North Carolina Energy Policy Council

AGENDA
10:00 a.m. Wednesday February 21, 2018
William G. Ross Jr. Environmental Conference Center
Nature Research Center
121 West Jones Street, Raleigh, North Carolina
27603

1. Call to order, opening remarks, and approval of the minutes from the November 9, 2017,
   Council meeting (5 min)
   Lieutenant Governor Dan Forest, Chair

2. Discussion of Electric Vehicles: Infrastructure, Demands, and Priorities (2 hours)
   Break (15 min)

3. Financing Opportunities; Volkswagen Settlement Agreement (1 hour and 10 min)

4. Council discussions and actions (10 min)

5. Public comment (10 min)

6. Closing remarks and adjourn (5 min)
   Lieutenant Governor Dan Forest, Chair
DISCUSSION OF ELECTRIC VEHICLES:

INFRASTRUCTURE, DEMANDS, AND PRIORITIES
DISCUSSION OF ELECTRIC UTILITY INFRASTRUCTURE; PRIORITIES AND NEEDS

KATE STAPLES, DOMINION POWER
### Electric Vehicle Charging Infrastructure Levels

<table>
<thead>
<tr>
<th>Charging Level</th>
<th>Range Added by Time/Charger Power</th>
<th>Supply Power</th>
<th>Connector</th>
<th>Equipment Cost Estimate</th>
<th>Installation Cost Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Level 1</td>
<td>4 mi/hour @ 1.4kW 6 mi/hour @ 1.9kW</td>
<td>120v AC; 20A (12-16A continuous)</td>
<td>Vehicles come with a portable charging cable</td>
<td>$300-$1,800</td>
<td>$0-$3,000</td>
</tr>
<tr>
<td>AC Level 2</td>
<td>10 mi/hour @ 3.4kW 20 mi/hour @ 6.6kW 60 mi/hour @ 19.2kW</td>
<td>208/240v AC; 20-100A (16-80A continuous)</td>
<td>J1772 connector</td>
<td>$400-$6,500</td>
<td>$600-$12,500</td>
</tr>
<tr>
<td>DC Fast Charging (Level 3)</td>
<td>24 mi/20 min @ 24kW 50 mi/20 min @ 50kW 90 mi/20 min @ 90kW</td>
<td>208/480v AC; 3 Phase input current proportional to output power</td>
<td>• SAE Combo • CHAdeMo • Tesla</td>
<td>$10,000-$40,000</td>
<td>$4,000-$50,000</td>
</tr>
</tbody>
</table>

Sources: EPRI, Clean Cities Advanced Energy, ABB
Electric Vehicle Charging Infrastructure Locations

- **Home charging** accounts for more than 80 percent of residential and fleet charging.

- **Workplace charging** is a great employee benefits and it extends daily electric range.

- **Public charging** allows for long distance travel and mass adoption.
Electric Vehicle Charging Infrastructure Locations (cont’d)

Source: Proterra

Source: Uber

Source: Port of Long Beach
Opportunities for Electric Utilities

Grid Utilization

- Smart Grid
  - Rate Options
  - Demand Management
- Smart Charging
  - Site Selection
  - Battery Storage
Kathleen Staples
Dominion Energy Virginia/Dominion Energy North Carolina
701 E. Cary Street Richmond, Virginia 23219
(804) 771-4720
kathleen.d.staples@dominionenergy.com
OUTLOOK AND PROJECTIONS FROM NC DEPARTMENT OF TRANSPORTATION

HEATHER HILDEBRANDT, NCDOT
Electric Vehicles: NCDOT Policy/Impacts

Heather J. Hildebrandt

February 21, 2018
Road Use and Maintenance

- Annual fee at registration offsets loss of revenue typically collected as a fuel tax per gallon of fuel
  - Originally $100/year
  - Now $130/year
EV Ownership

- Approximately 8.8 million vehicles registered in 2014
- Less than 1% EV

Registered Electric Vehicles

- Electric Vehicles
Alternative Fuel Corridors

• Proposed EV Corridors between Triangle and Asheville and Triangle and Charlotte
  – Mostly “signage pending”
  – Exit signage and way finding signs needed
Electric Vehicle Charging Corridors
Signage

• EV Charging can be added to FOOD LOGO signs
• EV Charging can be added to FUELS signs
  – Canopy, well lit, open to public, emergency call box.
Public Transit Division

• Good interest throughout the state
  – Vehicles on order by Go Durham, Go Triangle, and Fayetteville
  – Considering electric buses in Greensboro and Asheville
Infrastructure at Rest Stops

• Pilot with four charges started in 2012
  – 14 months
  – 146 vehicles
  – $44 of electricity

• Removed due to conflict between state and federal laws
CMAQ

• Federal program through FHWA
• Provides funds to projects that reduce congestion and improve air quality
  – Electric Buses/ fleet vehicles
  – Charging infrastructure eligible across state
Volkswagen Settlement

- NCDOT will be working with Division of Air Quality on project selection and implementation of program
- Electrify America chose Raleigh as one of the sites for community-based charging
Questions?

Heather J. Hildebrandt
Air Quality-CMAQ Program Manager
Transportation Planning Division

hjhildebrandt@ncdot.gov
919-707-0964
EV Charger Industry Perspectives On:

- Projected EV Adoption
- Benefits of networked chargers
- Challenges to deploying charging infrastructure
- Recommendations for overcoming challenges

Marcy Bauer
Director, Key Clients and Programs
Marcy.Bauer@EVgo.com
NC: Electric Vehicle Growth Has Been Strong

- 8,500+ on the road
- 42% YOY Growth

NC REGISTERED ELECTRIC VEHICLES: 2013 TO PRESENT

Slide Content Courtesy of Chargepoint
EVgo Network Growth

Fast Charging Locations and Sessions

- Average of 1 session per site per day at the 22 EVgo fast charger sites in NC
- Highest use EVgo site (Fremont CA): 70 sessions per day (18 per charger)
Projection shows that by 2026, EV sales will increase to nearly 10x over today’s sales.

Driven by more choices for drivers and falling battery prices.

Supported by more availability of charging infrastructure, both Level 2 and DCFC.
More Infrastructure Needed to Meet EV Driver Needs

- Current infrastructure is not enough to meet the demands of today’s NC EV driver, not prepared for future growth.

- Transportation is getting autonomous, electrified, and shared – requires significant investment in EV charging.

- States must prepare for mass electrification and smart charging – set targets to scale EV charging and prepare for mass EV adoption.

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**NREL Plug in EV Infrastructure Analysis: 2030**

<table>
<thead>
<tr>
<th>State</th>
<th>Total PEV</th>
<th>%BEV</th>
<th>Workplace L2 Plugs</th>
<th>Public L2 Plugs</th>
<th>Public DCFC</th>
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<tr>
<td>NC</td>
<td>475,000</td>
<td>47%</td>
<td>12,900</td>
<td>8,900</td>
<td>1,020</td>
</tr>
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</table>

Slide Content Courtesy of Chargepoint
EV Charger Deployment Challenges

**Design Constraints (ADA, Building Codes)**
- Can severely restrict or even eliminate the option of adding EV chargers
- Lack of familiarity or scaled requirement structure can add weeks or even months (and $$$) to an otherwise simple project
- Demand charges can make building the critical inter-city and corridor chargers impossibly costly
- Overly prescriptive or restrictive funding program language, or incentives for vehicles w/o chargers, can actually impede EV adoption

**Permitting and Utility Timelines**
- Can severely restrict or even eliminate the option of adding EV chargers
- Lack of familiarity or scaled requirement structure can add weeks or even months (and $$$) to an otherwise simple project
- Demand charges can make building the critical inter-city and corridor chargers impossibly costly
- Overly prescriptive or restrictive funding program language, or incentives for vehicles w/o chargers, can actually impede EV adoption

**Charger Operating Costs**
- Can severely restrict or even eliminate the option of adding EV chargers
- Lack of familiarity or scaled requirement structure can add weeks or even months (and $$$) to an otherwise simple project
- Demand charges can make building the critical inter-city and corridor chargers impossibly costly
- Overly prescriptive or restrictive funding program language, or incentives for vehicles w/o chargers, can actually impede EV adoption

**RFP and Grant Structures**
- Can severely restrict or even eliminate the option of adding EV chargers
- Lack of familiarity or scaled requirement structure can add weeks or even months (and $$$) to an otherwise simple project
- Demand charges can make building the critical inter-city and corridor chargers impossibly costly
- Overly prescriptive or restrictive funding program language, or incentives for vehicles w/o chargers, can actually impede EV adoption
Any charging network will inherently have low and high utilized stations.

Even the low utilization sites are important to drivers.
EV Charger Deployment Challenge: Demand Charges

Demand of SDG&E Freedom Station #1—June 2016
Peak Demand = 86.7 kW

<table>
<thead>
<tr>
<th>kWh</th>
<th>Bill Total</th>
<th>Demand Charge</th>
<th>Demand Charge % of Total Bill</th>
<th>Cost per kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,630</td>
<td>$3,124</td>
<td>$2,766</td>
<td>88%</td>
<td>$1.96</td>
</tr>
</tbody>
</table>

Each bar color represents a different day in June.
EV Charger Deployment Challenge: Demand Charges

<table>
<thead>
<tr>
<th></th>
<th>Jun-16 kWh</th>
<th>May-17 kWh</th>
<th>Bill Total</th>
<th>Demand Charge</th>
<th>Demand Charge % of Total Bill</th>
<th>Cost per kWh</th>
</tr>
</thead>
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<tr>
<td>kWh</td>
<td>1,630</td>
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<td>$2,766</td>
<td>88%</td>
<td>$1.96</td>
</tr>
<tr>
<td></td>
<td>$2,602</td>
<td></td>
<td></td>
<td>$1,773</td>
<td>68%</td>
<td>$0.87</td>
</tr>
</tbody>
</table>

SDG&E Summer Peak
11:00 AM - 6:00 PM

Each bar color represents a different day in June.
Network Blended Electricity Costs ($/kWh)

<table>
<thead>
<tr>
<th>$0.00</th>
<th>$0.10</th>
<th>$0.20</th>
<th>$0.30</th>
<th>$0.40</th>
<th>$0.50</th>
<th>$0.60</th>
<th>$0.70</th>
</tr>
</thead>
</table>

Based on EPA estimates of 1 gallon of gas = 33.7 kWh and EIA estimates of $3/gallon of gas in CA ($2.50 nationwide)
Gas is $.07/kWh nationwide, $.09 in CA

Network Fixed Electricity Costs ($/kWh)
Network Variable Electricity Costs ($/kWh)
Gas Parity @ $0.29/kWh

Current Blended $/kWh = $0.51/kWh
Network Utilization = 4-5%

Network Utilization

Electricity Costs AND Utilization
## EV Charger Deployment Challenges & Recommendations

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Constraints (ADA, Building Codes)</td>
<td>EV Ready Codes / Ordinances</td>
</tr>
<tr>
<td>Permitting and Utility Timelines</td>
<td>Charger as amenity, not parking space type</td>
</tr>
<tr>
<td>Charger Operating Costs</td>
<td>AHJ &amp; Utility Engagement (Rapid Response)</td>
</tr>
<tr>
<td>RFP and Grant Structures</td>
<td>Utility Engagement (Electricity Rate Restructure, Make-ready)</td>
</tr>
<tr>
<td></td>
<td>State EV Adoption Goal</td>
</tr>
<tr>
<td></td>
<td>Industry Engagement Up Front</td>
</tr>
</tbody>
</table>
Electric Vehicle Charging Stations: Advancing Smart Transportation

David Schatz
Director, Public Policy
November 8, 2017
Smart Charging is 21st Century Infrastructure

- Transportation is getting autonomous, electrified, and shared.
- States must prepare for mass electrification and charging.
- States that embrace innovation and competition will attract private investment and advanced tech.
1. Locate a station via a mobile app
2. Tap RFID card or phone to station to link to account
3. Start charging session
4. Check status on app/receive notifications; True up drivers fee (if needed)
Connected EV Charging – Value for All

**EV Drivers**
- Availability
- Information
- Convenience
- Seamless payment
- Consistent user experience

**Site Hosts (Commercial)**
- Maximize utilization
- Customizable tools
- Simple operation
- Limited administration
- Continuous upgrades
- Ensure uptime

**Utilities**
- Support EV adoption
- Visibility into the grid
- Data for load forecasting
- Load Management
- Flexible lever
- Seamless integration
NC: Electric Vehicle Growth is Strong

- 8,500+ on the road
- 42% YOY Growth
- .06% of all NC cars
**NC: Projections show even stronger growth**

- Projection shows that by 2026, EV sales will increase to nearly **10x** over today’s sales.
- Driven by more choices for drivers and falling battery prices.
- Supported by more availability of charging infrastructure, both Level 2 and DCFC.

*Source: Navigant 2017 Forecast*
Current ChargePoint Deployments by Category

- Workplace (46% of ports)
- Municipal (11% of ports)
- Retail (10% of ports)
- Parking (9% of ports)
- Multifamily (7% of ports)
- Hospitality (4% of ports)
- Healthcare (3% of ports)
- Education (6% of ports)
- Government (Fed, State) (2% of ports)
- Parks and Recreation (1% of ports)
- Fleet (2% of ports)
EV Ready Ordinance Addresses Major Barrier for Installing in Buildings

• EV ready ordinances typically specify a ratio of parking spots at nonresidential and multifamily buildings (and sometimes single/dual family homes) that must have the electrical capacity, pre-wiring, and conduit to support EV charging equipment.

• EV ready building codes help future-proof buildings, and are the most cost-effective way to bring EV charging to infrastructure to cities.

• Dozens of cities, counties, states, provinces, and countries across North America and Europe have adopted EV ready building codes.
More infrastructure is needed to meet the demands of EV drivers

NREL Plug in EV Infrastructure Analysis: 2030

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• Current infrastructure is not enough to meet the demands of today’s NC EV driver, not prepared for future growth
• Future growth of EVs requires significant investment in EV charging
• State must set targets to scale EV charging and prepare for mass EV adoption
Competitive Market for EV Charging

• North Carolina’s market for EV charging is served by a competitive market that has been deploying in the State for nearly 10 years.

• Site hosts currently choose from a range of products and services from multiple providers.

• Protecting that competitive market is critical, as it keeps costs low and maintains an innovative sector.
Preparing for Future EV Growth

1. Set goals for EV sector
2. Support EV charging deployment
3. Utility engagement
4. Clarify regulations
5. Start with government fleets
6. Incentives work

1,000+ EV Charging Ports in NC
UPDATE ON ELECTRIFY AMERICA

MICHAEL TUBMAN, ELECTRIFY AMERICA
EV PENETRATION IN RURAL AND DISPROPORTIONATELY AFFECTED COMMUNITIES

DIONNE DELLI GATTI, ENVIRONMENTAL DEFENSE FUND
RORY CHRISTIAN, ENVIRONMENTAL DEFENSE FUND
KRISTIE ALDRIDGE, NC ELECTRIC MEMBERSHIP COOPERATIVE
Electric Vehicles in rural and disproportionately affected communities

Rory Christian,
Clean Energy Director
EV Battery Packs

EV Lithium-ion battery pack costs and global lithium-ion demand from Evs 2010-2030 ($/kWh, GWh)

Source: Bloomberg New Energy Finance.
EV Battery Packs

BNEF lithium-ion battery price survey, 2010-16 ($/kWh)

$/kWh


1000 800 642 599 540 350 273

-20% -20% -7% -10% -35% -22%

Source: Bloomberg New Energy Finance.
Cost of Ownership

U.S. medium segment vehicle price estimates, Thousands 2016$

Source: Bloomberg New Energy Finance.
### Maintenance Schedule for your 2017 Chevrolet Bolt EV

<table>
<thead>
<tr>
<th>Model</th>
<th>Service Type</th>
<th>Mileage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
<td></td>
<td>0-3,000 miles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,000-6,000</td>
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<tr>
<td></td>
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<td>6,000-9,000</td>
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<td>9,000-12,000</td>
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<td>12,000-15,000</td>
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<td>39,000-42,000</td>
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<tr>
<td></td>
<td></td>
<td>42,000-45,000</td>
</tr>
</tbody>
</table>

- Rotate tires, if recommended for the vehicle, and perform Required Services.
- Replace passenger compartment air filter (or 3 years, whichever comes first).
- Drain and fill without coolant reservoir.

### Maintenance Schedule for your 2016 Chevrolet Cruze Limited

<table>
<thead>
<tr>
<th>Model</th>
<th>Service Type</th>
<th>Mileage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certified</td>
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<td></td>
<td></td>
<td>6,000-9,000</td>
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<td></td>
<td></td>
<td>9,000-12,000</td>
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<td>12,000-15,000</td>
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</table>

- Rotate tires, if recommended for the vehicle, and perform Required Services.
- Check engine oil level and oil quality. Change engine oil and filter, if needed.
- Replace passenger compartment air filter (or 3 years, whichever comes first).
- Replace engine oil and filter (or 4 years, whichever comes first).
- Replace spark plugs and inspect spark plug wires.
- Clean and fill engine coolant reservoir (Applies to 1.4 L).
<table>
<thead>
<tr>
<th></th>
<th>CONVENTIONAL VEHICLES</th>
<th>ELECTRIC VEHICLES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Routine Maintenance</strong></td>
<td>$6,000</td>
<td>$2,000</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>$10,800</td>
<td>$8,813</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$16,800</td>
<td>$10,813</td>
</tr>
</tbody>
</table>

Total Cost calculated does not include the replacement of an EV battery. Warranty coverage will vary depending on manufacturer, check with your dealership or manufacturer to discuss warranty terms and conditions.
Industry Commitments

- Tesla’s Model 3 **started to roll off the assembly line**
- Daimler **$740 million investment** in EV batteries
- Cummins projects a **fully electric truck platform** by 2019
- Lyft **pledged to provide** a billion rides a year powered by electricity by 2025
- Porsche 2023 target for **50% of production be EVs**
- **Volvo Cars** “all the models introduced starting in 2019 will be either hybrids or powered solely by batteries”
France declared it would be all electric by 2040
India challenged itself to be gas free by 2030
Britain announced that it will ban the sale of all diesel and gas-powered cars after 2040
Norway anticipates all new car sales will be Evs by 2025
China took the global lead in terms of number of EVs on the road
  • 1 in every 5 new car sales are EVs
  • The world’s largest EV charging network with over 167,000 charging stations.
Compelling Factors

• National and sub-national commitments helping to spur development of new EV models.
• Increased competition throughout the vehicle supply chain lowering costs.
• Production scale increasing steadily and improving overall production economics
• Better performance at lower costs
U.S. Public Charging Stations

Source: AFDC
Figure 13. Distributions of public charging stations within the U.S., by state (AFDC, 2017a).
Electric Buses Potential

- Over 14,000 school buses operate daily on routes throughout North Carolina
- The average bus travels 76 miles daily
- Average cost per student $600
- Usage profile aligned with grid needs
- Potential to reduce long term costs over time
- Improved local air quality

http://www.actrees.org/files/Research/parks_on_property_values.pdf
“It is imperative that the investment and resulting benefits be available to as many of North Carolina’s residents as possible, including those who reside in the rural communities many of which are served by the state’s many electric co-ops.”

Dionne Delli-Gatti
Environmental Defense Fund

Source: AFDC
# Infrastructure Investment Impact

<table>
<thead>
<tr>
<th>Local Population</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Values</td>
<td>Attracting Business</td>
</tr>
<tr>
<td>Community Viability</td>
<td>Property &amp; Employment Tax</td>
</tr>
<tr>
<td>Employment</td>
<td>Benefits to Utilities</td>
</tr>
<tr>
<td>Education</td>
<td></td>
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</table>

Investing in charging infrastructure
Creating opportunities for rural communities
Current infrastructure focus
Investing in EV charging

1. Reduces emissions in rural communities
2. Provides rural economic development opportunities
3. Propels tourism
Reducing overall emissions in rural NC

NC Electric Cooperative Territories are Situated in NC Counties with the Highest Point Source NOx Emissions (Unit Tons, 2015)
Facilitates rural economic development
Propels tourism
Investing in EV charging

1. Reduces emissions in rural communities
2. Provides rural economic development opportunities
3. Propels tourism
North Carolina Energy Policy Council

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FINANCING OPPORTUNITIES

VOLKSWAGEN SETTLEMENT AGREEMENT
Current Actions

• The state of North Carolina was officially named a state beneficiary by Wilmington Trust, the trustee on January 30, 2018.

• A summary of comments received from the Request for Information was posted on the DAQ Volkswagen web page on January 31, 2018. Copies of all comments received are also available on our web page.

• Working on a draft mitigation plan that takes comments into consideration.
Comments Received

- Eligible Non-Infrastructure Projects, 6.1%
- Citizen Email Comments, 1.8%
- Propane Form Letters, 10%
- Ineligible Project Comments, 4%
- EV Infrastructure, 78.7%
Comments Received For Eligible Non-Infrastructure Projects

NC School Buses: 9%
Airports: 8%
Local Government: 8%
State Government: 13%
Environmental Groups: 13%
Utilities: 6%
OEM: 6%
Transit: 28%
Alt Fuels: 9%
NC School Buses: 9%
North Carolina’s allocation of the VW Settlement is approximately $92 million. DAQ received project descriptions totaling over $409 million for the Request for Information.
Key Points from Responses

**Alternative Fuels**
- Of the 872 comments, we received 84 identical comments (10%) in support of including propane powered vehicles in the N.C. Mitigation Plan.
- Many of these same commenters are in support of propane-run fleet and freight vehicles, in addition to school buses.

**Electrification Infrastructure and Electric Vehicles (EVs)**
- Of the 872 comments, we received 679 identical comments and seven unique comments (79%) in support using the full allowable 15% of funds for EV infrastructure projects.
- The 679 identical commenters also encouraged DEQ to prioritize electric vehicles and buses for replacement whenever possible with the other 85% of the settlement funds and not to use funding for natural gas, propane or diesel vehicles.
Key Points from Responses

**Eligible Equipment**

• Some commenters stated preferences for project types that they feel will bring the most benefits to North Carolina.

• We received five unique comments (1%) supporting the replacement of school buses.

• Commenters submitted project concepts and comments for replacing old school buses with clean diesel, propane, natural gas and electric buses of which three commenters submitted project concepts for replacing existing school buses with 100% electric school buses.

• 15 commenters (2%) support funding replacement of transit buses with clean diesel, hybrid diesel, propane, natural gas and electric engines. Seven of the 15 project concepts included replacement of existing transit buses with 100% electric buses.

• Commenters also supported using funds to replace diesel trucking fleets, port equipment, ferries, locomotives, agricultural, airport support and construction equipment.
Key Points from Responses

Environmental Justice and Health Impacts

• Seven (1%) commenters support use of the VW funds for environmental justice concerns. Most of these comments focus on helping overburdened communities to include fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income status.
Key Points from Responses

Ineligible Ideas

• A wide range of ineligible concepts were received.

• Ideas include using funds for light rail-related projects, pedestrian and bike pathways, supporting clean energy and infrastructure development, offering rebates for the purchase and ownership of EVs, supporting research and funding to add new vehicles to existing fleets.
Next Steps

• DAQ is working on a draft mitigation plan that takes comments into consideration.
• Develop draft project selection criteria.

• **Timeline**
  • Draft Mitigation Plan released – *mid-late March 2018*
  • Stakeholder’s meetings & webinars – *Spring 2018*
  • Final Mitigation Plan – *Spring/Summer 2018*
Contacts

Brian Phillips, Mobile Sources Compliance Branch Supervisor
Phone: 919-707-8426
Email: brian.phillips@ncdenr.gov

Phyllis Jones, Grant Administrator
Phone: 919-707-8424
Email: phyllis.d.jones@ncdenr.gov

https://deq.nc.gov/about/divisions/air-quality/motor-vehicles-and-air-quality/volkswagen-settlement
PROPAINE AS AN ALTERNATIVE FUEL

JOHN JESSUP, PRESIDENT & CEO, NC PROPANE GAS ASSN.

WAYNE MOORE, OEM & AFTERMARKET PROGRAMS MANAGER, AGILITY FUEL SOLUTIONS

CHELSEA JENKINS, EXECUTIVE DIRECTOR FOR GOVERNMENT AFFAIRS, ROUSH CLEAN TECH
North Carolina Propane Gas Association
Propane is a big deal in NC

- A billion dollar industry in NC
Propane is a big deal in NC

- #1 nationally in total retail locations and bulk plants
- We deliver over 400 million gallons of propane in North Carolina every year
- We have customers and locations in all 100 counties of North Carolina
Propane is a big deal in NC

- Over 400 licensed dealers in North Carolina eager to serve the school bus market, and there is plenty of price competition.
- 95% of Propane in the US is produced domestically
- Many companies offer free dispensing equipment with multi-year contract
The replacement vehicles would largely be new diesel-powered school buses, with some propane-powered school buses, as well as pilots of fully electric school buses and the associated charging infrastructure.”

Kevin Harrison – Dept of Public Instruction

“...Riding on outdated school buses each day can pose significant risks to students’ health. Since school bus replacement is already a State responsibility, using the VW settlement to replace older school buses gives us a terrific opportunity to invest in something that will reduce student health risks and improve student safety.”

...We hope North Carolina will join other states in considering using VW settlement money for school bus replacement purposes.”

Leanne Winner - The North Carolina School Boards Association
North Carolina currently has 8 Propane school buses

<table>
<thead>
<tr>
<th>State</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
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<td>Alaska</td>
<td>29</td>
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<tr>
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<td>Georgia</td>
<td>324</td>
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<tr>
<td>Idaho</td>
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<td>Louisiana</td>
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<td>Maine</td>
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<td>Maryland</td>
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<table>
<thead>
<tr>
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<td>Massachusetts</td>
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<td>Ohio</td>
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<td>Vermont</td>
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<td>Washington</td>
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<tr>
<td>Wisconsin</td>
<td>649</td>
</tr>
<tr>
<td>Wyoming</td>
<td>15</td>
</tr>
</tbody>
</table>
North Carolina Propane Gas Association

• We believe the best use of VW funds is to purchase propane school buses and to repower the existing used fleet of diesel buses, thereby reducing emissions in the most cost-effective way, protecting our children from emissions, and saving State funds.
North Carolina Propane Gas Association

• John Jessup, President/CEO
• jjessup@ncpga.org

NCPGA Training Center
5109 Hollyridge Dr., Raleigh, NC
(919)787-8485
www.ncpga.org
What is an engine repower?

A repower is a strategic and cost effective way to significantly reduce emissions, while allowing the original vehicle body and chassis to be maintained.

The proposal is to replace the VT365 Navistar Engine.

The VT365 engine is found in Type C school buses with model year 2007 and older.
The average lifetime of a school bus is 12 to 15 years. Replacing the diesel engine with a liquid propane gas (LPG) engine repower package will provide additional years of operation using an environmentally cleaner, quieter and more reliable product compared to diesel.

In North Carolina, 800+ diesel-powered IC school buses have experienced premature diesel engine failure well ahead of the useful life of the vehicle.

By repowering a diesel-powered bus with a clean burning propane-powered engine, NOx emissions go down by a staggering 92 percent when replacing pre-2007 diesel buses.

Benefits of operating an LPG engine provides social, economic and environmental benefits:

- Lower fuel cost & operating cost per mile driven
- Lower maintenance costs
- Cleaner burning fuel
- Lower NOx emissions
An engine repower is a strategic way to significantly reduce the emissions from an engine, but allow the original vehicle body and chassis to be maintained. This is more cost-effective than replacing the entire vehicle.

<table>
<thead>
<tr>
<th>Eligible Mitigation Project Category</th>
<th>Average Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repower with LPG engine</td>
<td>$35,000</td>
</tr>
<tr>
<td>Propane school bus replacement</td>
<td>$95,000</td>
</tr>
<tr>
<td>Compressed Natural Gas school bus replacement</td>
<td>$125,000</td>
</tr>
<tr>
<td>Electric Vehicle school bus replacement</td>
<td>$300,000</td>
</tr>
</tbody>
</table>
North Carolina repower proposal

- Powertrain Systems, a division of Agility Fuel Solutions, based in Salisbury, North Carolina is the sole vendor, providing jobs and economic growth to the state.

- Agility Fuel Solutions has a dedicated GM 8.0L propane fueled engine certified to meet EPA and CARB emissions regulations.

- The engine marketed to OEM’s and fleets under the brand name Agility 488LPI is available with a complete state of the art liquid propane injection system that has been proven in the market for the past 10 years.

- CleanFUEL USA, now owned by Agility Fuel Solutions, has 15 years of aftermarket and conversion experience. Those same employees are spearheading this project for Agility.

- The 488LPI engine and fuel system is sold to a major OEM in North Carolina who utilize it in their school bus, truck and delivery truck applications.

- In early 2018, the engine and fuel system manufacturing and assembly will move to our 200,000-sq. ft. state of the art facility in Salisbury, North Carolina.
**Location:** Salisbury, North Carolina

- Provides Natural Gas, Propane, Hydrogen, Hybrid & Electric fuel solutions
- Tier One supplier to Freightliner Custom Chassis & Thomas Built Buses

<table>
<thead>
<tr>
<th>Products</th>
<th>Manufacturing Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Bus Systems</td>
<td>- CNC Laser</td>
</tr>
<tr>
<td>- Refuse Systems</td>
<td>- CNC Roll Form</td>
</tr>
<tr>
<td>- Truck Systems</td>
<td>- CNC Press Brake</td>
</tr>
<tr>
<td>- Fuel Management Modules</td>
<td>- CNC Machining</td>
</tr>
<tr>
<td>- Full Installations</td>
<td>- Mazak CNC</td>
</tr>
<tr>
<td></td>
<td>- Deburr</td>
</tr>
<tr>
<td></td>
<td>- Mill</td>
</tr>
<tr>
<td></td>
<td>- Multi Axis Extrusion Machine</td>
</tr>
<tr>
<td></td>
<td>- Robotic Tube Bending</td>
</tr>
<tr>
<td></td>
<td>- Automated Paint Shop</td>
</tr>
<tr>
<td></td>
<td>- Installation</td>
</tr>
</tbody>
</table>

**Footprint** 200,000 Sq. Ft. / 18,580 Sq. M

**Capacity Utilization** 20% (Based on 2 shift Operation) ~24,000 systems/year

**Certifications** ISO 9000 and TS16949 in process
OEM supplier: school bus market

488 LPI Engine

- OEM, Thomas Built Bus manufactured in High Point, NC
- Agility 488LPI assembled and shipped from Salisbury, NC
- Long block 8.0 Liter engine from General Motors
- Liquid Propane Injection by Agility Fuel Solutions
- Engine built specific for propane market
- Hardened valve seats (intake and exhaust) for durability
- Roller rocker arms
- Allison transmission
- Coavis fuel pump
School Bus Replacement: A Cost Effective Solution to NOx Reductions
Why Propane

**COST SAVINGS**
DISTRICTS REPORT SAVINGS OF UP TO .37¢ PER MILE

**NOISE REDUCTION**
UP TO 40% QUIETER

**COLD STARTS**
STARTS IN TEMPERATURES AS LOW AS -30°F

**LOWEST EMISSIONS**
INCREDIALLY REDUCED EMISSIONS

- 100% Particulate Matter
- 60% Nitrogen Oxide
- 80% Hydrocarbons
June 7th 2017 ROUSH CleanTech announces achievement of very low NOx with the 6.8L V10 Engine.

- For the 2017 MY RCT LPG Blue Bird Buses are now certified to **0.05 g/bhp-hr NOx**.

- This is achieved with **no extra hardware or increased variable cost**.

- The low NOx levels were achieved through careful, significant calibration changes and a CSSR (cold start spark retard) approach.
Standard Changes for NOx

The ROUSH / Blue Bird low NOx propane engine is 75% cleaner than the current EPA standard, which diesel engines are certified to, and is 99% cleaner than pre-1998 diesel school buses.
ICCT: Negative health impacts from diesel-sourced NOx emissions are increasing, despite regulatory limitations

- Lab-certified vehicles met mandatory emission limits but exceeded NOx emission limits for heavy-duty diesel vehicles, by 1.45 times on average in real world operation
- Excess diesel NOx emissions contributed to an estimated 1,100 premature deaths in the United States in 2015

UC-Riverside: SCR systems on today’s new diesel vehicles fall short of controlling NOx emissions in many duty cycles

These studies beg the question…
Is it wise for states to use funds derived from high-emitting diesel vehicles to now fund high-emitting diesel vehicles?
Certification versus Reality?

DATA UPDATE:
Two studies currently underway in West Virginia (WVU) and in CA (SCAQMD) that are measuring in-use emissions of a diesel school bus and a propane school bus. Results should be available in 2018.

- **Natural gas vehicles emitted lower NOx:** The ISL G natural gas engine emitted lower NOx emissions than its EPA certification standard. Emissions decreased as the duty cycles decreased (i.e., slower speeds, idling, stop-and-go traffic, etc.).

- **Diesel vehicles emit up to 4x higher NOx:** 2010 diesel engines with SCR emitted up to 4 times higher NOx emissions than its EPA certification standard. Emissions increased as the duty cycles decreased.
Dramatic Results for NOx in Emissions Models Based on In-Use Studies

2016 AFLEET Results: School Buses

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Purchase Price</th>
<th>NOx Reduced</th>
<th>Cost Effectiveness vs. Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>$95,000</td>
<td>537.0</td>
<td>$177</td>
</tr>
<tr>
<td>Diesel</td>
<td>$90,000</td>
<td>330.5</td>
<td>$272</td>
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<tr>
<td>Electric</td>
<td>$300,000</td>
<td>593.4</td>
<td>$506</td>
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</tbody>
</table>

2017 AFLEET Results: School Buses

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Purchase Price</th>
<th>NOx Reduced</th>
<th>Cost Effectiveness vs. Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>$95,000</td>
<td>893.7</td>
<td>$106</td>
</tr>
<tr>
<td>Diesel</td>
<td>$90,000</td>
<td>67.7</td>
<td>$1,330</td>
</tr>
<tr>
<td>Electric</td>
<td>$300,000</td>
<td>1,119.0</td>
<td>$258</td>
</tr>
</tbody>
</table>

Source: Argonne National Laboratory AFLEET Tool. School Bus purchase pricing shown above are national averages based on 2019 model year Blue Bird Vision school buses (propane, diesel, electric and CNG options with same configuration).

Argonne National Laboratory conducts applied research to develop sustainable innovative technologies to improve the efficiency of resource and energy utilization; to minimize our dependence on imported energy; and to enhance our national security. The AFLEET tool was developed by Argonne and the Department of Energy to examine both the environmental and economic costs and benefits of alternative fuel and advanced vehicles. The tool uses data from Argonne’s GREET fuel-cycle model to generate necessary well-to-wheels petroleum use and GHG emission co-efficients for key fuel production pathways and vehicle types. In addition, Environmental Protection Agency’s MOVES model and certification data are used to estimate tailpipe air pollutant emissions.
AFLEET Results: NOx Cost Effectiveness

Propane is 92% more cost effective at reducing NOx as compared to diesel.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Purchase Price</th>
<th>NOx Reduced</th>
<th>$/lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
<td>$92,400</td>
<td>893.7</td>
<td>$103</td>
</tr>
<tr>
<td>Diesel</td>
<td>$83,500</td>
<td>67.7</td>
<td>$1,234</td>
</tr>
<tr>
<td>Electric</td>
<td>$350,000</td>
<td>1,119.0</td>
<td>$313</td>
</tr>
<tr>
<td>CNG</td>
<td>$113,500</td>
<td>818.6</td>
<td>$139</td>
</tr>
</tbody>
</table>


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$47.3M Alternative Fuel School Bus Program

<table>
<thead>
<tr>
<th>$47.3M Scenario: Alternative Fuel School Bus Program</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Buses Operating in State (# Units)</td>
<td>16,496</td>
</tr>
<tr>
<td>Est. Cost of 2019 Model Year Diesel Bus ($)</td>
<td>$83,500</td>
</tr>
<tr>
<td>Est. Cost of 2019 Model Year Propane Bus ($)</td>
<td>$92,400</td>
</tr>
<tr>
<td>Est. Cost of 2019 Model Year CNG Bus ($)</td>
<td>$113,500</td>
</tr>
<tr>
<td>Est. Cost of 2019 Model Year Electric Bus ($)</td>
<td>$350,000</td>
</tr>
<tr>
<td>Total North Carolina VW EMT Allocation ($)</td>
<td>$94,678,714</td>
</tr>
<tr>
<td>School Bus Program Funding Scenario ($)</td>
<td>$47,339,357</td>
</tr>
</tbody>
</table>

| Propane Bus Incentive ($), 50% of Total Bus Cost | $46,200|
| CNG Bus Incentive ($), Based on 50% of Total Bus Cost | $56,750|
| Electric Bus Incentive ($), Based on 50% of Total Bus Cost | $175,000|

| Number of Estimated Bus Replacements, Propane Scenario | 1,025|
| Number of Estimated Bus Replacements, CNG Scenario   | 834|
| Number of Estimated Bus Replacements, Electric Scenario | 271|

| % of NC school bus fleet, propane scenario    | 6.21% |
| % of NC school bus fleet, CNG scenario       | 5.06% |
| % of NC school bus fleet, electric scenario  | 1.64% |

Assumptions:

- **Total number of school buses** estimated using R. L. Polk data.
- **School bus pricing** estimated and based upon model year 2019 Blue Bird Vision Type C school bus with fuel type option as indicated.
- **Incentives are recommended portion NC DEQ to provide to grant recipient.** Recipient to provide 50% as matching funds.
A $47.3 million investment in a North Carolina alternative fuel school bus program could produce the following results:

- Replacement of 6% of the North Carolina school bus fleet
- Reduction of 915 thousand pounds of NOx emissions
  - Over 73 thousand children impacted daily
  - Cost $103/pound of NOx Reduced

### Propane School Bus Scenario: $47.3M Funding

<table>
<thead>
<tr>
<th>Assumptions: 1,025 school buses replaced, 2007 average model year replaced with 2019 model year Vision propane bus, 15 year service life, 12,600 miles per year</th>
<th>POTENTIAL IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Propane School Bus ($)</td>
<td>$92,400</td>
</tr>
<tr>
<td># of Propane School Bus Replacements (assuming 50% cost share)</td>
<td>1,025</td>
</tr>
<tr>
<td>% of NC School Bus Fleet Replaced</td>
<td>6%</td>
</tr>
<tr>
<td>Total Funding Proposed ($)</td>
<td>$47,339,357</td>
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<tr>
<td>Total NOx Reduction (lbs)</td>
<td>915,784</td>
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<tr>
<td>Cost Effectiveness ($/lb)</td>
<td>$103</td>
</tr>
<tr>
<td>Petroleum Reduction (gallons)</td>
<td>27,665,858</td>
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<tr>
<td>Est. Total Children Impacted Daily (# of Children)</td>
<td>73,776</td>
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</tbody>
</table>
SCHOOL BUSES ARE A COST EFFECTIVE WAY TO REDUCE NOx!

Prioritize Alternative Fuels/ Cost Effectiveness

Allow Rural Areas to Participate

---

Argonne AFLEET 2017 Emissions Outputs

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Purchase Price</th>
<th>NOx Reduced</th>
<th>$/lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane</td>
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<tr>
<td>CNG</td>
<td>$113,500</td>
<td>818.6</td>
<td>$139</td>
</tr>
</tbody>
</table>
Alternative Fuels are proven, especially propane in a school bus application.

Propane contributes to the North Carolina economy, and NC is lagging in adoption compared to many other states.

States can see immediate and measurable benefits.

Sustainable program after funds exhausted.
Near zero emissions propane engines are here today

Path to renewable propane exists today

Spending on diesel may not result in lowering of NOx

Significant cost per mile reduction vs diesel based on TCO
THANK YOU!

SCHOOL BUS RESOURCE CONTACTS:

Chelsea Jenkins
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478.302.6131

Walt Brandenburg
Product Manager
Gregory Poole Bus Sales
North Carolina Blue Bird Dealer
walter.brandenburg@gregpoole.com
919.755.7021
UTILITY FINANCING OPPORTUNITIES

LANG REYNOLDS, DUKE ENERGY
Duke Energy
Electric Transportation
Electric Transportation = Economic Development

- Fuel and maintenance cost savings remain in-state.
- Improved air quality facilitates continued industrial recruitment.
- Automakers are expanding electric drive manufacturing and supply chain.
- Downward rate pressure preserves attractive electricity costs.
Electric Transportation Market – Not Just EVs

- Road

- Non-Road
North Carolina – EV Sales Trends

NC Cumulative EV Registrations

NC Cumulative EV Registrations

EV Market Share

NC vs National Average
Future Growth and Grid Impacts

Current Forecast:
Cumulative DEC+DEP EV Registrations

Current Forecast:
2030 Peak Load Impact (Unmanaged)

Summer (HE17)  DEC 79 MW
               DEP 44 MW
Winter (HE08)   DEC 11 MW
               DEP 6 MW

Growth in electricity demand from EVs not currently forecasted to require any incremental generation capacity.
Grid Impacts of Electric Transportation

- EV charging is a very flexible load which can be managed to occur when beneficial for the grid.

Source: Charge Carolinas Data

Source: Pacific Gas & Electric
Grid Benefits – EVs Can Benefit All Electric Customers

- Electric Transportation increases electric system utilization and can provide downward rate pressure.

Source: MJ Bradley, E3
Market Barriers - Infrastructure

- Charging access is a barrier to adoption.
- North Carolina:
  64 Public DC Fast Charge Stations
- “Infrastructure Gap” exists between current state and facilitating future adoption.
- Challenging economics

Source: https://www.afdc.energy.gov/fuels/electricity_locations.html
Electrification of transportation is a global trend.

Increased EV adoption can provide economic, environmental, and grid benefits.

No adverse grid impacts have been experienced from EV adoption; none are expected in the near future.

Making progress:
- Set a Goal
- Align Incentives
- Remove Barriers
NC EV Charging Infrastructure Grants

North Carolina Electric Vehicles & Charging Stations

Electric Vehicle Registrations (2015)

Public Charging Stations Installed

Public Charging Stations Proposed

Electric Vehicle Data Source: National Renewable Energy Laboratory, R.L. Polk, 2015 (data pulled by Triangle Clean Cities Coalition)
Charging Station Data Source: AFDC Alternative Fueling Station Locator Data, U.S. Department of Energy
Duke Energy Initiatives Past and Present

▪ ChargeCarolinas:
  2012-2013 DE installed +100 residential L2 EV charging stations.

▪ EEI Fleet Electrification Commitment:
  5% of all fleet purchases must be plug-in electric (DE fleet >10,000 vehicles).
  100% of new sedans are now plug-in electric.

▪ Electric Transportation Infrastructure Grants (NSR Settlement).
  $3.0M total to be distributed 2017-2021
  $1.0M - 200 public L2 EV charging stations.
  $1.5M - Truck Stop Electrification and Electric Transport Refrigeration Unit deployment.
  $0.5M – Electric transit bus charging infrastructure.

▪ DE Florida EV Infrastructure Pilot – 530 charging stations, $8M program.
# Automaker OEM Electrification Announcements

<table>
<thead>
<tr>
<th>OEM</th>
<th>Year</th>
<th>Mild Hybrid</th>
<th>Regular Hybrid</th>
<th>EV (PHEV/BEV)</th>
<th>Total Models</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo</td>
<td>2019</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>“All cars from 2019 will have an electrified option.”</td>
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<tr>
<td>Jaguar / Land Rover</td>
<td>2020</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>“Every vehicle from 2020 will have an electrified version.”</td>
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<tr>
<td>Lincoln</td>
<td>2022</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>“Electrified versions of its models.”</td>
</tr>
<tr>
<td>Ford</td>
<td>2023</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>18</td>
<td>“18 electrified models in five years (Ford Corp.).”</td>
</tr>
<tr>
<td>BMW</td>
<td>2025</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>12</td>
<td>25 electrified vehicles by 2025”</td>
</tr>
<tr>
<td>Mercedes</td>
<td>2025</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
<td>Up to 25% of production by 2025.”</td>
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<tr>
<td>Aston-Martin</td>
<td>2025</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>“Electrify all production cars in 2025.”</td>
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<tr>
<td>Hyundai</td>
<td>2025</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>“10% of sales will be electrified by 2025.”</td>
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<tr>
<td>Audi</td>
<td>2025</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>“30% of sales will be electrified by 2025.”</td>
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<tr>
<td>VW Group</td>
<td>2025</td>
<td></td>
<td>X</td>
<td>X</td>
<td>30</td>
<td>Launch 30 electric cars globally among VW’s brands by 2025. Investing $40B-$24B.</td>
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<tr>
<td>Uber</td>
<td>2020</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>“All-electric or hybrid in London by 2020.”</td>
</tr>
<tr>
<td>Uber</td>
<td>2025</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>“All-electric or plug-in hybrid in London by 2025.”</td>
</tr>
</tbody>
</table>

Source: EPRI
## Aggressive Global Commitment to Transportation Pollution

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of Proposed Ban</th>
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</thead>
<tbody>
<tr>
<td>Norway</td>
<td>2025</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2030</td>
</tr>
<tr>
<td>Germany</td>
<td>2030</td>
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<tr>
<td>Scotland</td>
<td>2032</td>
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<tr>
<td>UK</td>
<td>2040</td>
</tr>
<tr>
<td>France</td>
<td>2040</td>
</tr>
<tr>
<td>India</td>
<td>2030</td>
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</table>

<table>
<thead>
<tr>
<th>City</th>
<th>Year of Proposed Ban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stuttgart</td>
<td>2018*</td>
</tr>
<tr>
<td>Munich</td>
<td>TBD</td>
</tr>
<tr>
<td>Oslo</td>
<td>TBD</td>
</tr>
<tr>
<td>London</td>
<td>2025</td>
</tr>
<tr>
<td>Madrid</td>
<td>2025</td>
</tr>
<tr>
<td>Paris</td>
<td>2025</td>
</tr>
<tr>
<td>Athens</td>
<td>2025</td>
</tr>
<tr>
<td>Mexico City</td>
<td>2025</td>
</tr>
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</table>
North Carolina Energy Policy Council

AGENDA
10:00 a.m. Wednesday February 21, 2018
William G. Ross Jr. Environmental Conference Center
Nature Research Center
121 West Jones Street, Raleigh, North Carolina
27603

1. Call to order, opening remarks, and approval of the minutes from the November 9, 2017,
   Council meeting (5 min)
   Lieutenant Governor Dan Forest, Chair

2. Discussion of Electric Vehicles: Infrastructure, Demands, and Priorities (2 hours)
   Break (15 min)

3. Financing Opportunities; Volkswagen Settlement Agreement (1 hour and 10 min)

4. Council discussions and actions (10 min)

5. Public comment (10 min)

6. Closing remarks and adjourn (5 min)
   Lieutenant Governor Dan Forest, Chair
FUTURE MEETINGS:
The Energy Policy Council will tentatively meet quarterly on the third Wednesday of the month. While this schedule is tentative and subject to adjustment, please reserve the following dates:

Wednesday May 16, 2018
Wednesday August 15, 2018

ADDITIONAL INFORMATION:
Persons having questions about the Council meeting or other matters related to the Council may contact Council staff Timothy Webster at timothy.webster@ncdenr.gov