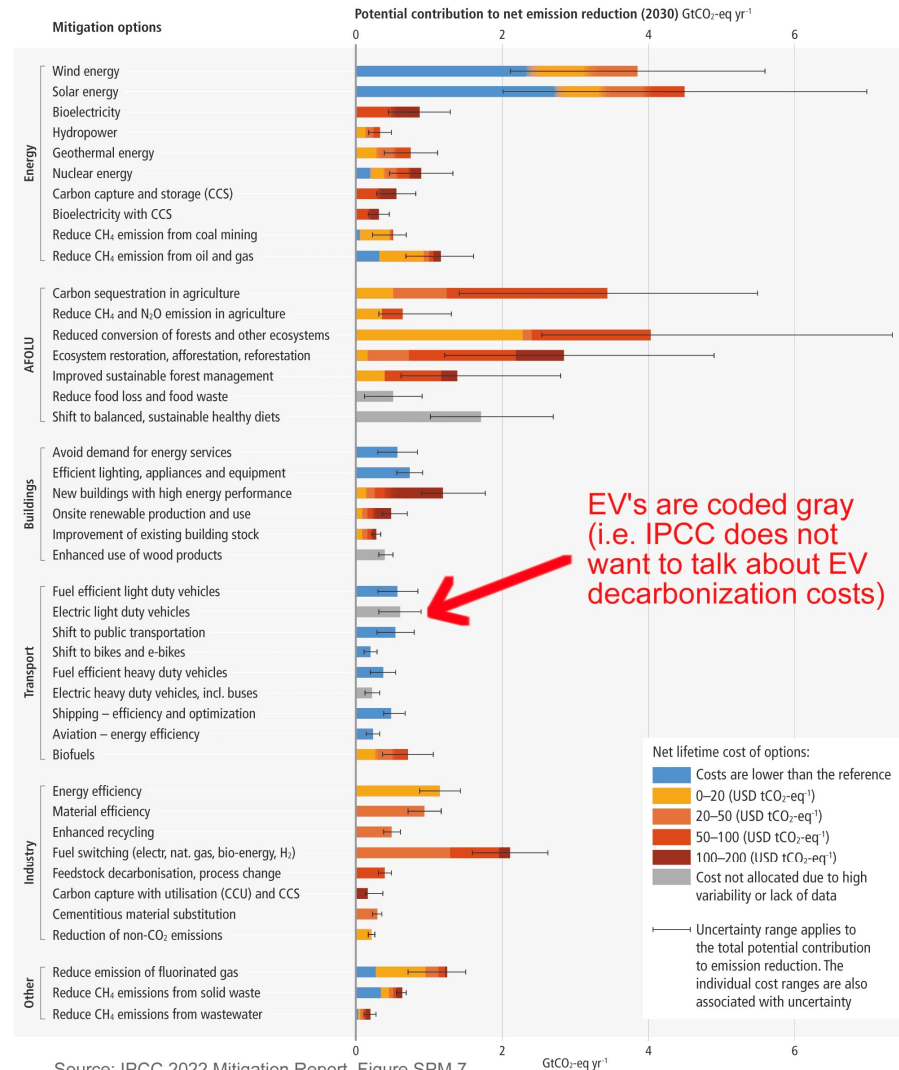


# THE REAL COST OF ELECTRIC CARS

- PRESENTED TO  
THE TORCH CLUB  
OF THE FOX VALLEY
- BY
- WALT HEDGES
- JANUARY 19, 2023







## U.S. Energy Information Administration

In 2021, about 4,108 billion kilowatthours (kWh) (or about 4.11 trillion kWh) of electricity were generated at utility-scale electricity generation facilities in the United States.<sup>1</sup> About 61% of this electricity generation was from fossil fuels—coal, natural gas, petroleum, and other gases. About 19% was from nuclear energy, and about 20% was from renewable energy sources.

The U.S. Energy Information Administration estimates that an additional 49 billion kWh of electricity generation was from small-scale solar photovoltaic systems in 2021.<sup>2</sup>

### U.S. utility-scale electricity generation by source, amount, and share of total in 2021<sup>1</sup>

Data as of November 2022

Energy source	Billion kWh	Share of total
<b>Total - all sources</b>	4,108	
<b>Fossil fuels (total)</b>	2,508	61.0%
Natural gas	1,579	38.4%
Coal	898	21.9%
Petroleum (total)	19	0.5%
Petroleum liquids	12	0.3%
Petroleum coke	8	0.2%
Other gases <sup>3</sup>	11	0.3%
<b>Nuclear</b>	778	18.9%
<b>Renewables (total)</b>	815	19.8%
Wind	378	9.2%
Hydropower	252	6.1%
Solar (total)	115	2.8%
Photovoltaic	112	2.7%
Solar thermal	3	0.1%
<b>Biomass (total)</b>	54	1.3%
Wood	36	0.9%
Landfill gas	9	0.2%
Municipal solid waste (biogenic)	6	0.1%
Other biomass waste	2	0.1%
Geothermal	16	0.4%
<b>Pumped storage hydropower<sup>4</sup></b>	-5	-0.1%
<b>Other sources<sup>5</sup></b>	12	0.3%



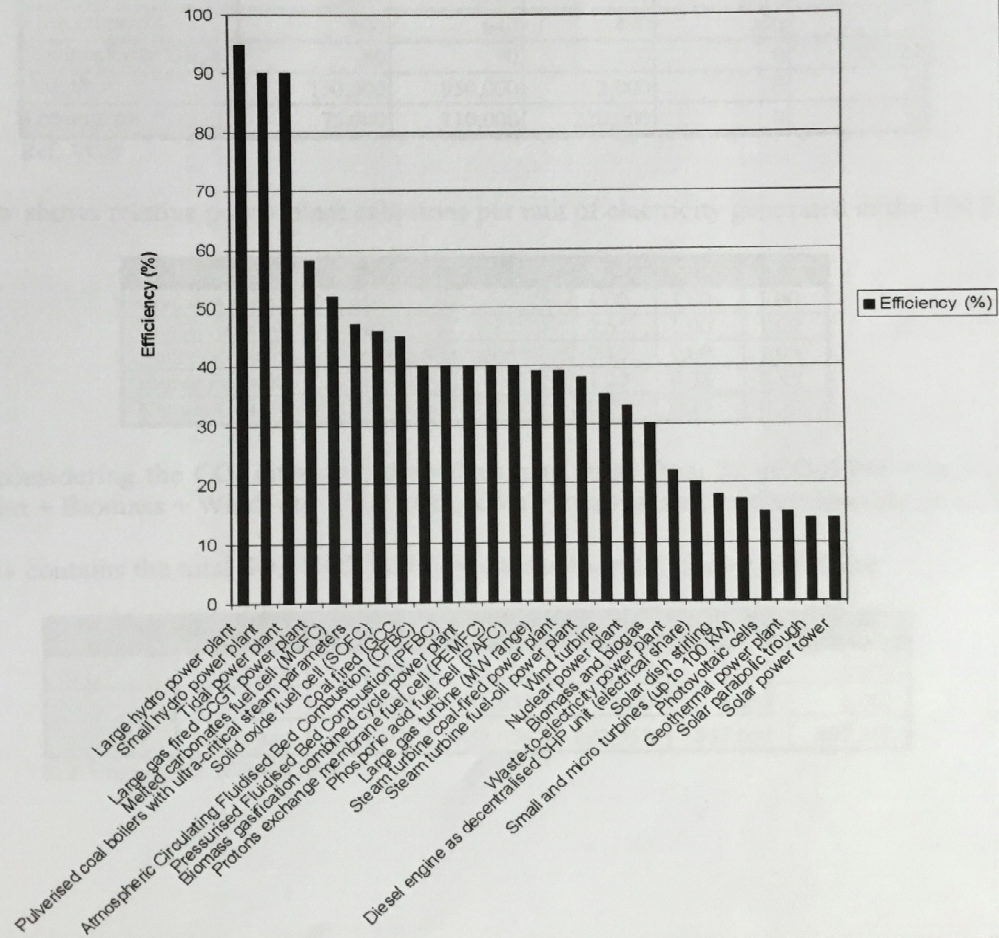


Type		Car+Fuel Cost, NREL (\$/mile)	Emissions, NREL gCO <sub>2</sub> e/mi	Avg Car Cost NREL (\$ MSRP)	Car+Fuel Cost (\$/year)	Emissions Metric mtCO <sub>2</sub> e/yr	Switch From Gas Vehicle			Switch From HEV (no plug)		
							Cost to switch from Gas (\$/yr)	CO <sub>2</sub> Reduction (mtCO <sub>2</sub> e/y	Decarboniz ation Cost (\$/mtCO <sub>2</sub> )	Cost to switch from HEV (\$/yr)	CO <sub>2</sub> Reduction (mtCO <sub>2</sub> e/y	Decarboniza tion Cost (\$/mtCO <sub>2</sub> )
Gas		\$ 0.30	425	\$25,970	\$4,279	6.1						
HEV, Hybrid, no plug		\$ 0.31	305	\$30,960	\$4,422	4.4	\$143	1.7	\$83			
Plugin Hybrid 20mi		\$ 0.39	274	\$36,460	\$5,563	3.9	\$1,284	2.2	\$596	\$1,141	0.4	\$2,581
Plugin Hybrid 50mi		\$ 0.47	248	\$45,660	\$6,704	3.5	\$2,425	2.5	\$960	\$2,282	0.8	\$2,807
EV 200mi		\$ 0.38	167	\$43,060	\$5,420	2.4	\$1,141	3.7	\$310	\$998	2.0	\$507
EV 300mi		\$ 0.47	179	\$55,660	\$6,704	2.6	\$2,425	3.5	\$691	\$2,282	1.8	\$1,270
*Conditions: NREL Avg Car 2021, 14 yrs x 14.3K mi/yr = 200K lifetime miles												

[illegible]

		Kona Gas Sel Fwd 2022	Kona EV Sel Fwd 2022					
<b>Lifetime costs</b>		<b>\$23,100</b>	<b>\$34,200</b>		\$ MSRP	Initial cost, no rebate		
			\$6,797		\$/life	Electricity lifetime cost		
		\$19,077			\$/life	Gasoline lifetime cost		
			13,520		\$/life	Battery replacement (once)		
		\$42,177	\$54,517		\$/life	Total cost over a lifetime		
		\$0.21	\$0.27		\$/miles	Lifetime cost per mile		
<b>Emissions</b>		69.9	20.5		mtCO2/life	CO2 emissions over lifetime		
<b>Switch to EV</b>			\$12,340		\$	Additional cost to switch to EV		
			49.4		mtCO2	Amount of CO2 reduction		
			\$250		\$/mtCO2	Decarbonization cost		
<b>Gasoline</b>		<b>32.5</b>			MPG	Gas mileage, 50/50 city/hwy		
		6,154			gallons	Gallons of gas over lifetime		
<b>Battery</b>			<b>64</b>		kWh/life	Battery capacity		
			<b>258</b>		miles	Range		
			<b>\$13,520</b>		\$	Battery Cost (estimated)		
			4.03		mi/kWh	Miles per unit of electricity		
			49,612		kWh/life	Electricity per lifetime		
<b>Conditions</b>		<b>14,263</b>	14,263		miles/yr	Miles driven per year		
		<b>14</b>	14		years	Lifetime duration		
		<b>200,000</b>	200,000		mi/life	Miles driven per lifetime		
		<b>\$3.10</b>			\$/gal	Cost of gasoline		
			<b>\$0.137</b>		\$/kWh	Electricity cost		
		<b>0.011</b>			mtCO2/gal	CO2 from gas, well-to-wheels		
			<b>0.000413</b>		mtCO2/kWh	CO2 emissions from electricity		

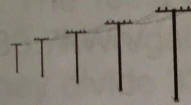
## Efficiency in Electricity Generation







FOSSIL  
FUEL  
51%  
EFF.



10%  
LINE  
LOSS



EFF TO  
PLUG  
41%



77%  
EFF  
TO  
WHEELS

TOTAL  
EFF  
18%



GAS CAR  
12-30% EFF

I agree with the sentiment of the message and would sign it and send it. With that said let's really compare apples to apples. The Tesla y is 275Wh/mi if you look up gasoline it has about 33.7kWh/gal. So when the liars want to make ev's look good they divide 33.7k by 275 to get 122.5 miles per gallon. Then they dug the number a bit to really make it look valid. Let's look at the grid. 61% fossil fuel, 19% nuclear, 20% renewable. Most of the fossil fuels are about 51% efficient from fuel burnt to watt produced on the out put. Line loss to get it to your house plug/ charger is an additional loss of 10% loss. A plug to wheel efficiency of an electric car is 77% So at worst if your energy was all fossil (which we are comparing) the total efficiency would be about 18%. So for every gallon of fuel spent you would receive  $33.7k(.18) = 6.0KWh$  now let's divide again  $6.0KWh/275 = 22.1mi/gal$ . Granted you now have to correct for the 39% of the grid which is nuclear and renewable which will raise the mileage by about 40% to about 31mi/gal.

This was written in response to the following excerpt demanding action against the new energy bill:

- The IRS is not categorizing the Tesla Model Y as an SUV, even thou the EPA does. This means Tesla Model Y, a pure EV with 330 mile range, 117 MPGe (very efficient), and SUV form factor is not eligible for the \$7,500 tax credit.



Type				Car Cost (\$ MSRP)	2022 Rebate	Car cost after rebate (\$)	HP	Battery (kWh)	Battery (miles)	Miles per kWh	Passenger Vol (cu ft)	Battery Warranty
EV 267mi	2022 Tesla Model 3 RWD			\$46,990	\$0	\$46,990	184	50	267	5.34	97	100K/8yr
EV 258mi	2022 Hyundai Kona EV, SEL FWD			\$34,000	\$7,500	\$26,500	201	64	258	4.03	93	100K/10yr
EV 250mi	2022 Chevrolet Bolt EUV, FWD 4dr			\$33,500	\$7,500	\$26,000	200	65	250	3.85	99	100K/8yr
EV 226mi	2022 Nissan Leaf S PLUS Hatchback			\$32,400	\$7,500	\$24,900	214	62	226	3.65	93	
EV 149mi	2022 Nissan Leaf S Hatchback			\$27,400	\$7,500	\$19,900	147	40	149	3.73	93	100K/8yr
EV 110mi	2022 MINI Electric Cooper SE FWD			\$29,900	\$7,500	\$22,400	181	33	110	3.33	80	100K/8yr

available local, state or federal incentives.

# Most Efficient Electric Vehicles (Energy Use Per 100 Miles)

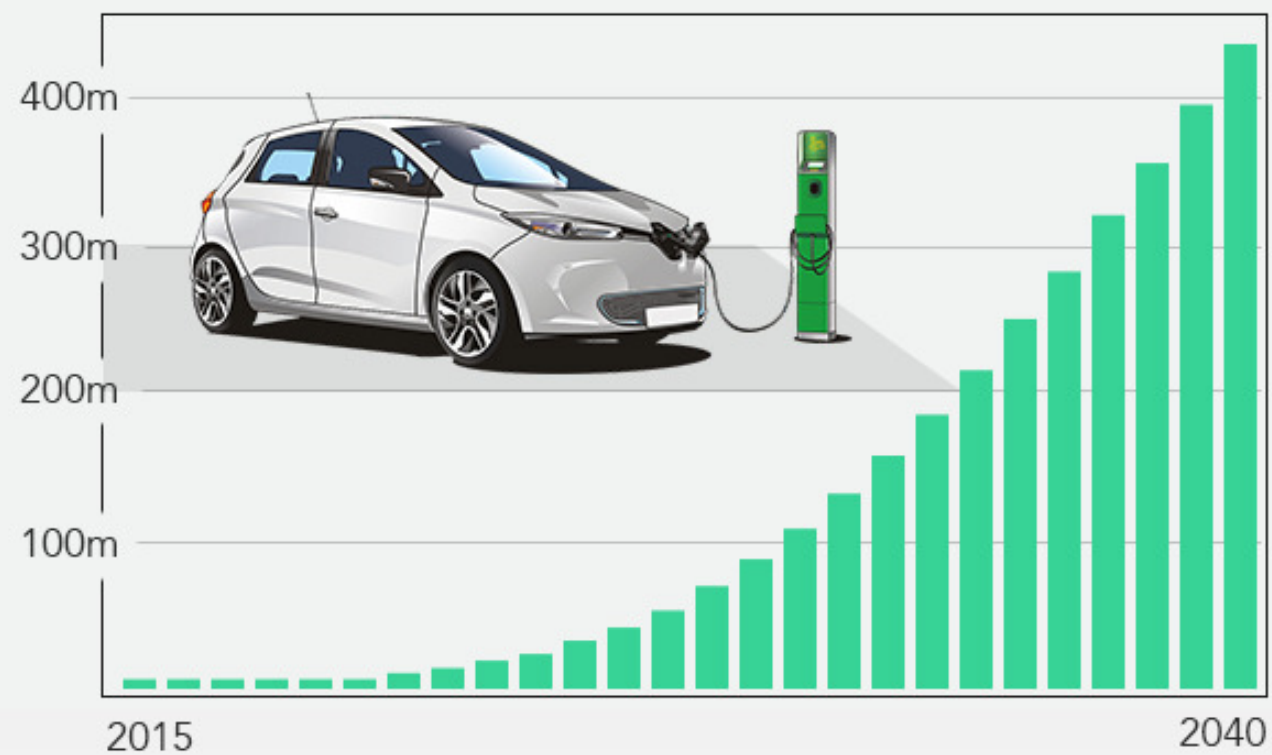
- 1. 2022 Tesla Model 3 RWD: 25 kWh
- 2. 2022 Lucid Air Grand Touring w/19-inch wheels: 26 kWh
- 3. 2022 Chevrolet Bolt EV: 28 kWh
- 4. 2022 Hyundai Kona EV: 28 kWh
- 5. 2022 Tesla Model S: 28 kWh
- 6. 2022 Tesla Model Y Long Range: 28 kWh
- 7. 2022 Chevrolet Bolt EUV: 29 kWh
- 8. 2022 Kia EV6 RWD: 29 kWh
- 9. 2022 Hyundai Ioniq 5 RWD: 30 kWh
- 10. 2022 Kia Niro EV: 30 kWh

Feedback



## The future is electric ⚡

*Projected cumulative sales of electric vehicles (2015 - 2040)*



DATA: Bloomberg New Energy Finance, Marklines

the **HUSTLE**

Household Power Usage Increase with Addition Of EV  
Assume: household usage of 4800kw-hr/year  
10,000 mi/yr car travel

	Usage.	Kw-hr/yr.	%increase
The Best Tesla model 3.	250W-h/mi.	2500.	52
The bad Ford F-150 Lightning.	510W-h/mi.	5100.	100
The Ugly E Hummer.	607W-h/mi.	6070.	126

