By 2023 In the U.S. for large cars and SUVs In Europe for large cars In China for midsize cars In South Korea for SUVs By 2024 in the U.S. for all segments of the car market, and in Europe for SUVs.

EVs predicted to make up 52% of all new vehicles sold by 2030 Bloomberg News and Finance





Where Do Most People Fuel?





































62 Solar Powered Supercharger Stations



EV charging depot can charge up to 96 electric semi-trucks at once June 2023



Chargers in Chicagoland (PlugShare) As you Zoom in More Chargers are Revealed



chargers Major interstates 50 miles apart





ailable chargers

to Google Maps if desired

How do navigate on A trip?



500,000 stations coming by 2030 via bi-partisan infrastructure bill

My Driver Cockpit



- Average driver drives 35 miles a day
- Average EV gets 250 → 300-mile range
- Most EV drivers charge at home overnight in their garage or driveway
- Start each day with a full battery
- Download PlugShare to see chargers around you. <u>https://www.plugshare.com/</u>

TCO: Total Cost of Ownership Look at your budget not just the MSRP

Common Budget Issues

- 1. Maintenance Costs
- 2. Fueling Costs (Gas or Electricity)
- 3. Purchase Cost (MSRP)*

4. Federal Tax Credits (\$3,750 to \$7,500)* ← 1/1/2024 at car dealer

5. State Incentives (IL \$4,000)

6. City or electric company incentives

 * Federal tax credits depend on battery minerals and composition <u>https://www.fueleconomy.gov/feg/tax2023.shtml</u>

Some of the federal tax credit rules can be side-stepped if you lease

Current Electric Vehicle Incentives



Department of the Treasury Internal Revenue Service





Federal Tax Credits: New EVs \$3,750 or \$7,500

- Limited to North American mfg. & battery rules
- EV charger/Installation: 30% Tax credit up to \$1,000
- Electric Panel upgrade: \$600
- Used EV: \$4,000 (<\$25,000, at least 2 years old, dealer)

Illinois State Rebate – Effective July 1, 2022

- \$4,000 on purchase of new or used EV
- Re-opens again in November

Local Charging Station Rebates (examples)

- Naperville \$700, Batavia \$500, etc.
- Check your utilities
- Chevrolet and Hyundai give away a 240-v (level 2) charger (certain EV models). Chevy, also a free std. installation when you purchase (Bolt EV or EUV models)

Total Cost of Ownership: 12-Years of <u>Maintenance</u>

GAS CAR

Certified Service	7,500 miles	15,000 miles	22,500 miles	30,000 miles	37,500 miles	45,000 miles	52,500 miles	60,000 miles	67,500 miles	75,000 miles	82,500 miles	90,000 miles	97,500 miles	105,000 miles	112,500 miles	120,000 miles	127,500 miles	135,000 miles	142,500 miles	150,000 miles
Rotate tires, if recommended for the vehicle, and perform Required Services. Check engine oil level and oil life percentage. Change engine oil and filter, if needed.	~	\checkmark	~	~	~	\checkmark	~	\checkmark	~	\checkmark	\checkmark	\checkmark	~	~	~	~	\checkmark	~	~	~
Replace passenger compartment air filter (or 2 years, whichever comes first).			\checkmark			\checkmark			<			\checkmark			<			\checkmark		
Replace engine air cleaner filter (or every 4 years, whichever occurs first).						✓						\checkmark						✓		
Replace spark plugs and inspect spark plug wires.													\checkmark							
Change automatic transmission fluid, if equipped. If filter is serviceable, change filter. (Applies to: Severe)						~						~						~		
Change transfer case fluid. (Applies to: AWD, Severe)						\checkmark						\checkmark						\checkmark		
Drain, flush, and refill the engine cooling system (or every 5 years, whichever occurs first).																				\checkmark
Change brake fluid (or every 10 years, whichever comes first).																				\checkmark

ΕV

Certified Service	7,500 miles	15,000 miles	22,500 miles	30,000 miles	37,500 miles	45,000 miles	52,500 miles	60,000 miles	67,500 miles	75,000 miles	82,500 miles	90,000 miles	97,500 miles	105,000 miles	112,500 miles	120,000 miles	127,500 miles	135,000 miles	142,500 miles	150,000 miles
Rotate tires, if recommended for the vehicle, and perform Required Services.	\checkmark	1	1	\checkmark	1	~	\checkmark													
Replace passenger compartment air filter (or 2 years, whichever comes first).			\checkmark			1			\checkmark			\checkmark			\checkmark			\checkmark		
Drain and fill vehicle coolant circuits.																				\checkmark

EV	SERVICE	COST
NO	Lube and Oil Filter	\$64.95
NO	Replace Transmission Fluid	\$175.00
NO	Fuel Filter Replace	\$149.99
NO	Tune-up/spark plugs	\$150.00+
NO	Replace Engine Air Filter	\$50.00
NO	Replace Timing Belt	\$612.00
RARE	Front Brake Pad Replace	\$199.99
RARE	Rear Brake Service	\$199.99
YES	Radiator or circuit flush	\$159.00
YES	Windshield Wiper Blades	\$29.95
YES	12-volt Battery Check	\$14.99
YES	Tire Rotation	\$9.95
YES	Wheel Balance	\$109.95
YES	Passenger Cabin Filter	\$59.95
YES	Wheel Alignment	\$129.95

EPA Class	Gasoline Model	MSRP	EV Model	MSRP	Difference
Sedan	Toyota Camry SE ICE Federal tax credit Illinois rebate	\$26,320 0 0 \$26,320	Tesla Model 3 RWD EV Fed tax credit Illinois rebate	\$40,240 -\$7,500 -\$4,000 \$28,740	-\$13,920 -\$2,420

- \$366 a mo. payment (est.)
- \$99 a mo. Maintenance
- •
- soz a mo. 1st 6 yrs. \$236 a mo. 2nd pARE ANY 2 CARS ON DELantenan \$483 a mo. CAN COMPARE ANY 2 Star aintenance

• \$399 a mo. paym



43

(est.)

- \$40,846 lifetime (\$0.27 a mi.) nme (\$0.40 a mi.) 📂
 - Toyota @ 31 MPG / Gas @ \$4.07 a gallon 08/29/23
 - 12,581 miles per year

 Tesla @ 3.80 Mi / kWh @ \$0.13 a kWh – 08/29/23 12,581 miles per year

Conclusion

- EVs help families breathe healthier air.
- EVs help families stay environmentally safe.
- EVs source energy **locally** versus depending on unstable countries and world events.
- The EV total **cost** of ownership is economical.
- EVs are **quiet**, they **perform** well, and they are **fun** to drive. They are **better** cars.

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Thank you!

Top EV Misunderstandings Reference

	Myth and Misunderstandings	Facts
1	EV batteries are expensive/need replacement.	Batteries have an 8 yr/100,000 mi warranty.
2	I will run out of battery range on an EV.	EVs tell you in real-time your available range. Most EV drivers charge night and start each day full.
3	EVs are expensive.	There are more than 20 models below avg. car precises. With incentives many EVs cost less than ICE cars. Total cost of ownership is usually less with an EV.
4	We have tons of gas stations everywhere. We don't see many EV chargers.	Most EV drivers charge daily at home. Chargers are displayed on the navigation system.
5	EVs take a long time to charge	Charge time at home for an average driver is <2 hours. At public chargers a near full charge can be done in 15 to 30 minutes – on trip, often over coffee or lunch.
6	EV emissions are just as bad as gas cars.	EVs have no emissions. But when charged on a mixed fossil fuel grid, they have 53% less emissions than ICE. EVs charged on solar, or a green grid are 86% less.
7	ICE cars are dependable (2,000 moving parts).	EVs are dependable – they have only 20 moving parts.
8	EVs catch fire.	NHTSA says EV fires are about the same or less than ICE.
9	EV batteries have rare minerals and are mined in poor working conditions.	EV materials are not rare and many metals are being replaced (e.g., cobalt, nickel). Federal subsidies depend on sourcing compliance.