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
1900 (brake) horsepower
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 “hypercars”
Payback Calculations

Purchase: $2.5 Million
Payback Calculations

Purchase: $2.5 Million
Annual Savings: $700
Payback Calculations

Purchase: $2.5 Million
Annual Savings: $700

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

plug-in nc
www.pluginncc.com
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

<table>
<thead>
<tr>
<th>Miles per Year</th>
<th>Avg. Miles per Day</th>
<th>Gasoline Cost per Year</th>
<th>Electric Cost per Year</th>
<th>Annual Savings</th>
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<tbody>
<tr>
<td>10,000</td>
<td>27</td>
<td>$917</td>
<td>$333</td>
<td>$583</td>
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<td>12,000</td>
<td>33</td>
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<td>15,000</td>
<td>41</td>
<td>$1,375</td>
<td>$500</td>
<td>$875</td>
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<td>20,000</td>
<td>55</td>
<td>$1,833</td>
<td>$667</td>
<td>$1,167</td>
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<td>25,000</td>
<td>68</td>
<td>$2,292</td>
<td>$833</td>
<td>$1,458</td>
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</tbody>
</table>

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

Electric: $0.03/mile
Gasoline: $0.09/mile
U.S. Average Retail Fuel Prices

https://www.afdc.energy.gov/fuels/prices.html
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)

- Bolt (all-electric): $205
- Leaf (all-electric): $344
- Focus (all-electric): $386
- Fusion (hybrid plug-in): $497
- Prius (hybrid plug-in): $893
- Taurus (gas): $923
- Volt (hybrid plug-in): $921
- Fusion (hybrid): $1,311
- Fusion (gas): $1,621
- Focus (gas): $1,805

Source: nyc.gov/DCAS
Environmental Impacts

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

- **Gasoline vehicle** (compact/mid-size car):
  - CO2e: 9200 lbs
  - NOx: 20 lbs
  - PM: 1.4 lbs

- **EV charged on grid**:
  - CO2e: 3000 lbs
  - NOx: 5 lbs
  - PM: 1.1 lbs

- **EV charged with renewables**:
  - CO2e: 0 lbs
  - NOx: 0 lbs
  - PM: 0.3 lbs

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
Plug-in Electric Vehicles

Plug-in All Electric Vehicle
- Charging Equipment
- Electric Motor
- Battery
- Port
- Electric Power Control

Plug-in Hybrid Electric Vehicle
- Charging Equipment
- Electric Motor
- Electric Power Control
- Gas Tank
- Gas Engine
- Generator
- Battery
- Port
Automakers Selling EVs in NC - 18
Popular All-Electric Models

Nissan LEAF

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

Annual global light duty vehicle sales

Source: Bloomberg New Energy Finance

Cumulative 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

Source: Government-fleet.com
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.”
Introducing the 2020 Ford Escape
2020 Kia Soul – 243 miles

Source: Kia
2019 Kia Niro – 239 miles

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

<table>
<thead>
<tr>
<th>Vehicle Classes</th>
<th>Description</th>
<th>MEDIUM and HEAVY DUTY Electric Vehicles Available</th>
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</thead>
<tbody>
<tr>
<td>Class 4</td>
<td>Hybrid-Electric Ford Transit Van</td>
<td>XL Hybrids</td>
</tr>
<tr>
<td>Class 5</td>
<td>Hybrid-Electric Box Truck</td>
<td>HINO</td>
</tr>
<tr>
<td>Class 6</td>
<td>All-Electric Refuse Truck</td>
<td>BYD</td>
</tr>
<tr>
<td>Class 7</td>
<td>Kalmar All-Electric Class 7 Tractor</td>
<td>TransPower</td>
</tr>
<tr>
<td>Class 8</td>
<td>All-Electric Class 8 Tractor</td>
<td>US Hybrid</td>
</tr>
<tr>
<td>Forklifts</td>
<td>All-Electric Lithium Ion BYD Forklift</td>
<td>BYD</td>
</tr>
<tr>
<td>Transit Buses</td>
<td>All-Electric Transit Bus (35 or 40 foot)</td>
<td>Proterra</td>
</tr>
<tr>
<td>School Buses</td>
<td>All-Electric School Bus</td>
<td>Blue Bird</td>
</tr>
</tbody>
</table>
Workhorse NGEN-1000

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/Sourcewell – National Auto Fleet Group

• Fleets 4 the Future

• EVI Pro Lite

• AFLEET – Argone National Laboratory
Resources

Community Planning Guide for Electric Vehicles

80+

Plug-in nc

Air Quality and Economic Benefits of Electric Transportation

Why support electric vehicles?

EV Growth

Other Benefits

What is Plug-in NC?


Electric Vehicle Registrations (2016)

Public Charging Stations (2016)
Thank You!

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