



Sustainable Transportation Coalition of Hawai'i

A U.S. DEPARTMENT OF ENERGY CLEAN CITIES COALITION

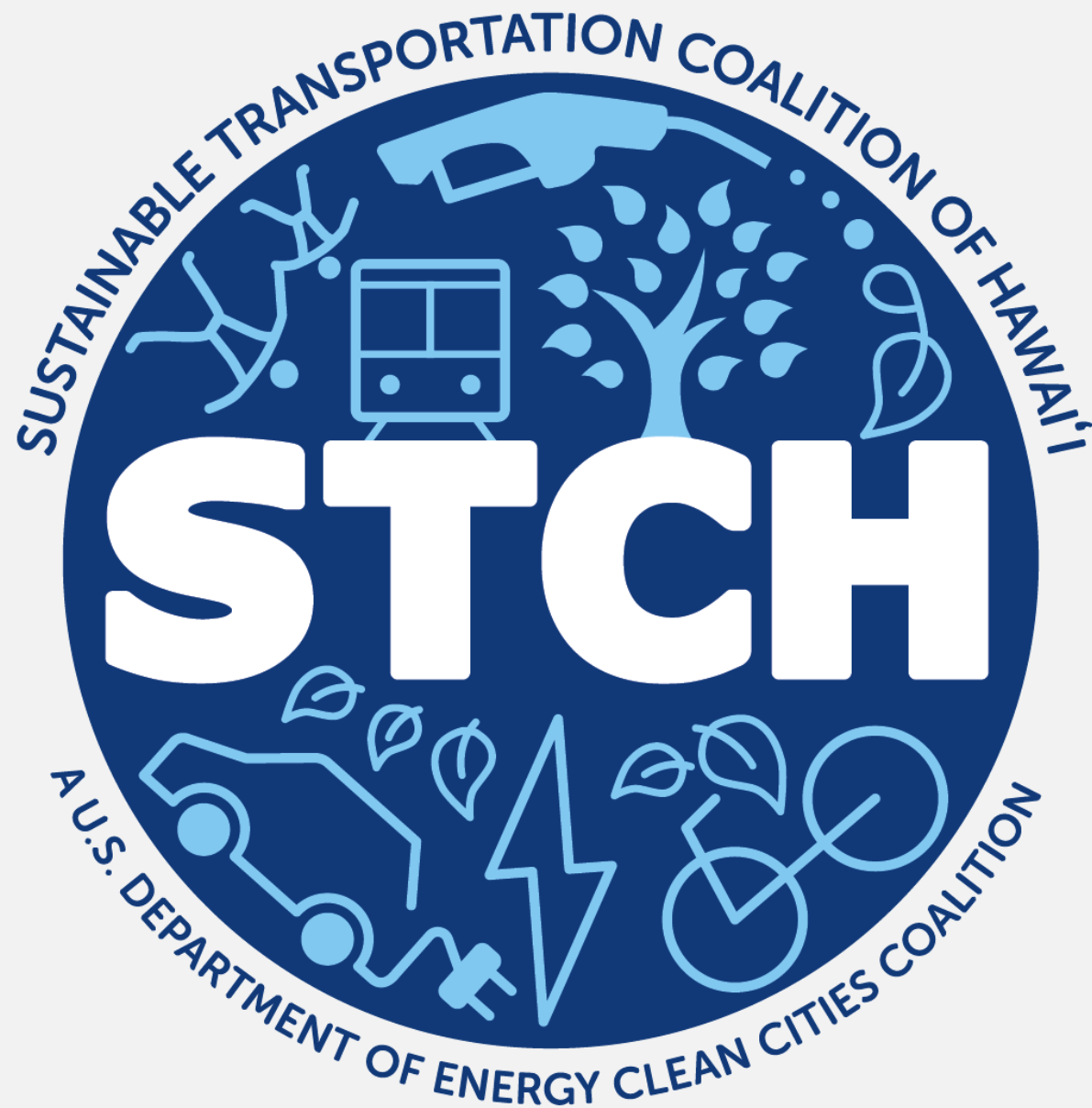
Lauren Reichelt

Clean Transportation Director-Blue Planet Foundation

Coordinator- Sustainable Transportation Coalition of Hawaii (STCH)

Accelerating Hawaii toward
100% clean energy.





National Network of Clean Cities Coalitions

Nearly 100 Clean Cities coalitions with thousands of stakeholders, representing ~80% of U.S. population



cleancities.energy.gov

Clean Cities Focus

Light-, Medium-, and Heavy-Duty Vehicles



Energy Efficient Mobility Systems and Technologies

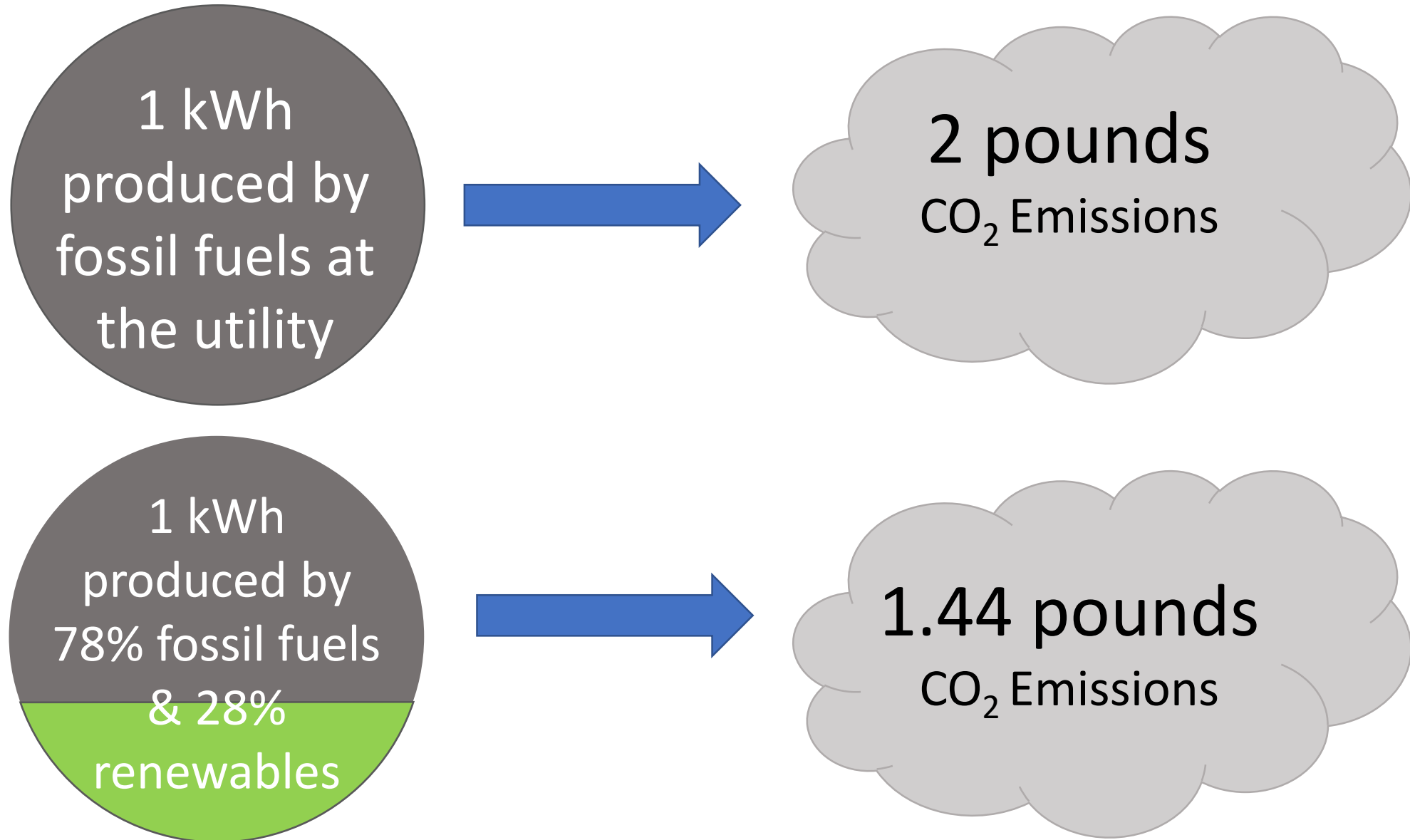
Alternative Fuel Infrastructure



Why EVs?

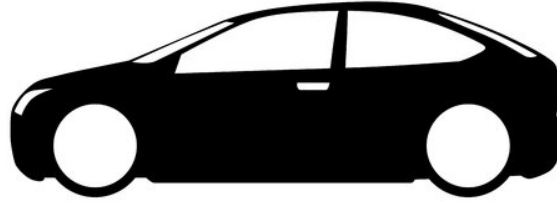
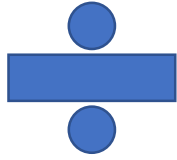
- EVs produce less greenhouse gas emissions and use less petroleum over the lifetime of the vehicle— even now, with the current grid mixes across the state
- EVs can be more cost effective over the lifetime of the vehicles
- Market-ready and proven models exist in some vehicle segments and for a variety of use-cases
- EoT benefits the state overall with energy security and resiliency

Approximate Emissions Produced at Utility

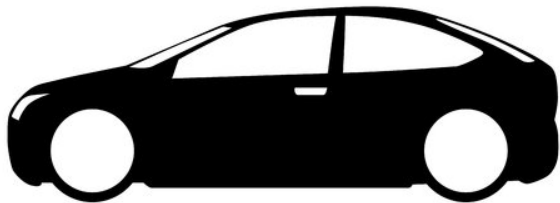


Battery Electric Vehicle Emissions

1.44 pounds
CO₂ emissions
per 1 kWh produced

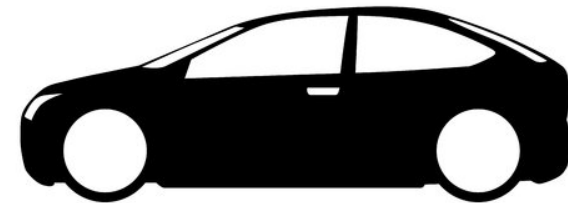


About 3.5-4 miles per kWh



.411 pounds CO₂ per mile driven

to



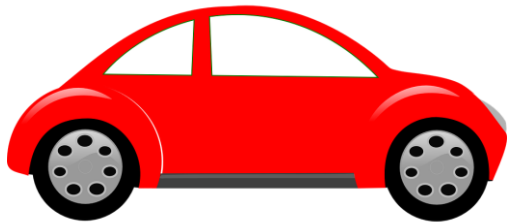
.36 pounds CO₂ per mile driven

Gasoline Vehicle Emissions



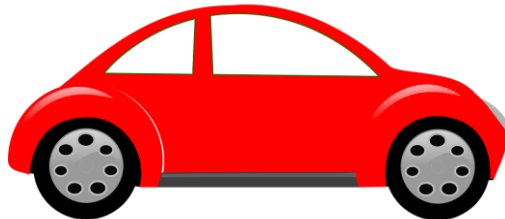
19.59 pounds
CO₂ emissions
per gallon

22 MPG



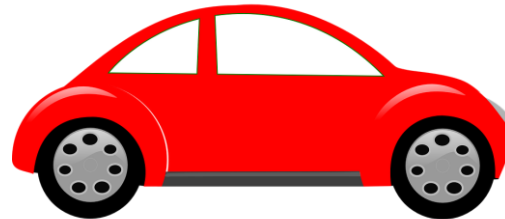
.89 pounds CO₂/mi

30 MPG



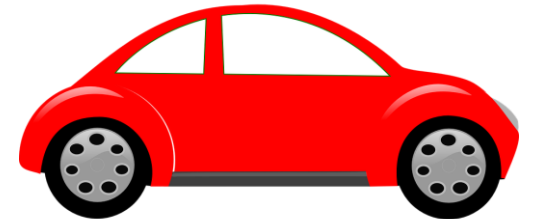
.65 pounds CO₂/mi

40 MPG



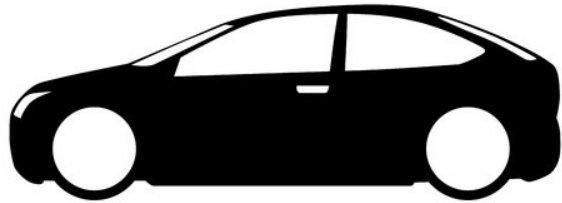
.489 pounds CO₂/mi

54 MPG

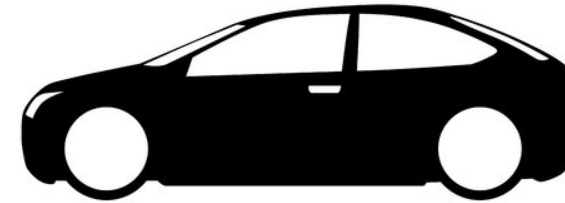


.363 pounds CO₂/mi

Electric Vehicles



to

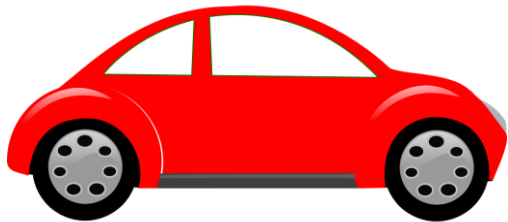


.411 pounds CO₂ per mile driven

.36 pounds CO₂ per mile driven

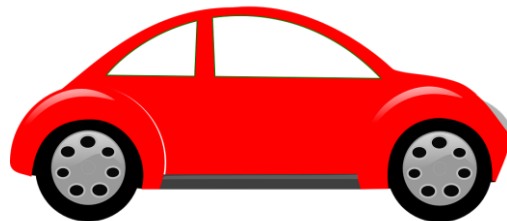
Gas-powered Vehicles

22 MPG



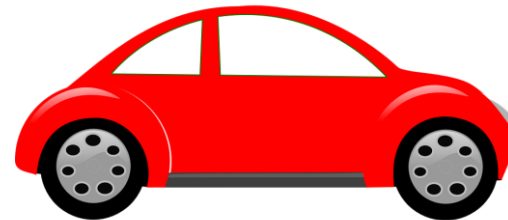
.89 pounds CO₂/mi

30 MPG



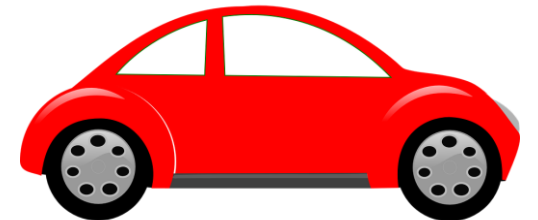
.65 pounds CO₂/mi

40 MPG



.489 pounds CO₂/mi

54 MPG



.363 pounds CO₂/mi

HECO Companies' Current and Projected RPS Achievement

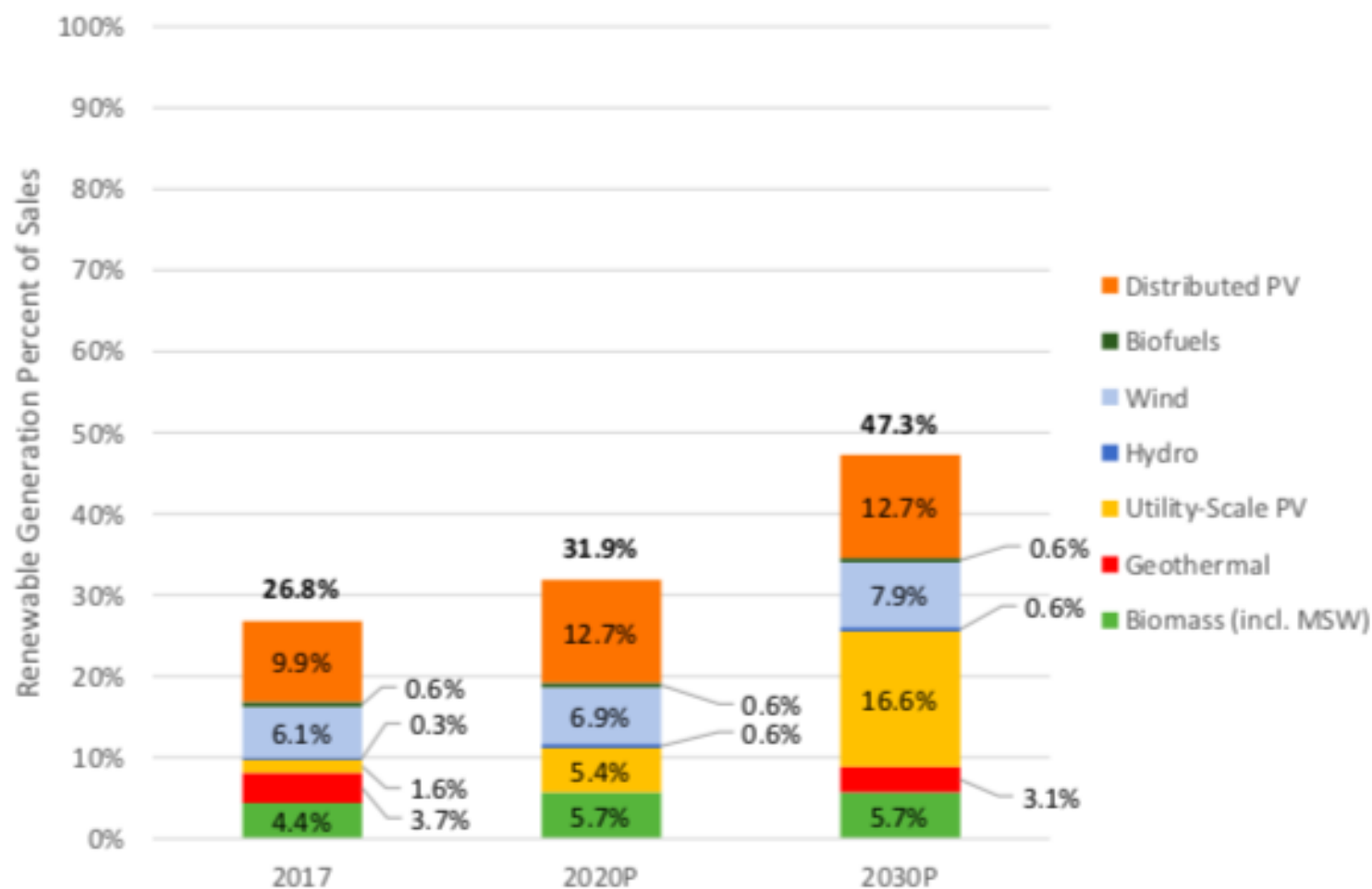
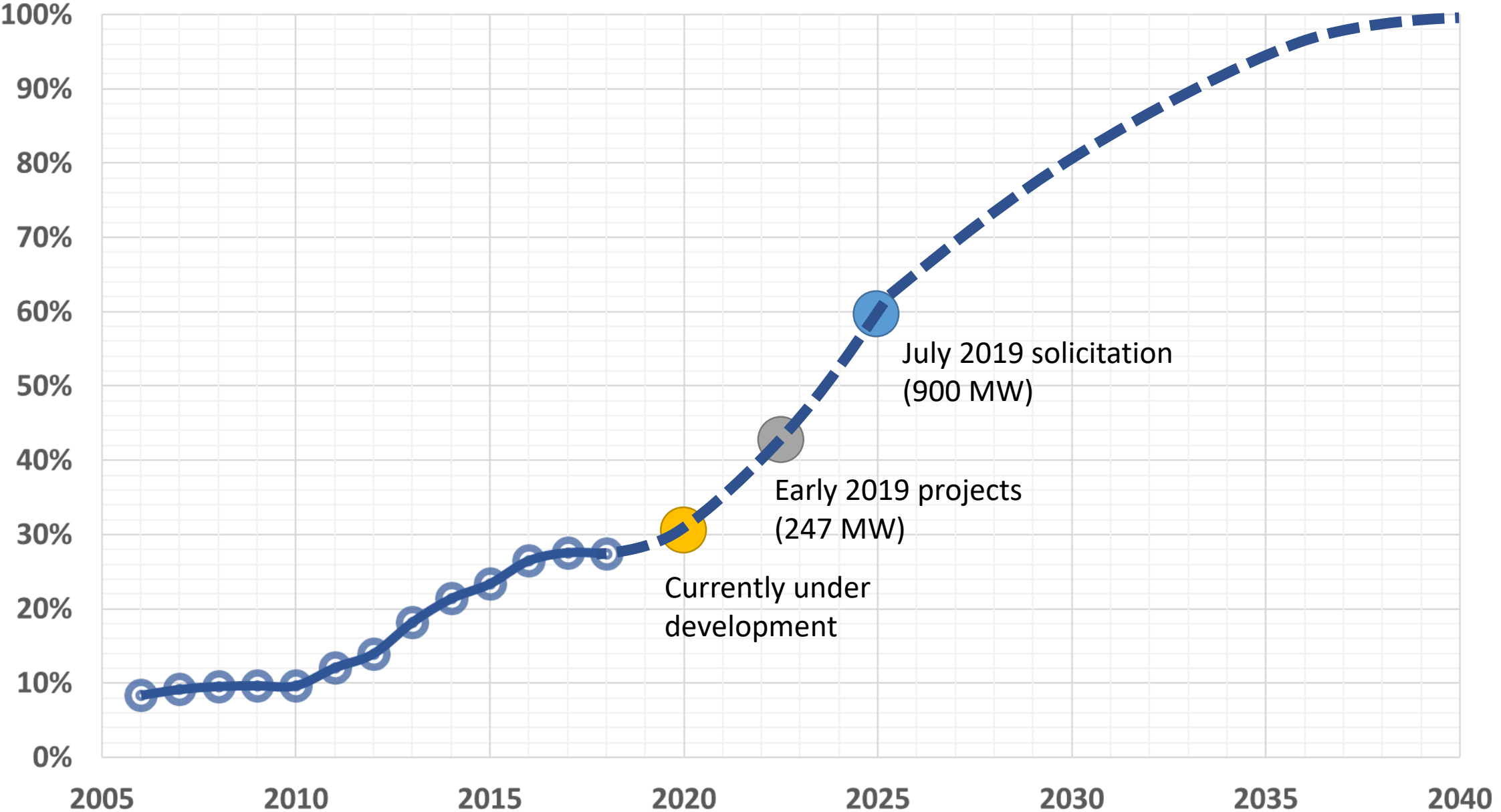


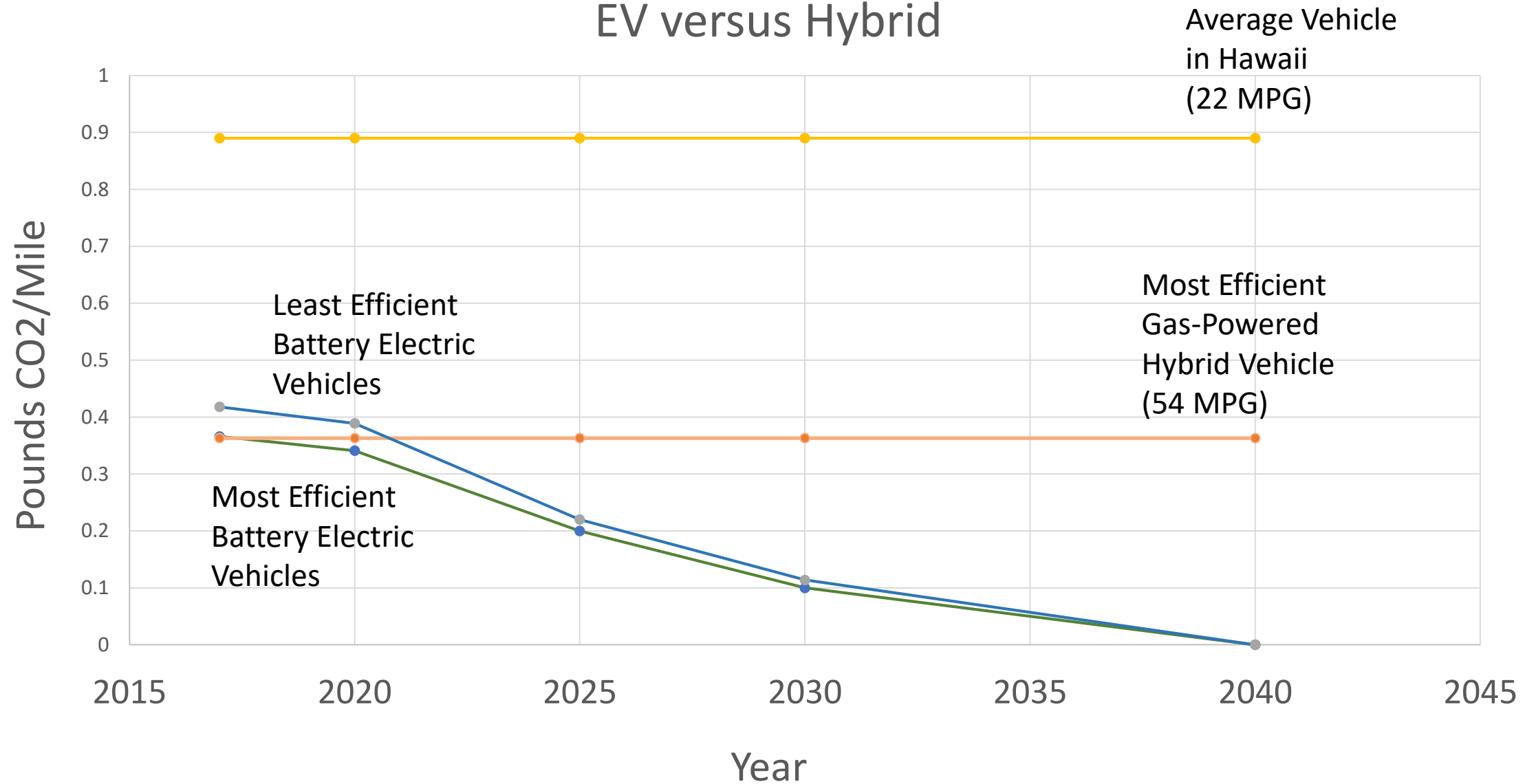
Figure 5: HECO Companies' Current and Projected RPS Achievement

Hawaii's Renewable Energy Growth



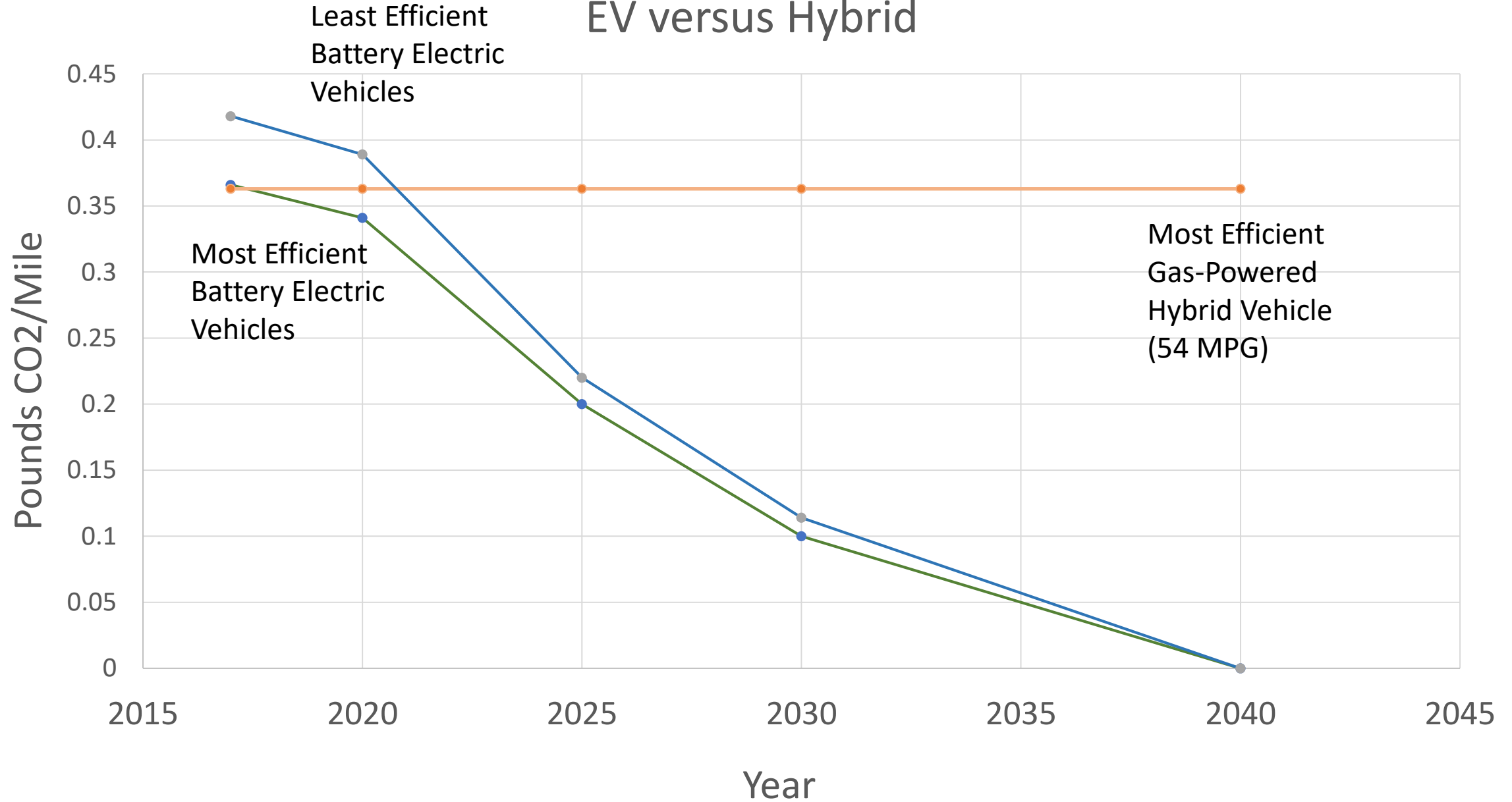
CO2 Emissions/Mile

EV versus Hybrid



CO2 Emissions/Mile

EV versus Hybrid



2018



- Embedded emissions paid off after 2 years compared to internal combustion engine vehicles (ICEs)
- 1.5 years if charged from renewables

2015



- Embedded emissions paid off between 6 and 16 months of driving depending on vehicle model and where they're sold

FIGURE ES-2. Life Cycle Global Warming Emissions from the Manufacturing and Operation of Gasoline and Battery-Electric Vehicles

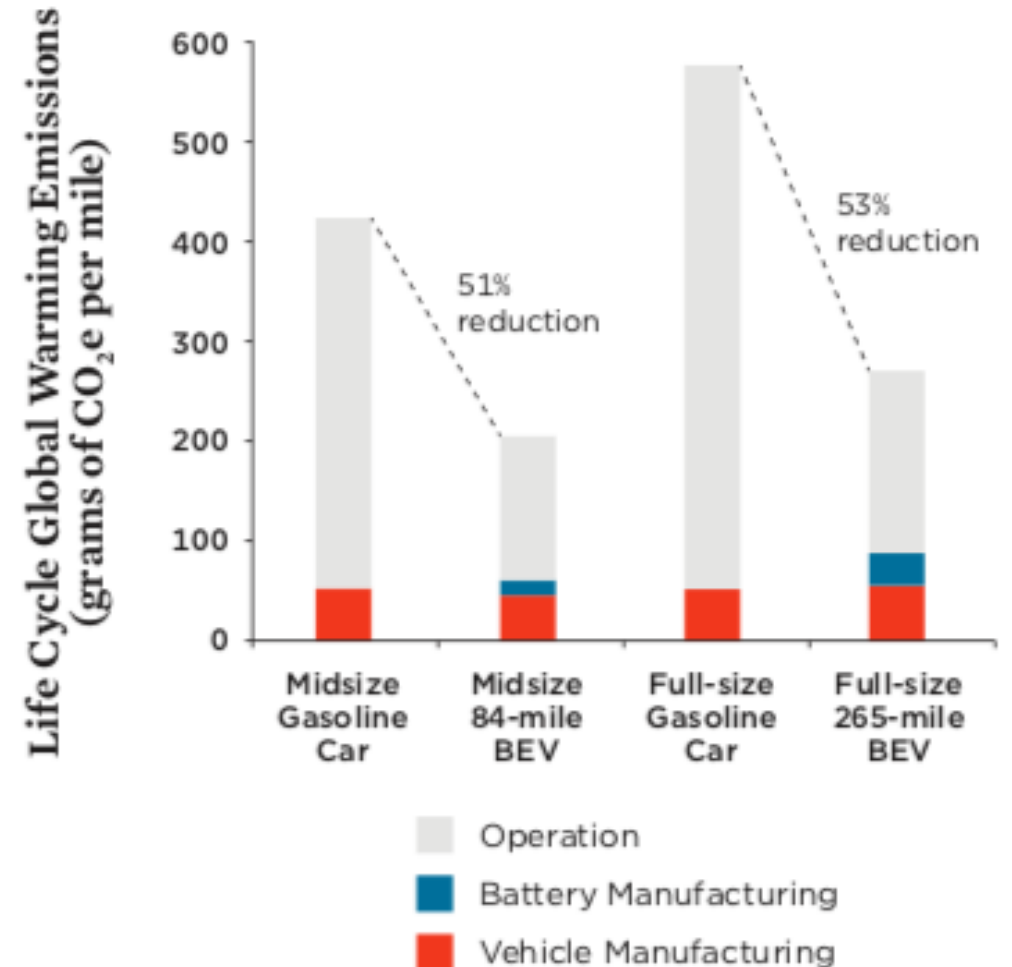


Table 5. Vehicle total costs of ownership (8-year lifespan) from least expensive to most expensive.

Make	Model	Type	MSRP Base	Fuel \$	Tax Credits	Maintenance	Insurance	Residual	Ownership Costs
Hyundai	Ioniq Electric	Electric	\$29,500.00	\$3173.00	\$7500.00	\$3781.40	\$11,800.00	\$5605.00	\$35,148.90
Toyota	Prius c	Hybrid	\$20,630.00	\$5859.00	-	\$6482.40	\$8252.00	\$5982.70	\$35,240.49
Ford	Focus Electric	Electric	\$29,120.00	\$4073.00	\$7500.00	\$3781.40	\$11,648	\$5532.80	\$35,589.25
Hundai	Ioniq	Hybrid	\$22,000.00	\$4866.00	-	\$6482.40	\$8800.00	\$6380.00	\$35,768.77
Hyundai	Ioniq Blue	Hybrid	\$22,200.00	\$4819.00	-	\$6482.40	\$8880.00	\$6438.00	\$35,942.90
Nissan	Leaf	Electric	\$29,990.00	\$3969.00	\$7500.00	\$3781.40	\$11,996.00	\$5698.10	\$36,537.82
VW	e-Golf	Electric	\$30,495.00	\$4061.00	\$7500.00	\$3781.40	\$12,198.00	\$5794.05	\$37,241.43
Toyota	Prius	Hybrid	\$23,475.00	\$4914.00	-	\$6482.40	\$9390.00	\$6807.75	\$37,453.88
Kia	Niro FE	Hybrid	\$23,340.00	\$5744.00	-	\$6482.40	\$9336.00	\$6768.60	\$38,133.71
Kia	Niro	Hybrid	\$23,340.00	\$5773.00	-	\$6482.40	\$9336.00	\$6768.60	\$38,162.43
Kia	Soul EV	Electric	\$32,250.00	\$3818.00	\$7500.00	\$3781.40	\$12,900.00	\$6127.50	\$39,122.01
Toyoto	Prius Eco	Hybrid	\$25,165.00	\$4850.00	-	\$6482.40	\$10,066.00	\$7297.85	\$39,265.96
Fiat	500e	Electric	\$32,995.00	\$3899.00	\$7500.00	\$3781.40	\$13,198.00	\$6269.05	\$40,104.45
Honda	Accord Hybrid	Hybrid	\$25,100.00	\$5830.00	-	\$6482.40	\$10,040.00	\$7279.00	\$40,173.47
Tesla	Model 3	Electric	\$35,000.00	\$3506.00	\$7500.00	\$3781.40	\$14,000.00	\$6650.00	\$42,137.12
Toyota	Camry Hybrid LE	Hybrid	\$27,950.00	\$4914.00	-	\$6482.40	\$11,180.00	\$8105.50	\$42,421.13
Chevrolet	Malibu Hybrid	Hybrid	\$27,920.00	\$5859.00	-	\$6482.40	\$11,168.00	\$8096.80	\$43,332.39
Chevrolet	Bolt EV	Electric	\$36,620.00	\$3506.00	\$7500.00	\$3781.40	\$14,648.00	\$6957.80	\$44,097.32
Honda	Clarity Electric	Electric	\$33,400.00	\$4061.00	Lease Only	\$3781.40	\$13,360.00	\$6346.00	\$48,256.48
Toyota	Camry Hybrid LX	Hybrid	\$32,400.00	\$5859.00	-	\$6,482.40	\$12,960.00	\$9396.00	\$48,305.19
BMW	i3	Electric	\$44,450.00	\$4107.00	\$7500.00	\$3781.40	\$17,780.00	\$8445.50	\$54,173.26
Tesla	Model X 75	Electric	\$70,532.00	\$4443.00	\$7500.00	\$3781.40	\$28,212.00	\$13,401.08	\$86,068.01
Tesla	Model S 75D	Electric	\$74,500.00	\$3853.00	\$7500.00	\$3781.40	\$29,800.00	\$14,155.00	\$90,279.22
Tesla	Model S 100D	Electric	\$94,000.00	\$4038.00	\$7500.00	\$3781.40	\$37,600.00	\$17,860.00	\$114,059.34
Tesla	Model X 100D	Electric	\$96,000.00	\$4859.00	\$7500.00	\$3781.40	\$38,400.00	\$18,240.00	\$117,300.81
Tesla	Model S P100D	Electric	\$135,000.00	\$4200.00	\$7500.00	\$3781.40	\$54,000	\$25,650.00	\$163,831.32
Tesla	Model X P100D	Electric	\$140,000.00	\$5137.00	\$7500.00	\$3781.40	\$56,000	\$26,600.00	\$170,818.49

\$7,500

Federal Tax Credit

Form 8936	Qualified Plug-in Electric Drive Motor Vehicle Credit (Including Qualified Two-Wheeled Plug-in Electric Vehicles) ▶ Attach to your tax return. ▶ Go to www.irs.gov/Form8936 for instructions and the latest information.	OMB No. 1545-2137 2017 Attachment Sequence No. 125
Department of the Treasury Internal Revenue Service	Name(s) shown on return	Identifying number
Note: • Use this form to claim the credit for certain plug-in electric vehicles. • Claim the credit for certain alternative motor vehicles on Form 8910.		

Solar Photovoltaic

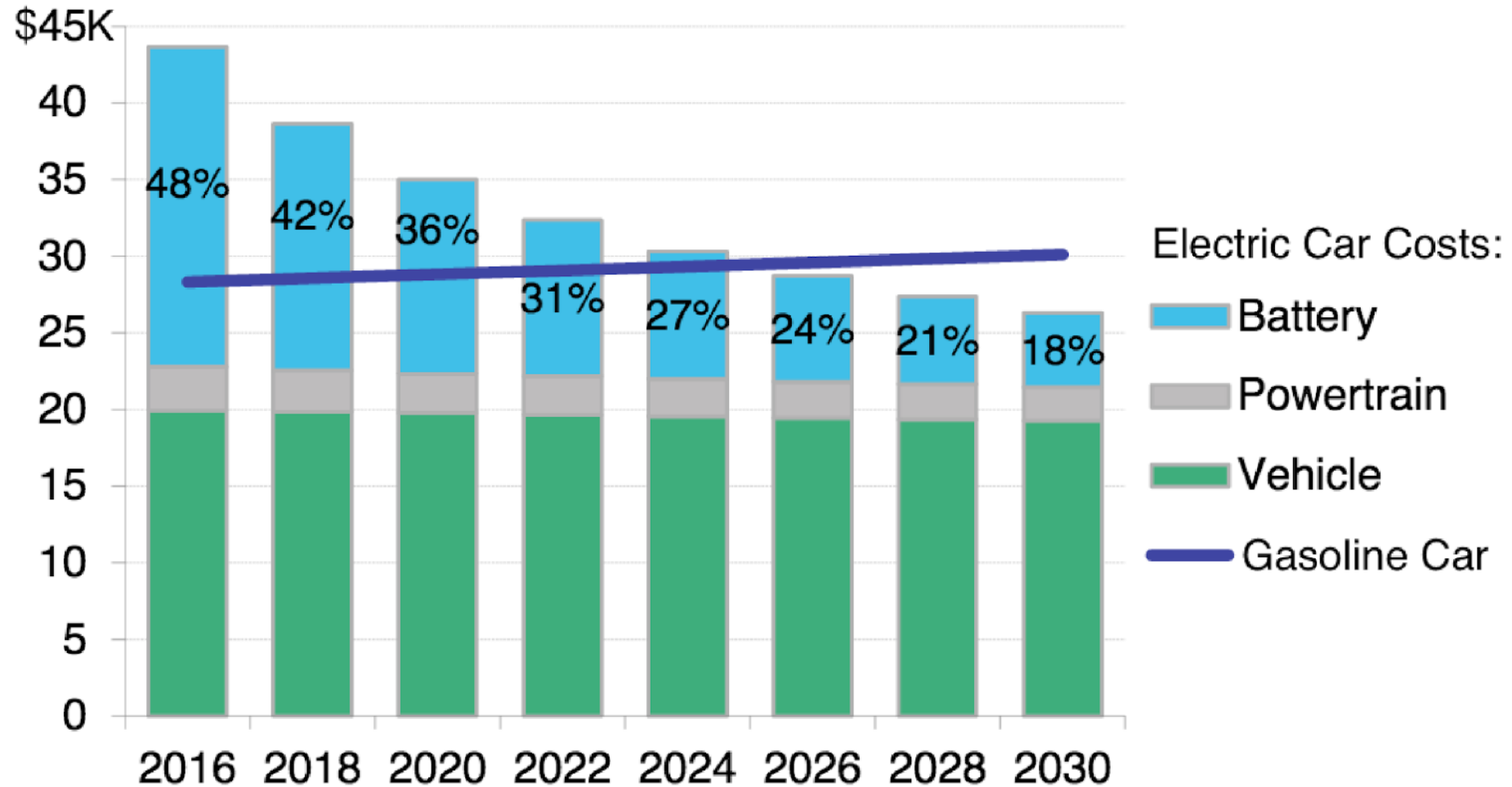


Group Purchasing



Electric Cars Will Win on Price

Falling battery prices undercut gasoline cars by mid-2020s



Source: Bloomberg New Energy Finance







2020 Kia Soul EV
243-mile range
64kWh battery
Estimated base \$37,500



2019 Nissan Leaf
215-mile range
62kWh battery
\$37,445



Hyundai Kona Electric SUV
258-mile range
64kWh battery
\$36,950



2019 Kia Niro Electric
239-mile range
64kWh battery
\$38,500

Cobb County, Georgia (2017)

- "Mission-specific fuel use"
- 23 Nissan Leaf PEVs for employees

“ It is a municipal fleet manager's responsibility to be a good steward of the citizens that trust us to manage their tax dollars. ”

Al Curtis, Cobb County Director of Fleet Management



City of Sacramento (2011-2016)

- Department of General Services
- 2011-2016 incorporated 60 plug-in hybrid and BEVs into their fleet
- Motorpool Level 2 chargers that partially rely on solar
- Additional chargers for city employees



Rivian R1T

- 230-400 miles driving range
- 754 horsepower
- Can tow 11,000 pounds



- 230-mile range version coming late 2020
- \$69,000
- Also releasing a 7-passenger SUV



25 electric/hybrid models **by 2025**



13 EV models **by 2023** and pledged **\$500M** in Rivian



Electrifying its **entire portfolio by 2022** and Daimler is investing **\$10B** in EVs



20 EV models **by 2023** and plans to phase out gas vehicles



All electric/hybrid vehicles **by 2019**



TOYOTA

10 EV models by early 2020s, investing **\$13B** by 2030 into EVs and batteries

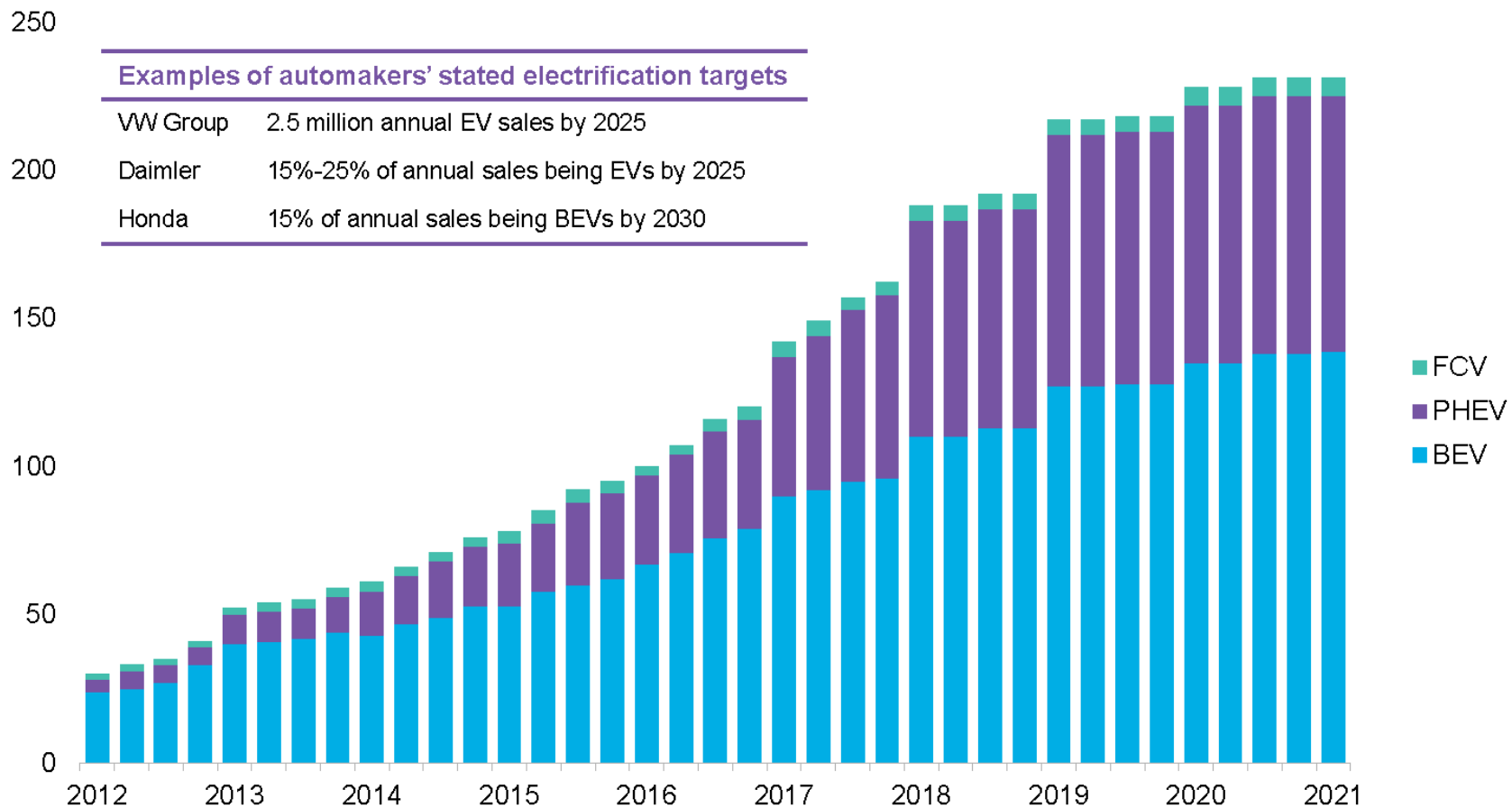
VOLKSWAGEN
GROUP



22 million BEVs by 2029

Electric vehicle model availability

Number of models available

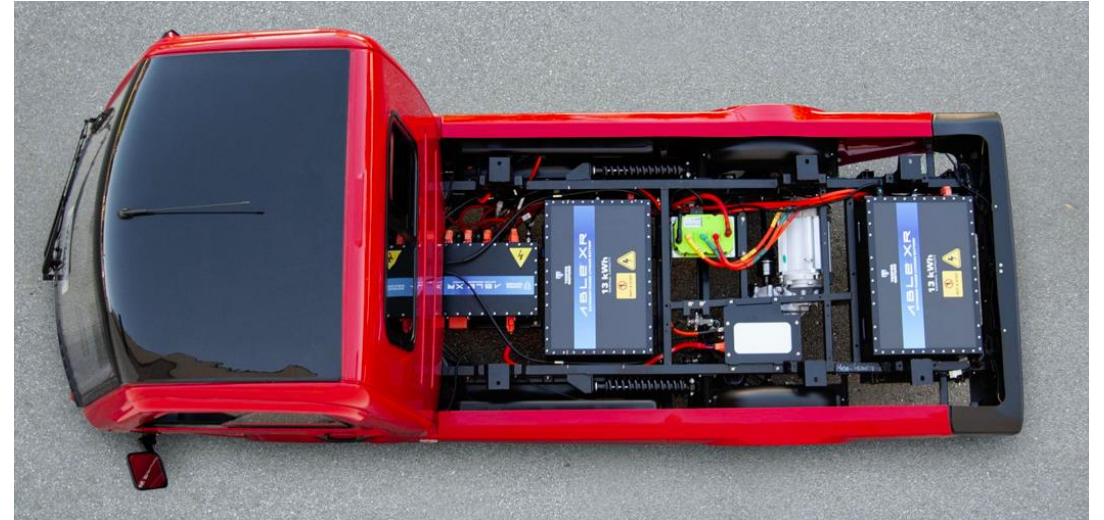


Source: Bloomberg New Energy Finance









Would You Ride On Horse Cars Were They Running Today?

Electricity holds as unquestioned a superiority in the matter of lighting as it does in the matter of transportation.

Don't Be A "Horse Car Man"

Hawaiian Electric Co., Ltd.

KING ST. NR. ALAKEA.

PHONE MAIN 390.



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