

# Charging Infrastructure: What, Where, and How Many?

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- Speakers:
  - **Patty Readinger**, Manager, Government Affairs & Public Policy, Electrify America
  - **Colin Mellor**, Eastern Regional Lead, Environmental Policy Unit, North Carolina Department of Transportation
  - **Claus Daniel**, Director, Sustainable Transportation Program, Oak Ridge National Laboratory




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Andrew (Drew) Frye, Program Manager of Grid Edge Technology and Electric  
Vehicle Strategy, Tennessee Valley Authority





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# DRIVE ELECTRIC TENNESSEE

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## *ELECTRIC VEHICLE ROADMAP*

Drive Electric  
 **TENNESSEE**

# drive electric Tennessee Stakeholders

The following Key Contributors and participating organizations attended events and developed & reviewed key deliverables over the past several months.

## Key Contributors:



## Participants:

- |                       |                       |                      |   |
|-----------------------|-----------------------|----------------------|---|
| • Atlas Public Policy | • City of Knoxville   | • GRIDSMART          | • Southern Alliance for Clean Energy (SACE) |
| • Bridgestone         | • City of Chattanooga | • Local Motors       | • Southeast Energy Efficiency Alliance      |
| • BYD                 | • Cummins Filtration  | • Nissan             | • Stantec                                   |
| • CDE Lightband       | • Draft Agency        | • Schneider Electric | • Tennessee Automotive Association          |
| • ChargePoint         | • General Motors      | • Sierra Club        | • University of Tennessee – Knoxville       |
| • City of Nashville   | • Greenlots           | • SoftServe          | • Vanderbilt University                     |
|                       |                       |                      | • Volkswagen                                |

# Shared Vision & Mission

The following Name and Vision define who we are and our outlook on Tennessee's transportation sector. The Mission describes, at a high level, how we will achieve the vision.



**Vision:** Driving Tennessee to become an electric transportation leader in the Southeast

**Mission:** Collaboratively pursuing initiatives that will significantly increase EV adoption from 5,000 EVs today to 200,000 EVs by 2028, guided by shared principles that benefit all residents of Tennessee

# Opportunity Areas and Goals

Contributors established four Opportunity Areas to categorize actions described in a Roadmap. **Opportunity Areas** are aligned with **Goals** and contain various Initiatives with individual Projects.

1  
Driving Charging Infrastructure  
Availability



Develop a charging infrastructure that enables Tennessee residents to (1) drive and charge an EV in their daily lives (home, work, and public charging) or (2) access electric public transit options

2  
Driving Awareness



Increase awareness and first-hand experience of the benefits of driving an EV such that the majority of vehicle owners are aware of EVs when they begin their next purchasing process

3  
Driving Innovative & Supportive  
Policies



Create consistent, innovative, and supportive policies across Tennessee at the state, county, city, and utility levels, inclusive of incentives, electricity rates, planning standards, and other policies and programs

4  
Driving EV Availability, Offerings &  
Innovation



Make EV models viable, accessible, and comparable purchasing alternatives to traditional vehicles

# Driving Charging Infrastructure Availability

The following three Initiatives support the Driving Charging Infrastructure Availability Opportunity Area:

## Driving Charging Infrastructure Availability

### EV Infrastructure Coordination & Planning

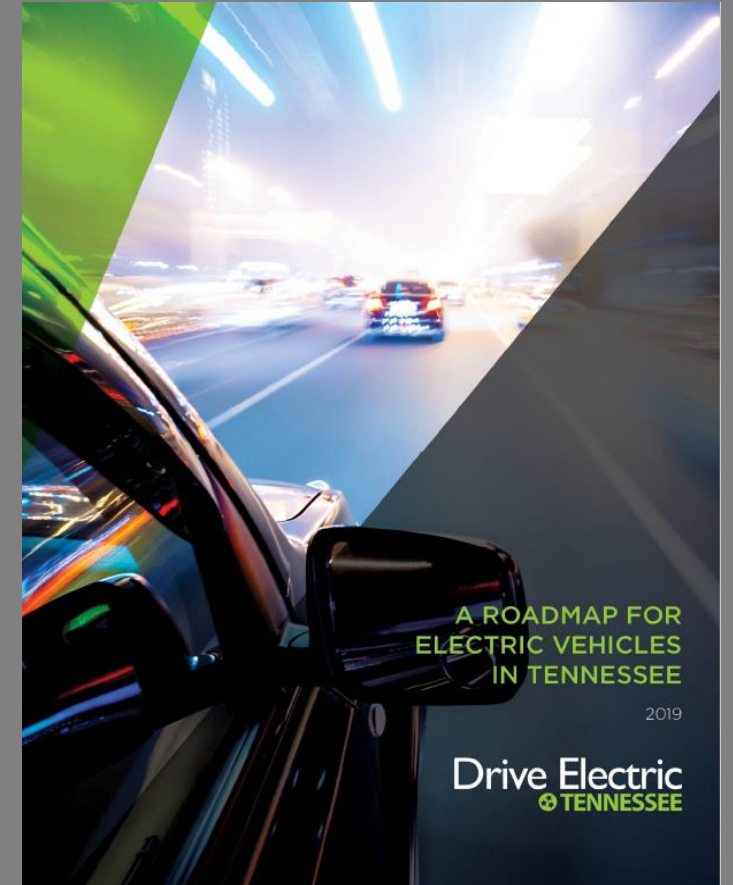
Initiative to guide coordinated future EVSE efforts including a statewide needs assessment, benchmarking, and strategic planning projects

### EV Infrastructure Build-Out

Initiative to install public EVSE, focusing on areas identified in the EV Infrastructure Coordination & Planning Initiative

### EV Infrastructure Standards & Maintenance

Initiative to ensure the usefulness and functionality of all installed EVSE on an ongoing basis, preventing disrepair







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Patty Readinger, Manager, Government Affairs & Public Policy, Electrify America

A large, stylized, wavy line graphic that starts in light blue on the left and transitions to white on the right, curving across the middle of the image.

# ***Southeast Regional Transportation Electrification Workshop***

*Panel: "Charging Infrastructure: What, Where, and How Many?"*

National Governors Association; Nashville, TN  
March 11, 2019

# Our transformational opportunity: the largest single investment ever made in infrastructure, education and awareness, and access to drive ZEV adoption

## Our Mission

Electrify America will be a catalyst for promoting ZEV adoption by offering transformative, customer-centric infrastructure and energy management solutions.

## Our Company

Electrify America is a subsidiary of Volkswagen Group of America created to implement the \$2 billion ZEV Investment Commitment. We have recruited talent from across diverse industries.

## Our Approach

Electrify America is a data-driven company committed to increasing the use of ZEV technology.



# Cycle 1 investment will create a robust DC charging network linking U.S. highways and major metropolitan areas

42 states

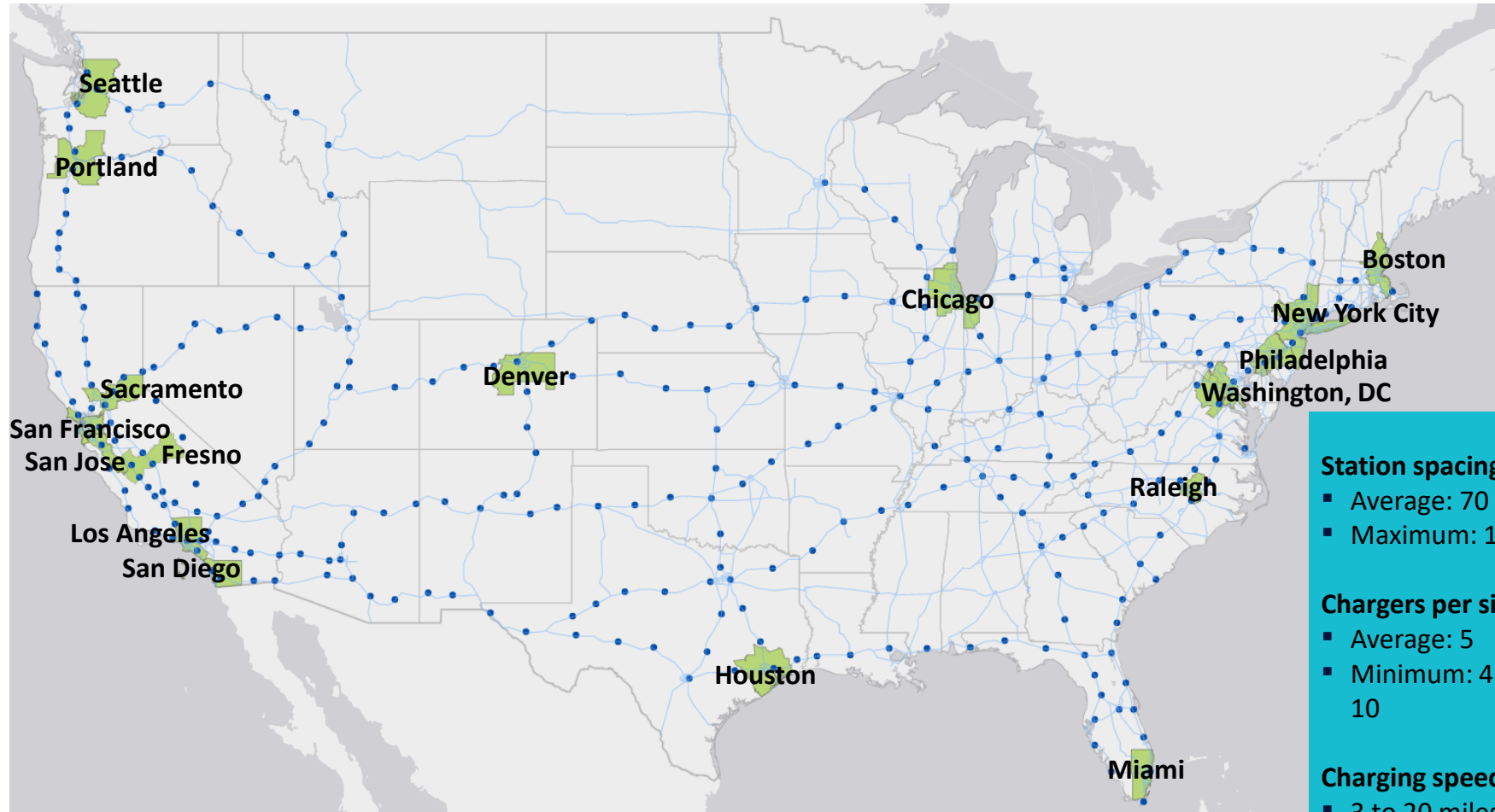
17 large metros

86 metros\*

484 stations

2000+ DCFC

2800+ Level 2s



\* Highway sites in MSAs with more than 500,000 population

## Station spacing:

- Average: 70 miles\*
- Maximum: 120 miles

## Chargers per site:

- Average: 5
- Minimum: 4 Maximum: 10

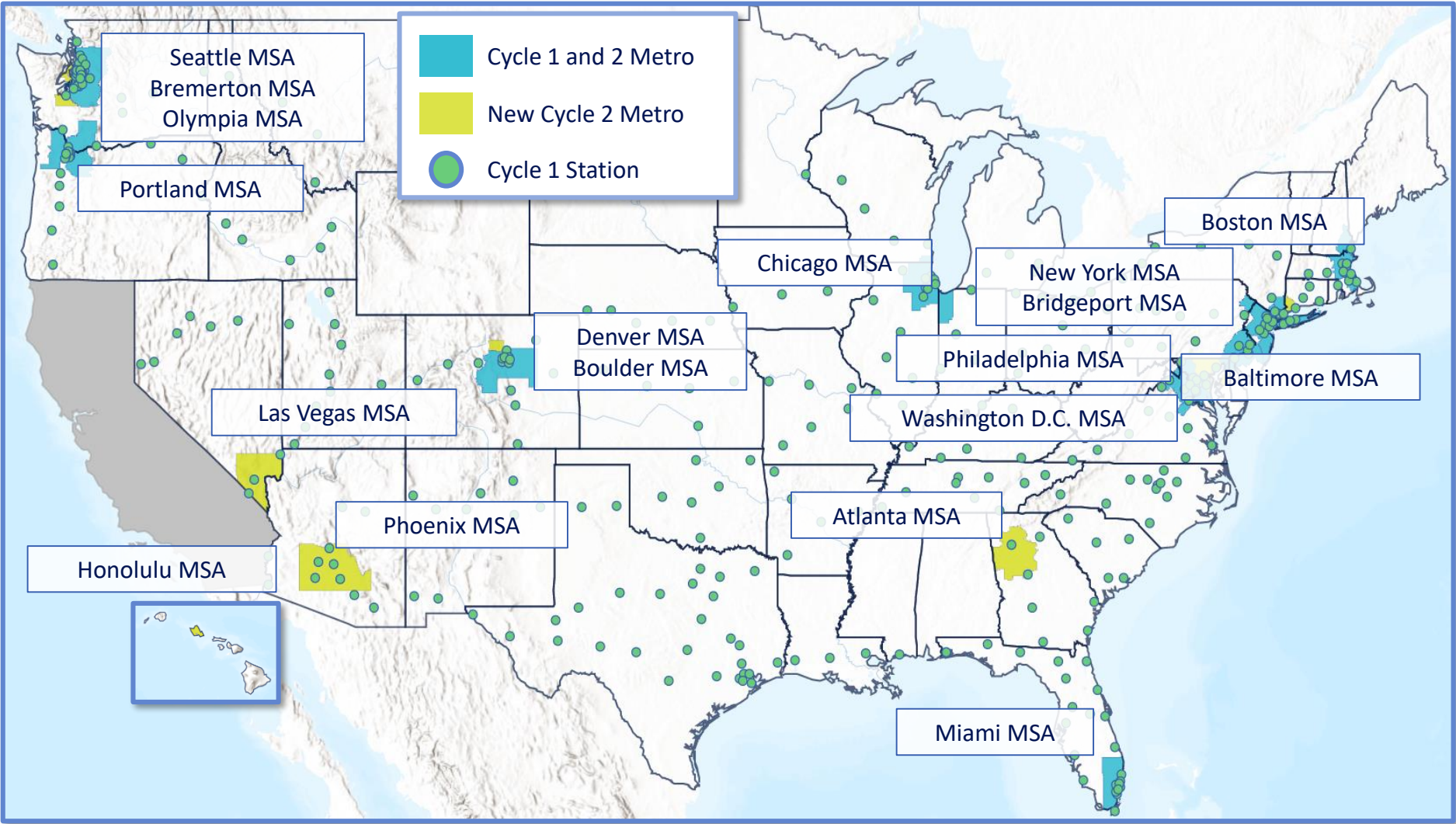
## Charging speed

- 3 to 20 miles per minute

\*48 miles in California



# Cycle 2 investments will be made in 18 metropolitan areas across the country



# Challenges to investment persist

1

## Permitting Delays

*Current construction bottlenecks in many areas of the country, especially California, are due to lengthy permitting durations.*

3

## Need for Education & Awareness Efforts

*Focused investment to raise consumer education and awareness is needed by all sectors to educate and encourage ZEV adoption.*

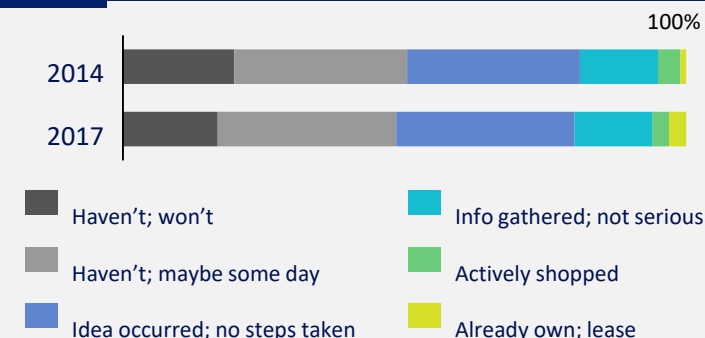
2

## Lack of ZEV Vehicles and Users

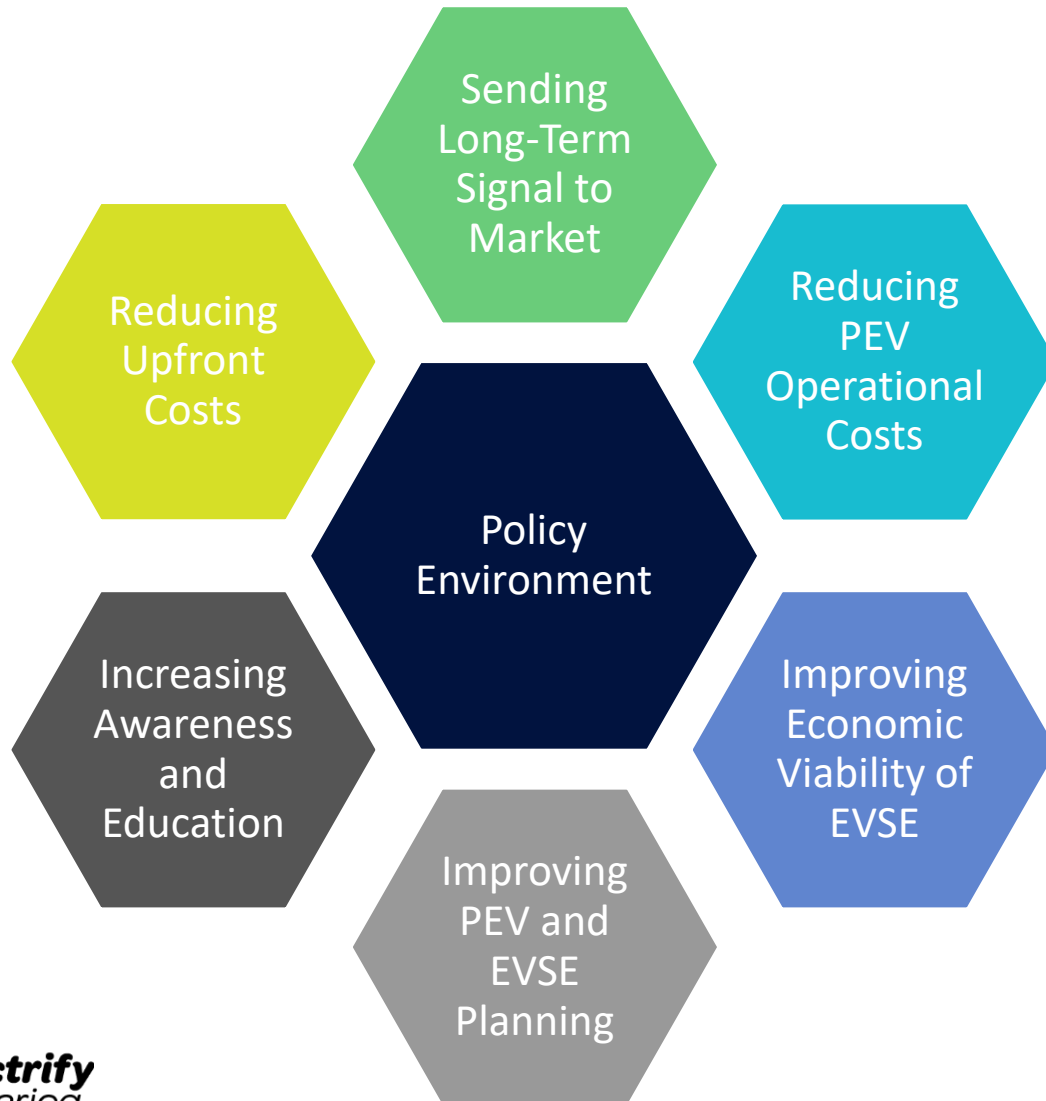
*The higher purchase cost associated with a ZEV vs. an ICE vehicle remains a barrier to wider ZEV adoption.*

4

## ZEV Consideration Remains Low



# States and cities can create policy environments to encourage ZEV adoption and investment



Analysis by NASEO and Cadmus found sending a long-term signal to the market and reducing upfront costs were the most powerful policy tools to drive ZEV adoption.

## PEV Policy Evaluation Rubric:

[https://naseo.org/Data/Sites/1/pevpolicyrubricmethodology\\_naseo.pdf](https://naseo.org/Data/Sites/1/pevpolicyrubricmethodology_naseo.pdf)



**We look forward to continued collaboration  
to drive ZEV adoption**



**Thank you**





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Colin Mellor, Eastern Regional Lead, Environmental Policy Unit, North Carolina  
Department of Transportation

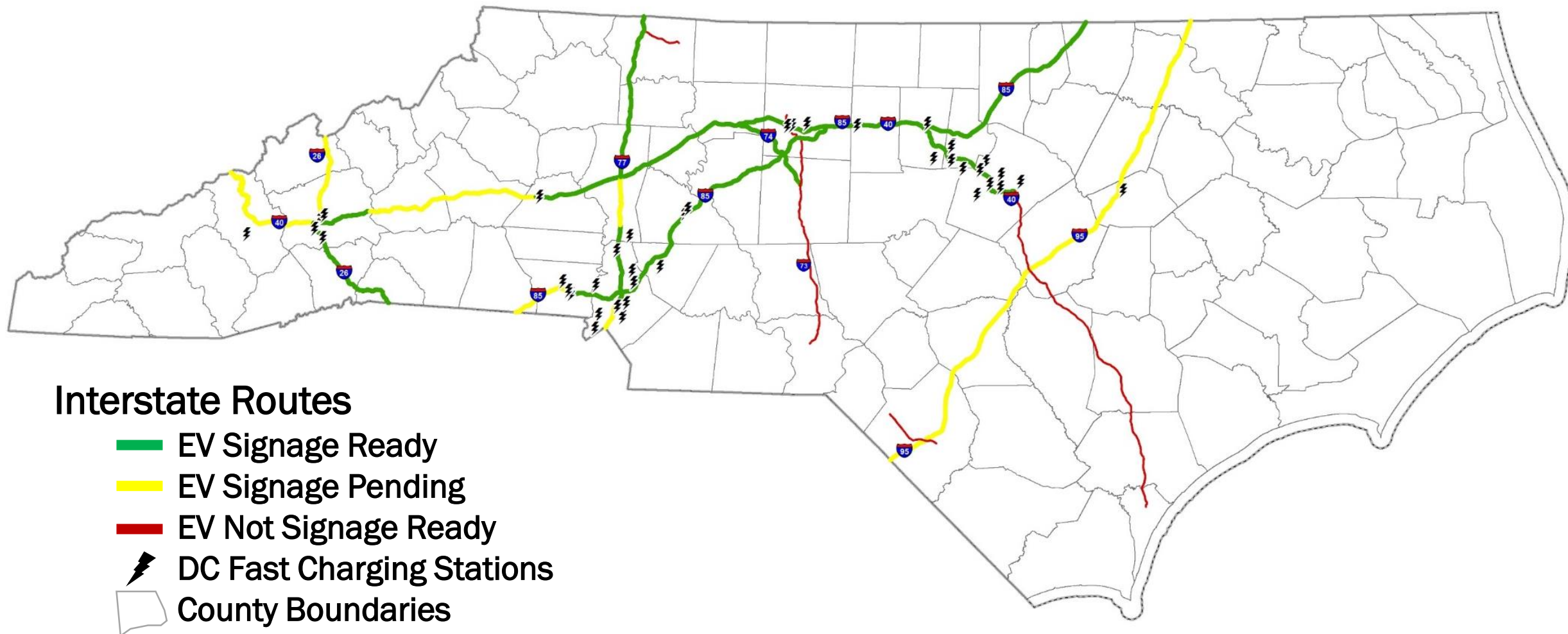
# **Executive Order No. 80**

## ***North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy***

The State of North Carolina will strive to accomplish the following by 2025:

- a. Reduce statewide greenhouse gas emissions to 40% below 2005 levels
- b. Increase the number of registered, zero-emission vehicles (ZEVs) to at least 80,000
- c. Reduce energy consumption per square foot in state-owned buildings by at least 40% from fiscal year 2002-2003 levels

# FHWA & NCDOT Designated EV Recharging Corridors





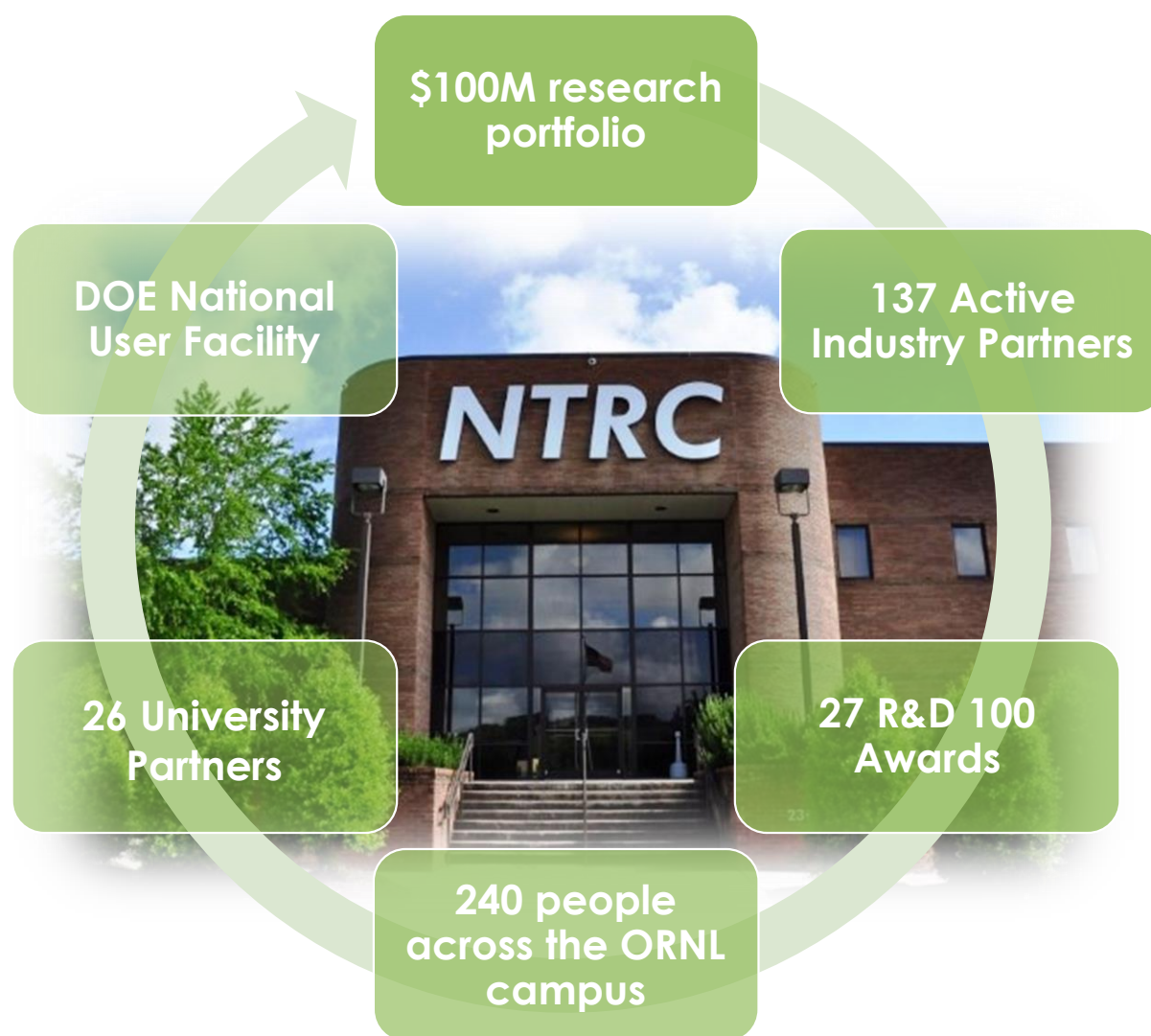
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Claus Daniel, Director, Sustainable Transportation Program, Oak Ridge National  
Laboratory



The DOE National Transportation Research Center is the portal to Oak Ridge National Laboratory for everything automotive, truck, and mobility sciences



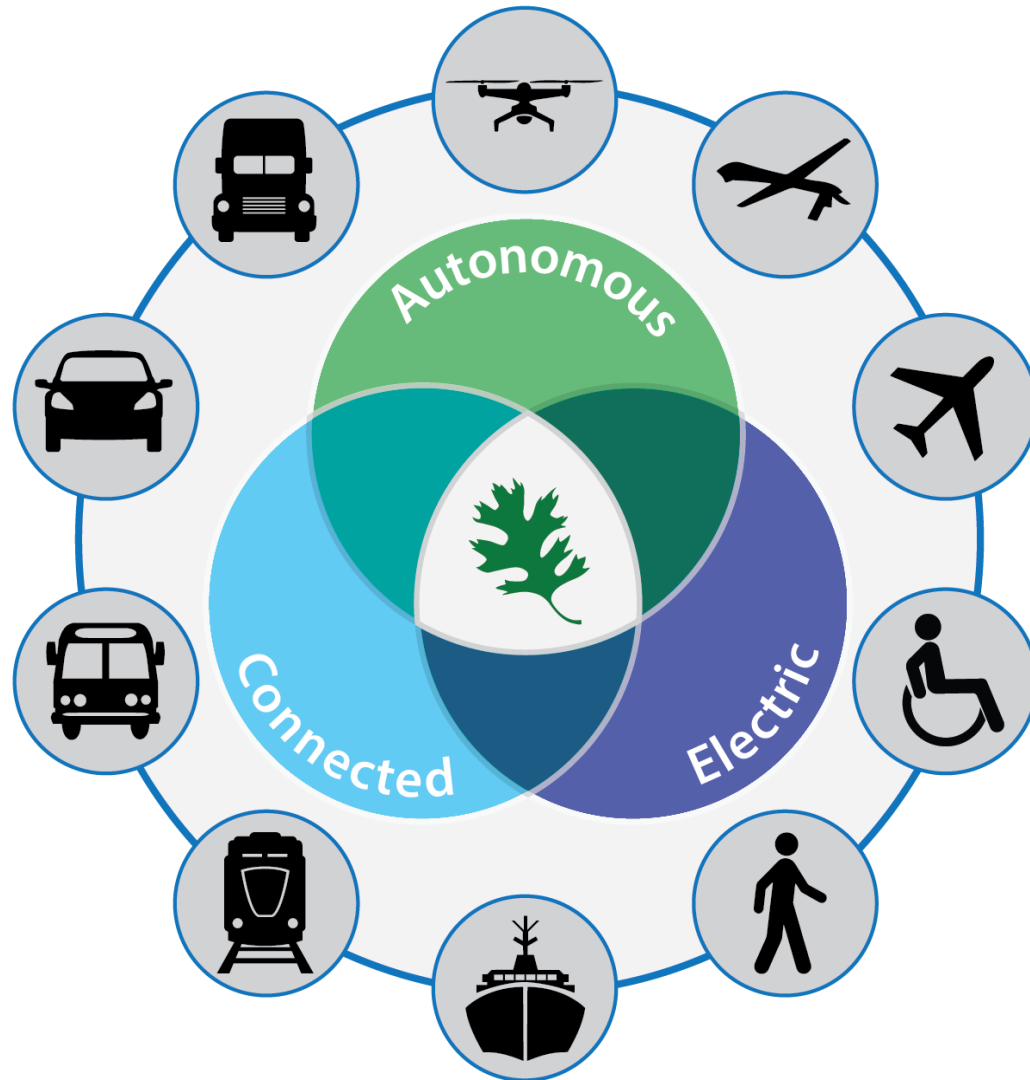
Electrification

Combustion  
and Emission  
sciences

Data science  
and  
automated  
vehicles

Materials for  
future systems

# Three Driving Forces Transforming All of Mobility



## Automated Vehicles

Navigate and travel without the need for human guidance

## Connected vehicles

Communicate with other vehicles, surrounding infrastructure, and traffic controllers

## Electric vehicles

Propelled using batteries and electric motors or hybrid gasoline-electric



## Consortium Mission:

To involve key stakeholders from the public and private sectors to assess, develop, and deploy new intelligent mobility innovations in Tennessee



DENSO

NISSAN

BRIDGESTONE

FedEx



softserve



FUJITSU

GRIDSMART

miovision  
technologies



Stantec

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# Questions

Thanks to 240+ colleagues, our partners, and



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