



Electric Vehicle Benefits & Availability

Jacob Bolin
Fleet Electrification Opportunities
May 8th, 2019

EV TRIVIA

Name the car...

Name the car...

0-60 mph in 2 seconds

Name the car...

0-60 mph in 2 seconds

Fastest street legal car ever built

Name the car...

0-60 mph in 2 seconds

Fastest street legal car ever built

1900 (brake) horsepower

Name the car...

0-60 mph in 2 seconds

Fastest street legal car ever built

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Accelerates faster than an F-16 jet

Name the car...

0-60 mph in 2 seconds

Fastest street legal car ever built

1900 (brake) horsepower

Accelerates faster than an F-16 jet

280 miles of range

Source: CNBC



Pininfarina Battista “hypercar”

Payback Calculations

Purchase: \$2.5 Million

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Annual Savings: \$700

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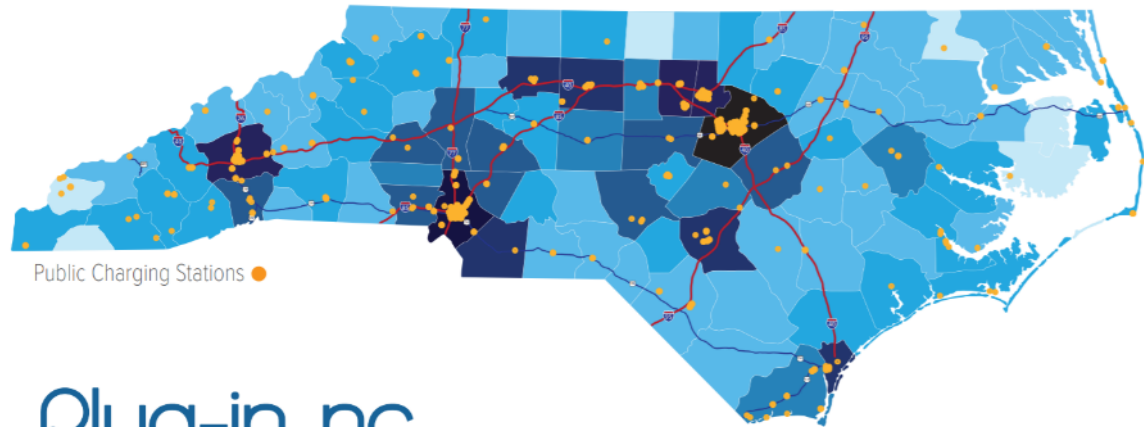
3,571 Years

Plug-in NC



- State wide collaborative industry group promoting electric vehicle adoption since 2011.
- Long time planning partner with the Department of Energy and North Carolina's Clean Cities Coalitions.
- Promote electric vehicle adoptions through education and outreach, consulting and resource development.
- Provides a collaborative opportunity for stakeholders to work together to ensure a seamless integration of plug-in electric vehicles into our local communities.

North Carolina Electric Vehicles & Charging Stations



What is your level of knowledge about EVs?

- Almost none
- I know a little
- I know a lot
- Expert Status

Current reasons to implement or explore EVs?

- Potential fuel and/or maintenance savings
- Comply with air quality/sustainability initiatives at your organization
- Noise levels
- Other

Why Drive Electric?

Electric vehicles provide:

- Cost savings
- High performance
- Healthier communities
- Energy independence
- Load Management & Balance



Most Important Electric
Vehicle Factors

Economic Impacts for NC

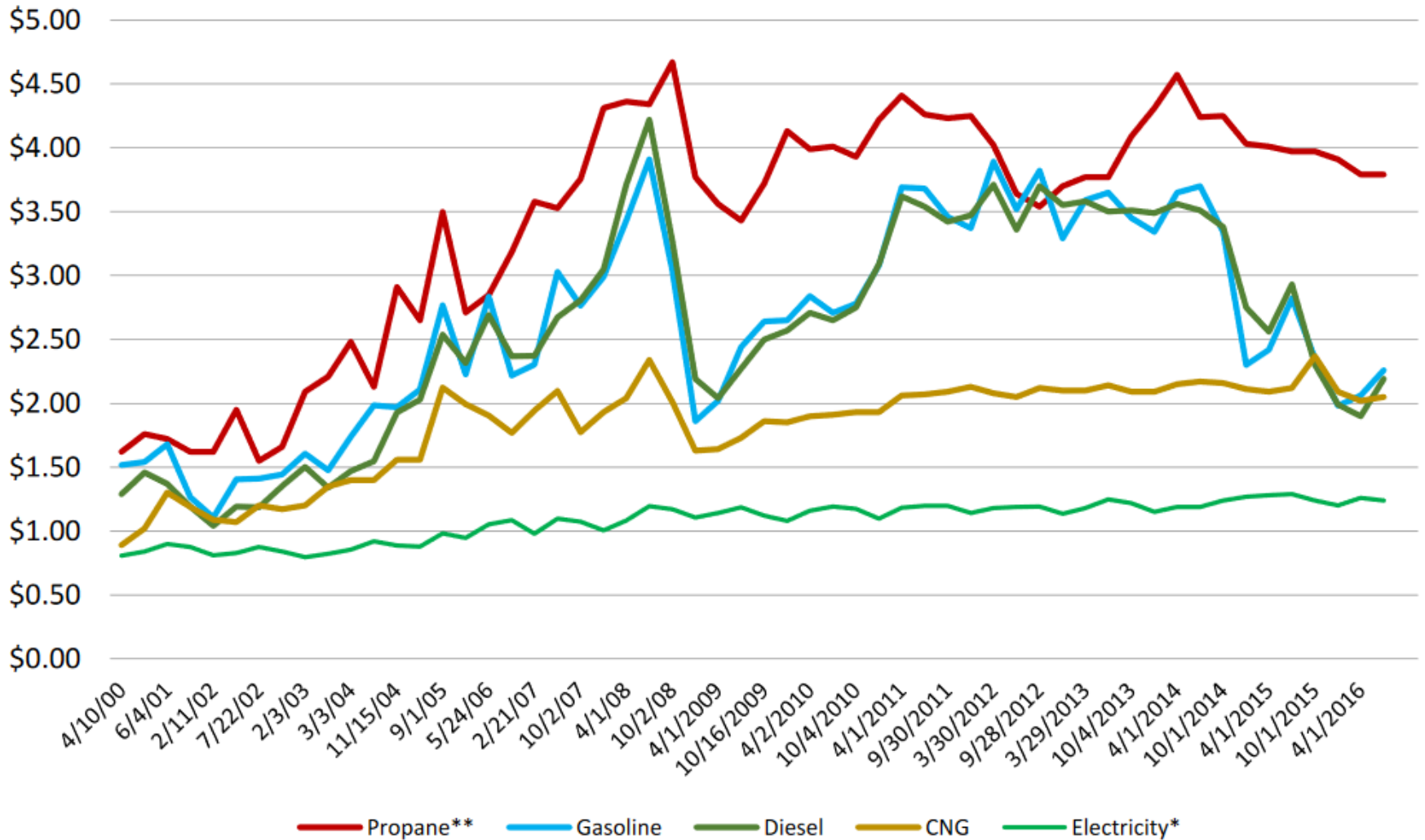
ANNUAL FUEL COST SAVINGS				
Miles per Year	Avg. Miles per Day	Gasoline Cost per Year	Electric Cost per Year	Annual Savings
10,000	27	\$917	\$333	\$583
12,000	33	\$1,100	\$400	\$700
15,000	41	\$1,375	\$500	\$875
20,000	55	\$1,833	\$667	\$1,167
25,000	68	\$2,292	\$833	\$1,458

Electric:
\$0.03/mile

Gasoline:
\$0.09/mile

Assumptions: Cost per Gallon Gasoline \$2.75, Cost per kWh- \$0.10

U.S. Average Retail Fuel Prices



<https://www.afdc.energy.gov/fuels/prices.html>

NYC Fleet - Maintenance Savings



Bill de Blasio, Mayor
Lisette Camilo, Commissioner
Keith T. Kerman, Deputy Commissioner
and Chief Fleet Officer

NYC Fleet Newsletter

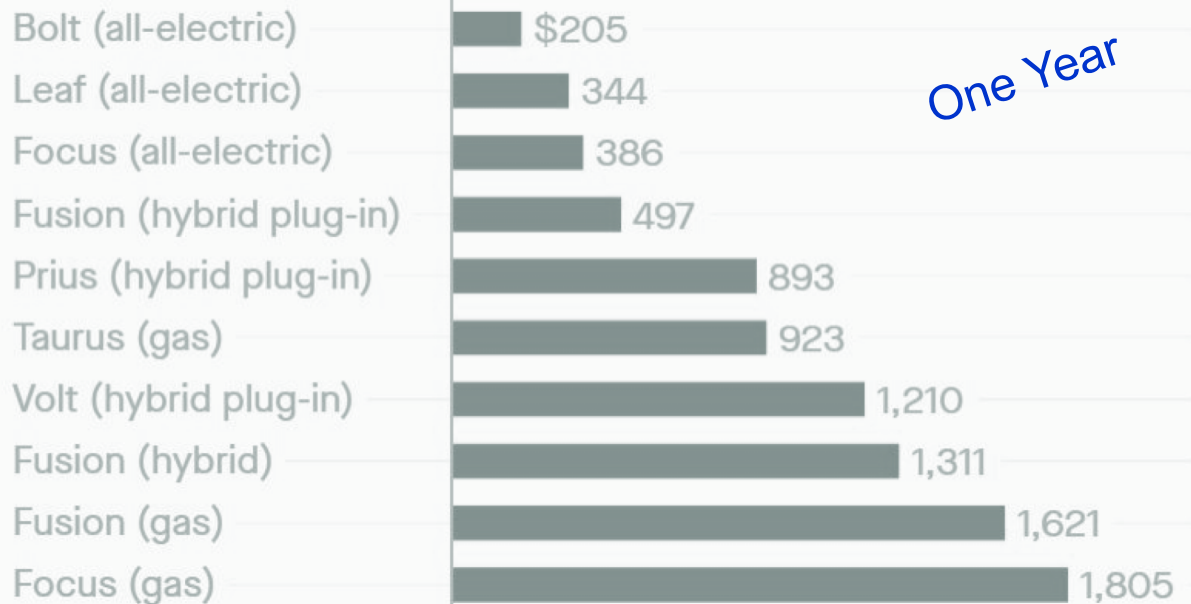
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Reducing Maintenance Costs With Electric Vehicles

By: Keith T. Kerman

When we discuss benefits of electric plug-in vehicles, we generally focus on stopping the use of fossil fuels and the air quality and greenhouse benefits this brings. Electric vehicles also offer the promise of substantial reductions in maintenance and repair costs and service disruptions.

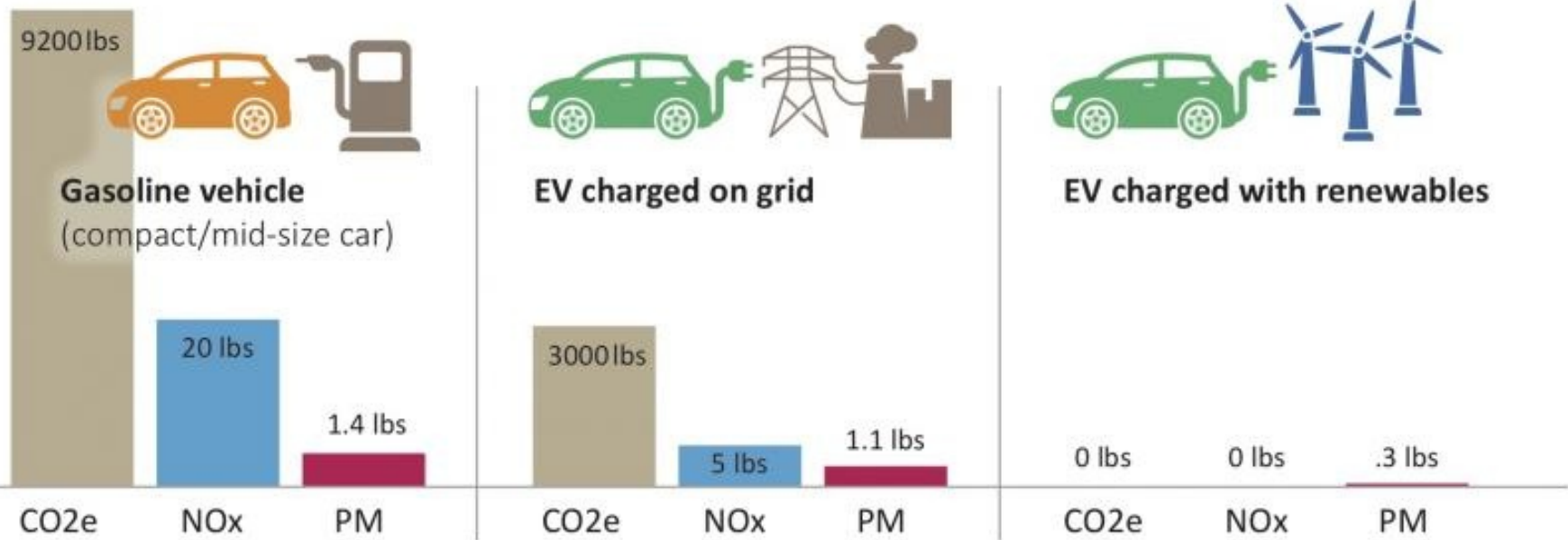
maintenance costs (2018)



Source: nyc.gov/DCAS

Environmental Impacts

Annual vehicle emissions by fuel type (12,000 miles)



Source: MN Pollution Control Agency


Plug-in Electric Vehicles

- Move toward **electricity** as primary fuel source
- Plug into an external electrical power supply to refuel
- Have an electric motor or combination of electric motor and gasoline engine (hybrid) that propels the vehicle




Toyota Prius
Hybrid Electric



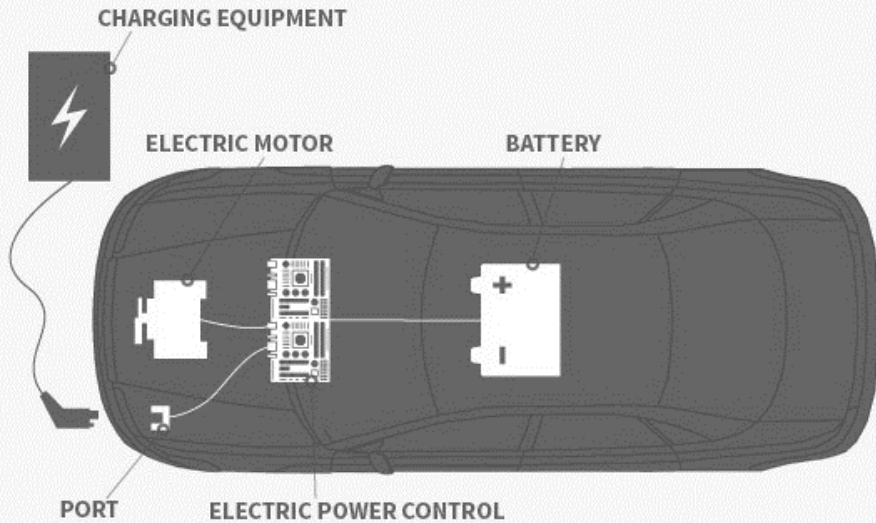
GM's Chevy Volt
Plug-in Hybrid 



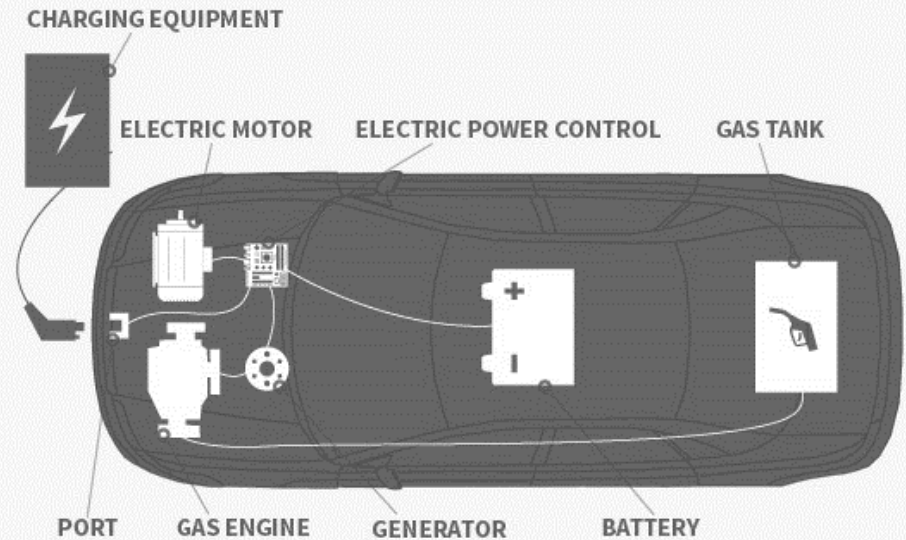
Nissan LEAF
Plug-in All-Electric 

Plug-in Electric Vehicles

Plug-in All Electric Vehicle



Plug-in Hybrid Electric Vehicle



Automakers Selling EVs in NC - 18



Popular All-Electric Models



Nissan LEAF
151 Miles (2018) 200+ Miles (2019)



BMW i3
114 Miles (optional range extension)



Tesla Model S
210 to 315 Miles



Tesla Model 3
220 - 310 Miles



Chevy Bolt EV
238 Miles

Popular Plug-in Hybrid Electric Models



Chevy Volt
420 Total Miles / 53 Electric



Ford C-Max Energi
620 Total Miles / 21 Electric



BMW X5 eDrive
340 Total Miles / 20 Electric

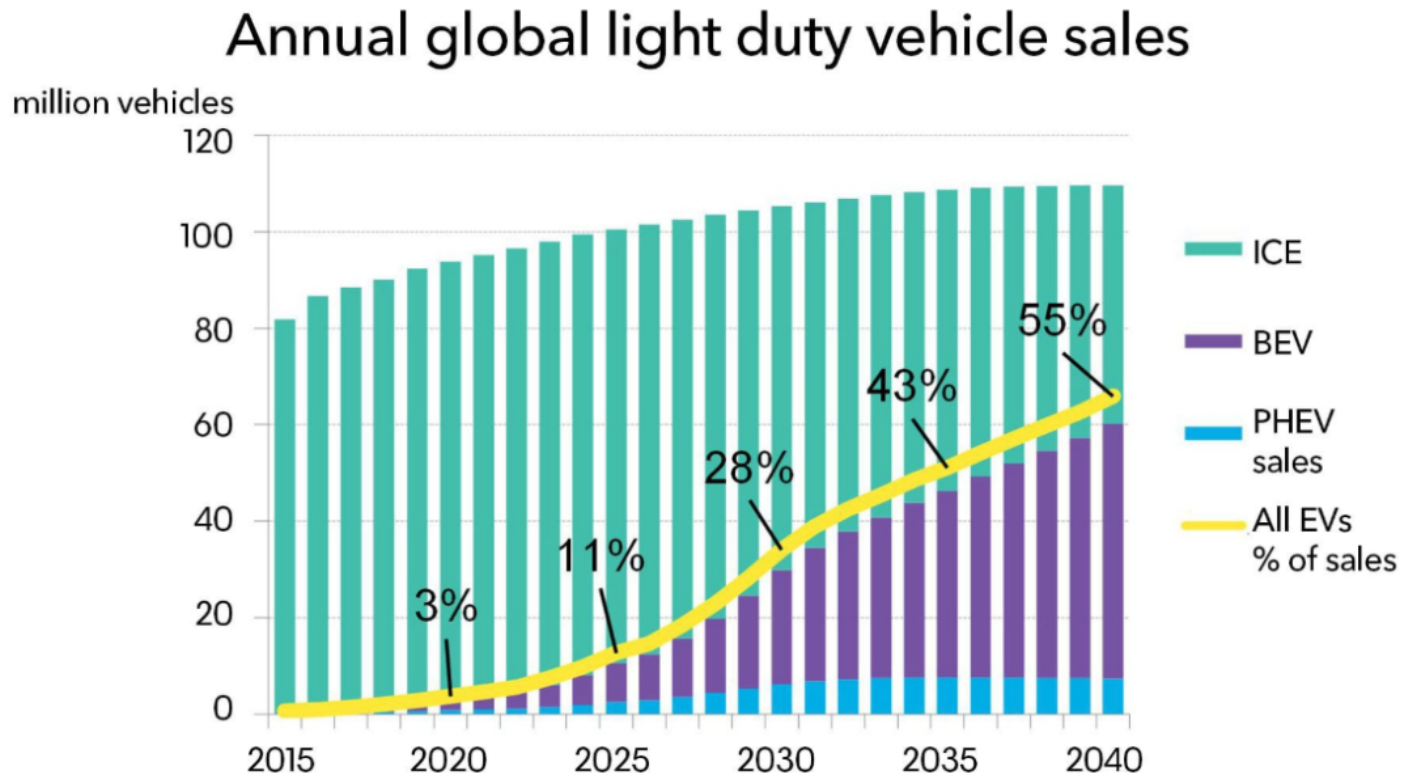


Workhorse Pick-up
310 Total Miles / 80 Electric



Toyota Prius Prime
640 Total Miles / 25 Electric

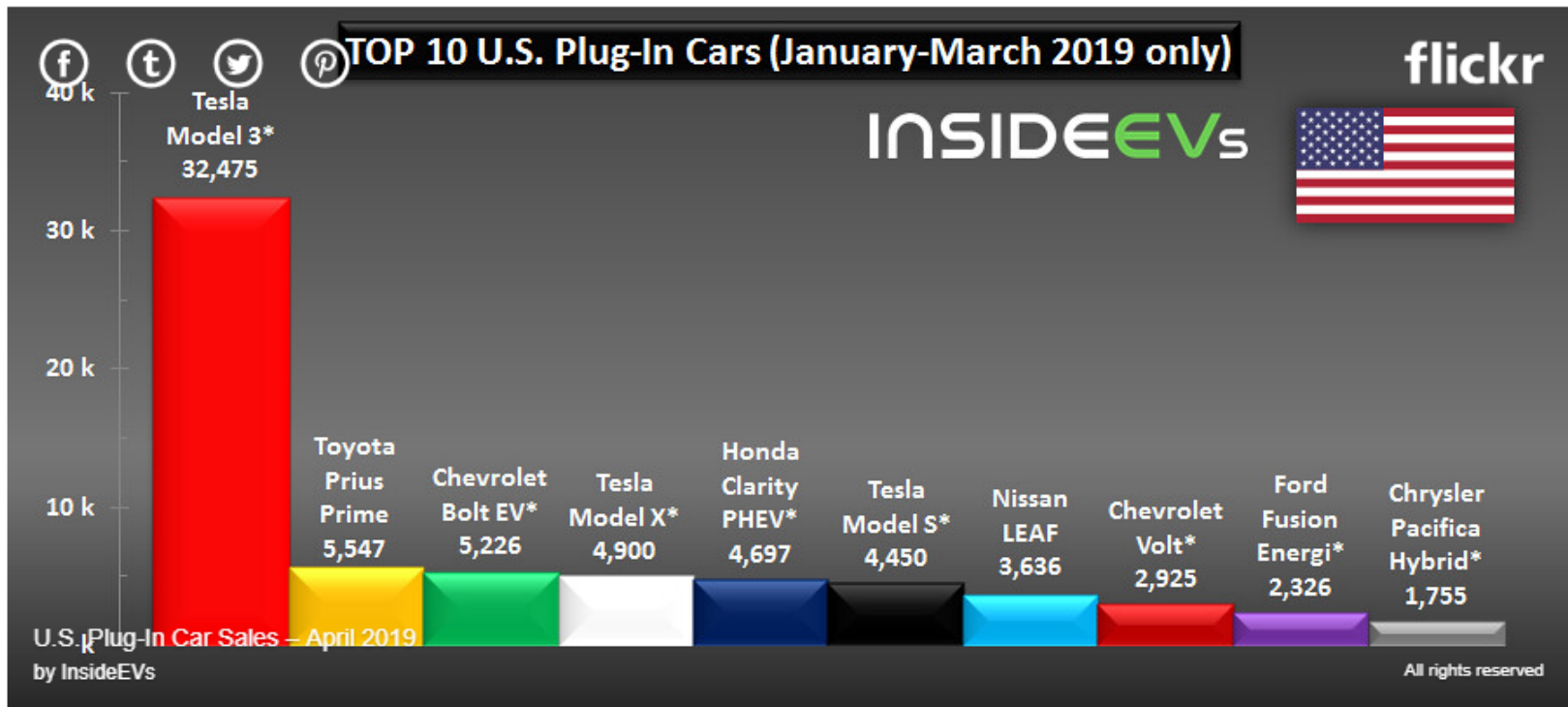
Projected EV Growth Rates



Source: Bloomberg New Energy Finance

Electric Vehicle Outlook 2018: Public Report

2019 EV Sales



Fleet Best-Fit Applications

- Light-Duty EV offerings are most prominent
- Vehicles traveling 5,000 – 15,000 miles per year can achieve cost-parity
- Vehicles traveling more than 15,000 miles per year provide life cycle cost savings
- Steady daily mileage
- Frequency of overnight parking locations

The Future of EVs

Light-duty offerings by 2022(ish)

“**Ford** is investing \$4.5 billion in electric cars, and will be adding 13 electric cars and hybrids by 2020.”

“**Honda's** CEO recently announced that two-thirds of its line-up by 2020 will be electrified.”

“ **BMW** has stated that it intends to make plug-in hybrid electric versions of every single car it builds.”

2020 Ford Escape (PHEV) – 30 Mile e-range

Introducing the 2020 Ford Escape



Pre-production models shown throughout. 2020 Ford Escape shown. Available Fall 2019.
2020 Ford Escape Hybrid available Fall 2019. 2020 Ford Escape Plug-In Hybrid available Spring 2020.

Source: Ford

2020 Kia Soul – 243 miles



Source: Kia

2019 Kia Niro – 239 miles



Kia

Source: Kia



Workhorse W-15 (PHEV): 80 Mile e-range



Source: EV Bite

2020 Rivian R1T – 400 miles



Source: Myev.com

2022 VW ID Buzz ~ 300 miles



Concept vehicle shown. Not available for sale.
Specifications may change.

Source: VW

Medium and Heavy Duty Electric Vehicles

Vehicle Classes

New vehicle classes are coming with larger batteries and faster charging speeds.



MEDIUM and HEAVY DUTY Electric Vehicles Available				
Class	Type	Example Manufacturers	Battery Size (capacity in kWh)	Charging Speed
Class 4	Hybrid-Electric Ford Transit Van	XL Hybrids	1.8 - 15 kWh	3.3 kW
Class 5	Hybrid-Electric Box Truck	HINO	99 kWh	16.5 kW
Class 6	All-Electric Refuse Truck	BYD	99 kWh	16.5 kW
Class 7	Kalmar All-Electric Class 7 Tractor	TransPower	150 kWh	70 kW
Class 8	All-Electric Class 8 Tractor	US Hybrid	188 kWh	80 kW
Forklifts	All-Electric Lithium Ion BYD Forklift	BYD	37 kWh	24 kW
Transit Buses	All-Electric Transit Bus (35 or 40 foot)	Proterra	79-440 kWh	200-300 kW
School Buses	All-Electric School Bus	Blue Bird	150 kWh	20 kW

Workhorse NGEN-1000



Workhorse's NGEN-1000 electric van. (Photo: Workhorse)

“United Postal Service, by far Workhorse’s biggest customer, ordered 950 NGEN-1000 vans in June 2018. Global logistics giant DHL ordered 63.” – Trucks.com

Mercedes-Benz ESPRINTER



Source: Myev.com

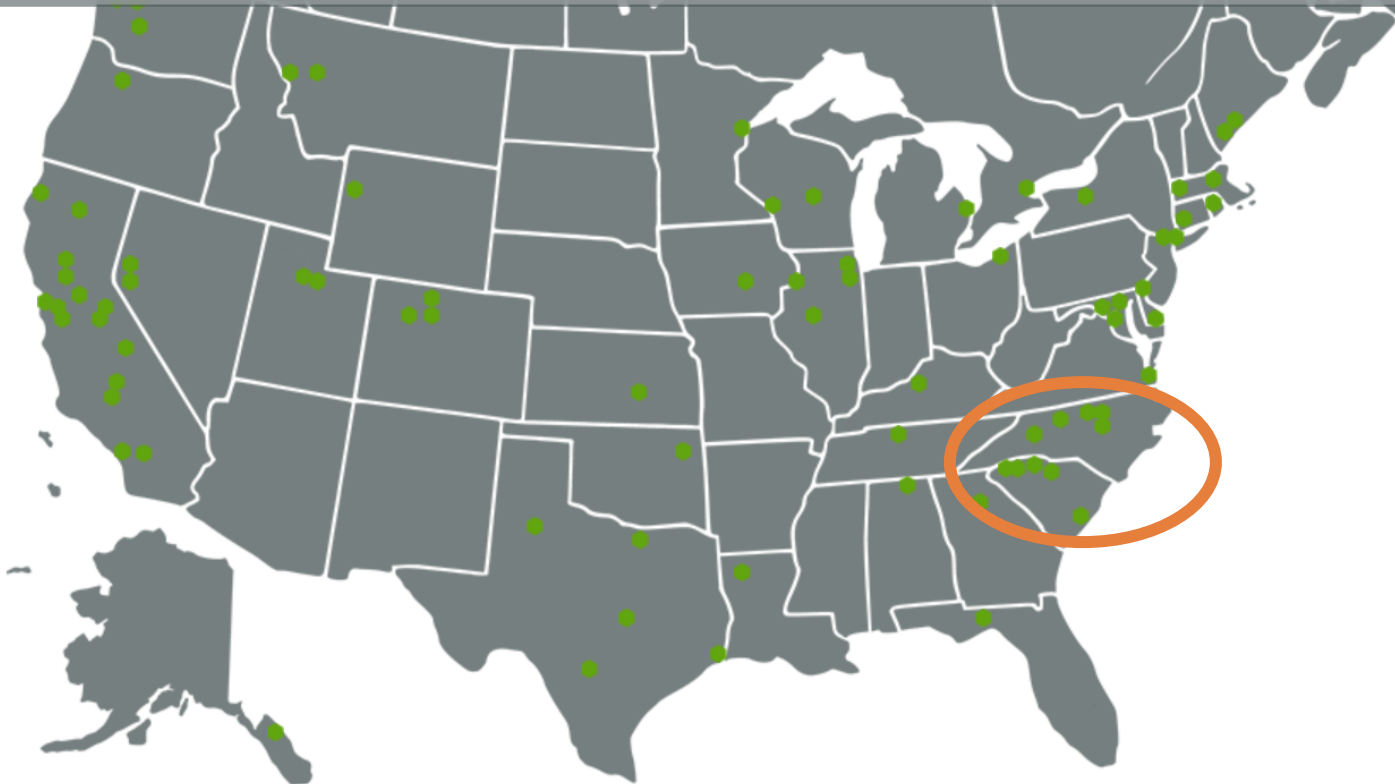
LION 8

URBAN CLASS 8 TRUCK



Public Transit & School Buses





Source: <https://www.proterra.com/our-story/our-customers/>

Key Takeaways

- Viable EV options on the road today
- Over 1.1 Million Plug-in Vehicles have been sold in U.S.
- By 2025, approximately 7 million EVs on US roads
- Payback < 3500 years

Fleet Resources

- NJPA/Sourcwell – National Auto Fleet Group
- Fleets 4 the Future
- EVI Pro Lite
- AFLEET – Argone National Laboratory

Resources

Air Quality and Economic Benefits of Electric Transportation

Plug-in NC recommends that Volkswagen environmental mitigation funds:

- Allocate the maximum 15 percent of the funds to increasing electric vehicle charging infrastructure in North Carolina.
- Accelerate the proven benefits of light-duty electric vehicle adoption by immediately expanding EV charging networks into low coverage high impact areas.
- Prioritize medium and heavy duty vehicle replacements with available electric vehicles.

Why support electric vehicles?

- Environmental Improvements**
 - Air quality improvements are the goal of the Volkswagen Settlement funds.
 - Investing in charging infrastructure can help move the consumer marketplace to electric vehicles for a big impact on NC's emissions.
 - The electric grid gets cleaner every day and emissions benefits will grow over time.
- Economic Development**
 - Several NC companies work with electric vehicles, including charging station manufacturers and grid integration suppliers. These include AES, General Electric, Siemens and EngieGrid Transportation Solutions.
 - By shifting to electric fuel, drivers save money and spend locally.
- Cost Savings**
 - Electricity is \$1 per gallon equivalent fuel alternative.
 - Federal tax credits and dealer incentives make electric vehicle purchases attractive.
 - Electric vehicles have lower maintenance costs.
- Energy Independence**
 - Electric fuels are locally generated.
 - Domestically produced fuels are not as subject to international influences and/or severe weather events.
 - A variable mix of electric generation fuels provides stability in electricity pricing.
- Beneficial Grid Asset**
 - Encourage greater integration of renewable generation, help manage peak loads, optimize energy efficiency and enable vehicle-to-grid power supply.

plug-in nc Webinar

Message from Advanced Energy admin
Welcome to the National Drive Electric Week webinar! We'll be taking questions at the end please share any questions you have here.

Presenters
Lindsay Brecheisen

COMMUNITY PLANNING GUIDE FOR ELECTRIC VEHICLES

EV Growth

NC growth in light-duty electric vehicles: 50% year over year

Public charging stations grew 30% over the last year

Still need more...

- NC has a good charging network, however there is a lot of gaps.
- The Electric Power Research Institute (EPRI) recommends public charging stations for vehicles.

Other Benefits

TOURISM destinations can attract more visitors. Electric vehicles can charge while visiting attractions across the state, including rural destination areas.

Visitors from other states will stop in NC to charge while traveling.

NC will be seen as a state that promotes green tourism.

MEDIUM and HEAVY DUTY electric vehicles

What is available?

Reduced emissions even with plug-in hybrids! There are more emissions reductions per mile for medium and heavy-duty vehicles than for the low per gallon mileage.

What is Plug-In NC?

- State will lead industry in electric vehicle sales by 2015.
- Long time partner with the Deep South and North Carolina Cities Coalition.
- Promote electric adoptions through outreach and resource development.
- Provides a collaborative opportunity for stakeholders to work together to seamlessly integrate electric vehicles into communities.

North Carolina Electric Vehicles & Charging Stations: 2016

Electric Vehicle Registrations (2016)

Public Charging Stations (2016)

Type	Example Manufacturers
Hybrid Electric Ford Transit Van	AL Hybrids
Hybrid Electric Box Truck	EMCO
All Electric Refuse Truck	BYD
Kahner All Electric T2 Van/Taxi	TransPower
All-Electric Class 6 Tractor	GE Hybrid
All-Electric Lithium Ion BYD Purcell	BYD
All-Electric Transit Bus (35 or 40 Seat)	Proterra
All-Electric School Bus	Blue Bird

80+

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Thank You!

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