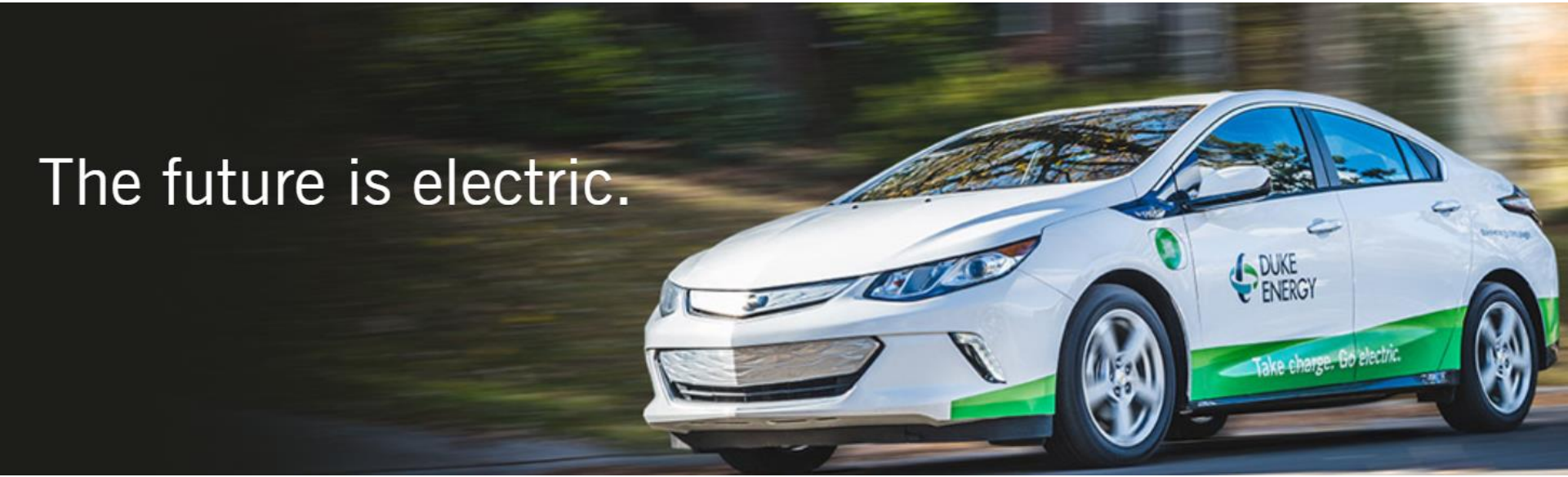
NC Electric Transportation
Stakeholder Collaborative 2-11-2020



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Agenda

- **Update on Approved Programs**
  - Multi Family
  - Fast Charging
  - Public Level 2
  - EV School Bus
- **Second Phase and Additional Pilots**
  - 2nd Phase Pilots
  - Additional Pilots
  - Rate Design Considerations
- **EM&V - Approved pilots**
  - Metrics and Goals for Approved Programs

Update on Approved Programs

EV School Bus

- 30 buses (15 DEC / 15 DEP)
- DE to install & own EVSE.
- DE to retain right to repurpose battery.
- Total per bus funding capped at $215,000
- V2G Testing

Fast Charging

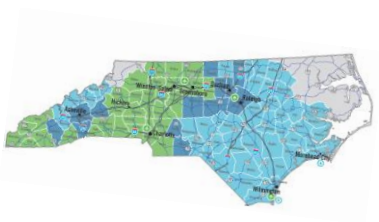
- 40 Chargers (24 DEC / 16 DEP)
- DE to install, own and operate.
- 100+ kW equipment, future proofed for future expansion.
- Fast Charge Fee in line with statewide average of publicly-available DCFC.
- Any net revenues to offset program costs.

Public Level 2

- 160 chargers (100 DEC and 60 DEP)
- DE to install, own and operate.
- Rate: SGS + $0.02/kWh
- Any net revenues to offset program costs.

Multifamily Level 2

- 80 chargers (50 DEC and 30 DEP
- DE to install, own and operate.
- Rate: SGS + $0.02/kWh
- Any net revenues to offset program costs



DEC / DEP NC service territories

Photos for illustrative purposes only – not reflective of program installations

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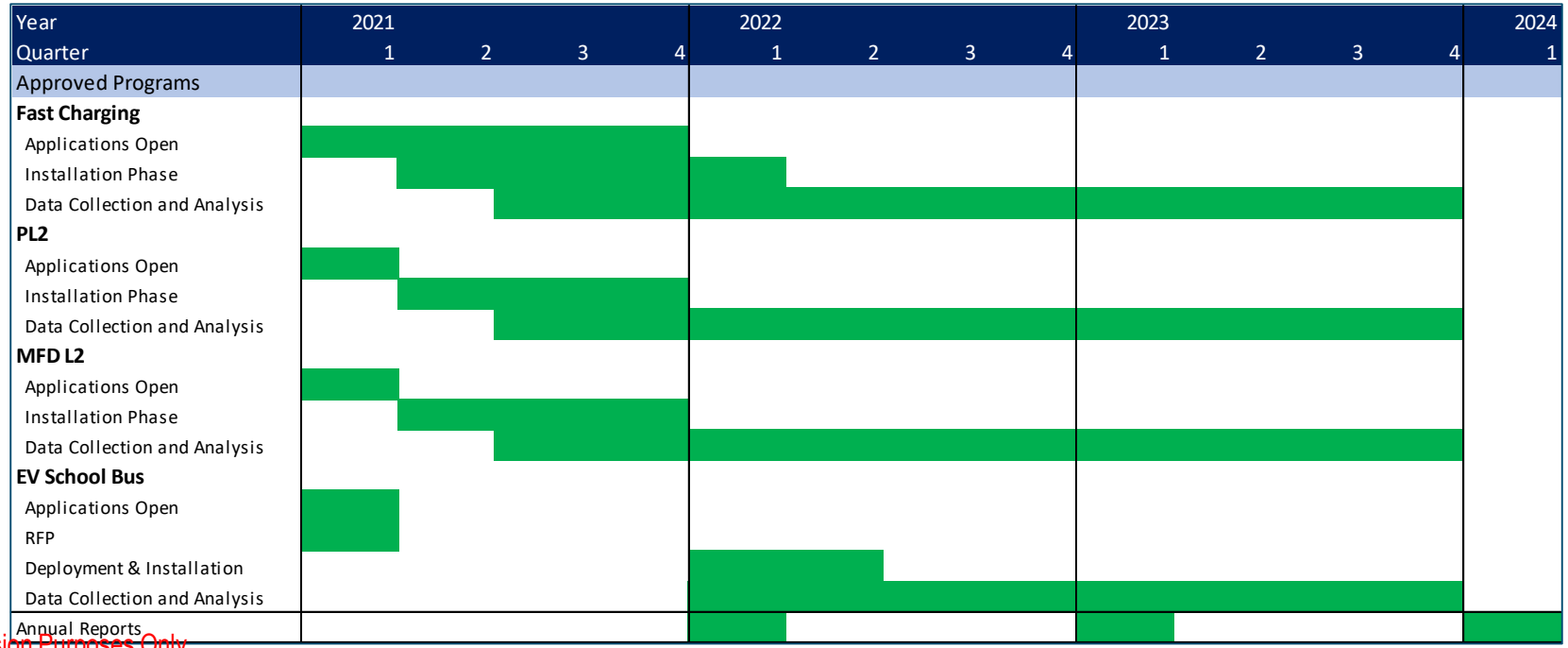
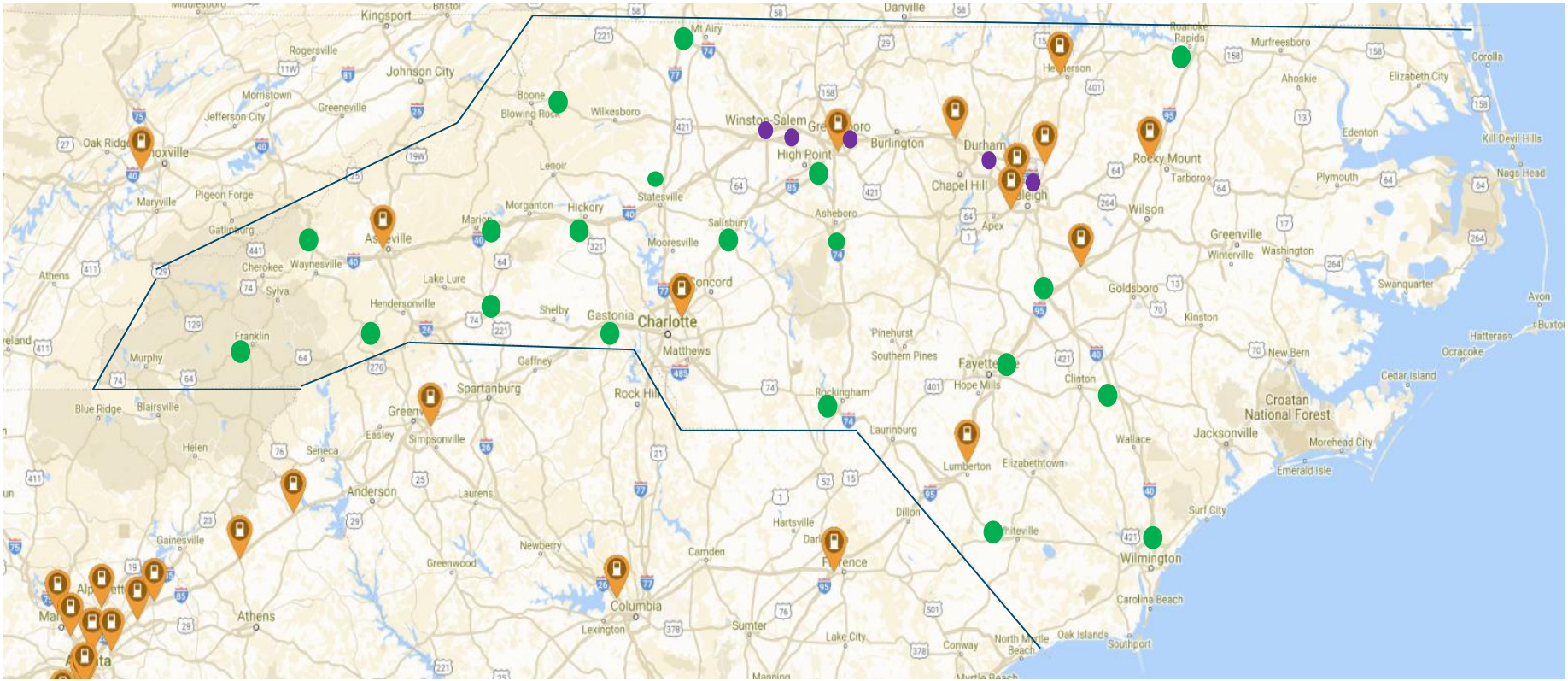
Update on Approved Programs

- Soft launch website now up on DE.com to gather customer interest.
- DE team currently finalizing application forms, customer contracts, and vendor contracts.
- On track to open applications in February.
- Current estimated timeline:



Fast Charge Program – Location Mapping

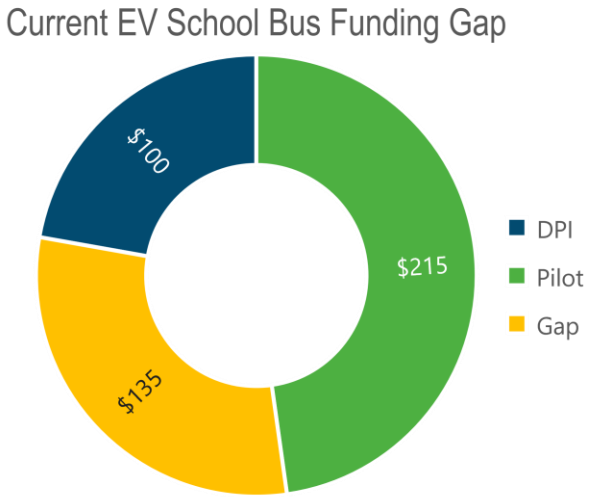


DCFC Gap Areas (Preliminary)

DEQ Phase 1 Fast Charging VW Grants (>100kW dedicated)

Electric School Bus Considerations

- Replacement bus funding provided annually through Department of Public Instruction.
- School districts own and operate buses once procured.
- Electric school bus price ~$450K verses ~$100K for conventional diesel.
- NCUC order approving ET Pilot caps funding at $215K per bus.
- VWS funding targeted to supply ~1/3 of EV bus deployment cost.
- DEQ has awarded first tranche of VW Settlement funding, timing of second tranche has not been announced.



Second Phase Pilots

The Commission expects Duke to explore in the second round of these three pilot programs and any other proposed programs additional ownership and partnership models for EV infrastructure, including utility fully owned and operated stations; make-ready stations with third-party owned charging equipment…

- Second Phase Pilot Goals:

  Support continued advancement of EV growth in NC consistent with Executive Order 80 of 80,000 EVs in NC by 2025.

  Estimated 2025 infrastructure gap: ~600 Public DCFC *(DOE EVI Pro-Lite tool)*

  Explore different program structures and ownership models.

  Ensure access to customer segments not addressed by approved Pilots.

What we heard from last meeting…

Time Varying Rates

- Help EVs to maximize “fuel” savings

Encourage Off-Peak Charging

- Incent beneficial charging behavior

Subscription Pricing

- Straight forward billing

Lower financial barriers

- Customer options for upfront install and hardware costs

Can we learn from our line extension policy?

Cost of Extension ("Cost")

Revenue Credit ("RC") = # of Years x Estimated Annual Revenue

Cost – RC = Customer's Contribution

Cost = $1,000

RC = $600

3 years x $200

Customer's Contribution* = $400

* If > $0

RC (Investment by Utility) of $600

Facilitating Business Models: EV Make Ready Credit

A Make-Ready Credit is a building block to create a viable EV ecosystem. It encourages residential and non-residential customers to invest in wiring upgrades to existing structures while providing a benefit to all utility customers by lowering the per unit cost of electricity.

EV Make-Ready Credit (Similar to the Line Extension Policy)

- Defray the installation costs associated with EV chargers to encourage a mutually beneficial EV adoption decision.
- Investments can be in customer-sited enabling infrastructure, excluding the EV charger and software, in order to serve load from electric vehicles.
- Align cost allocation of investments with future revenue.
- Customer obtains installation through a licensed and approved contractor.

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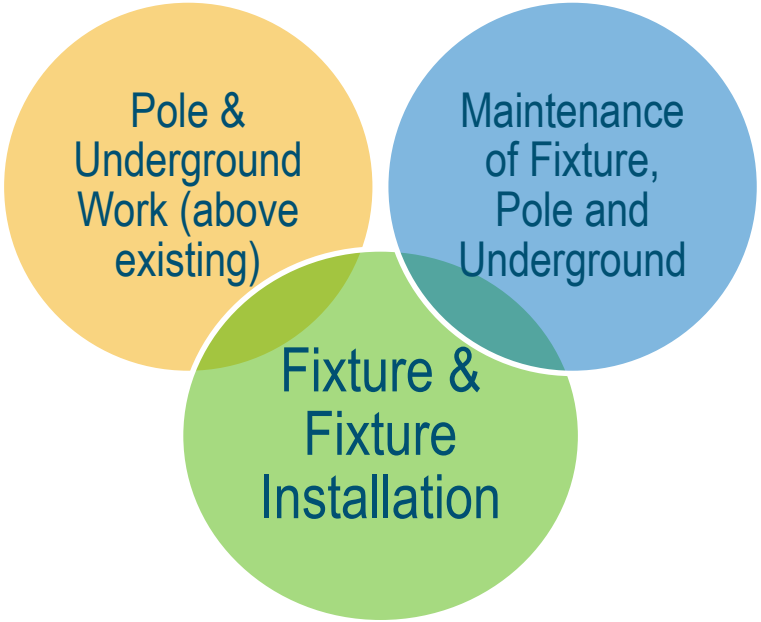
EV Charging Infrastructure Tariff – Structured in a Manner Similar to Outdoor Lighting

Outdoor Lighting Rate Architecture

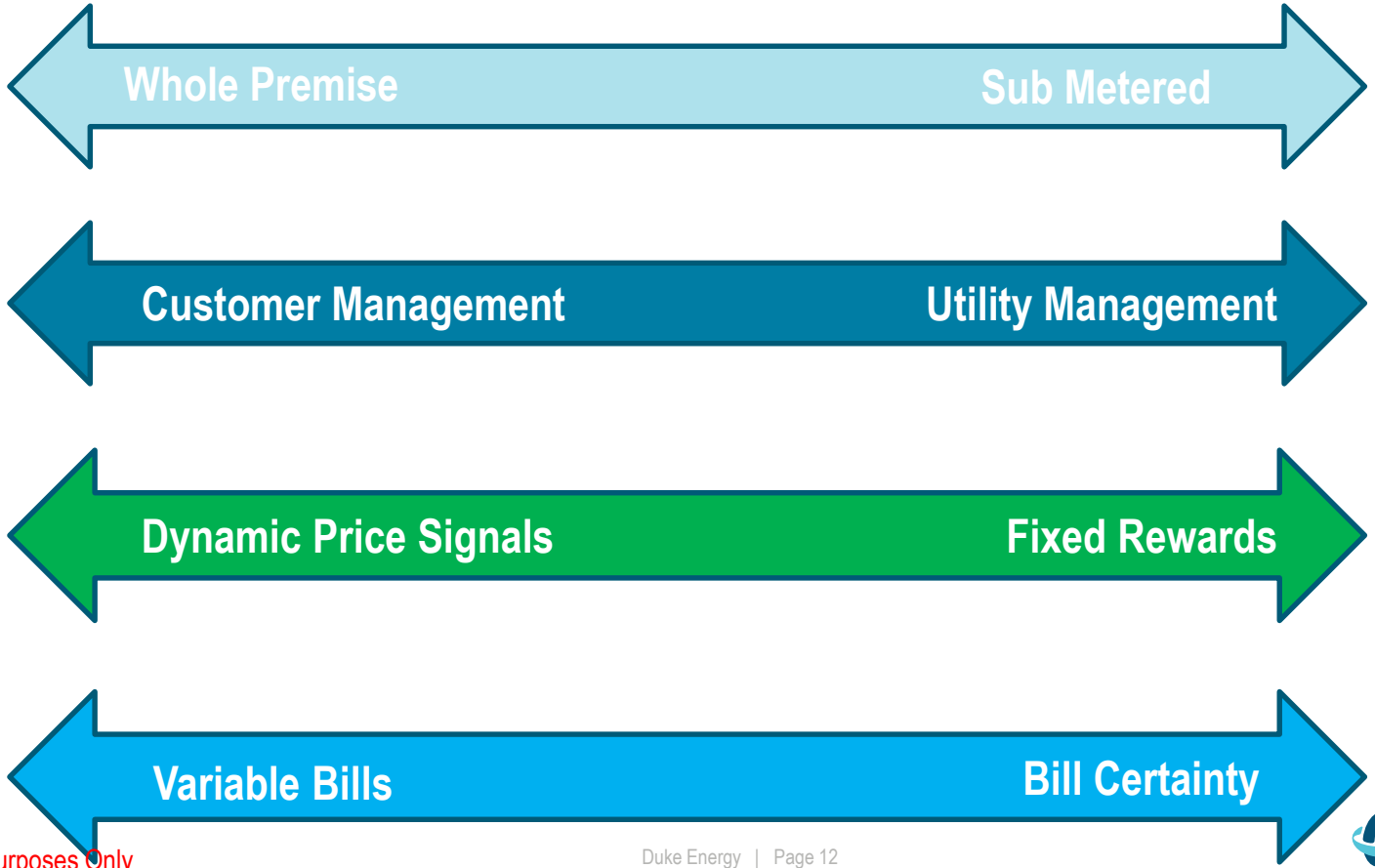


One Rate Per Month Per Fixture + Energy

Charging Infrastructure Tariff

One Rate Per Month Per Charger + Energy

Pricing Program Spectrums to Keep in Mind



Residential Pilot Options

Make-Ready Credit for installation of L2 Charging

Dynamic TOU

Whole Home

- Additional savings for off-peak charging with CPP events
- Super-Off Peak period
- Applies to entire home
- No additional hardware/software requirements

EV Subscription Program

Sub metered

- "All you can charge" & "All you can smartly charge"
- Fixed monthly bill for electricity w/ discounted rate for control.
- With control, utility can curtail charging

EV Off-Peak Credit Program

Sub metered

- Monthly credit to observe off-peak charging for any non-TOU rate
- No additional hardware requirements

EV Firm Load Management Program

- Annual credit to allow utility load management while charging
- *Not available to Off-Peak Credit participants
- Evaluate DR & metering capabilities, test local distribution control

Non-Residential Pilot Rate Options

- Non-Residential customers can take advantage of more sophisticated rate designs that offer additional opportunities for savings
- Concepts need to align with overall non-residential portion of the comprehensive rate design study

Make-Ready Credit

Dynamic TOU (SGS only)	Non-Residential Hourly Rates
Additional savings for off-peak charging with CPP events	Hourly price signals allows for lower demand charges
Super-Off Peak period	Could provide a cost-justified, advantageous rate design for EV charging
No additional hardware/software requirements	Need to learn how EV charging stations can respond to high prices

What we heard from last meeting…

Time Varying Rates

- In line with EV charging needs

Encourage Off-Peak Charging

- Simple incentives to encourage beneficial charging behavior

Subscription Pricing

- Predictable “fuel” costs that simplify going electric

Lower financial barriers

- Eliminate barriers to adopting charging infrastructure and technology

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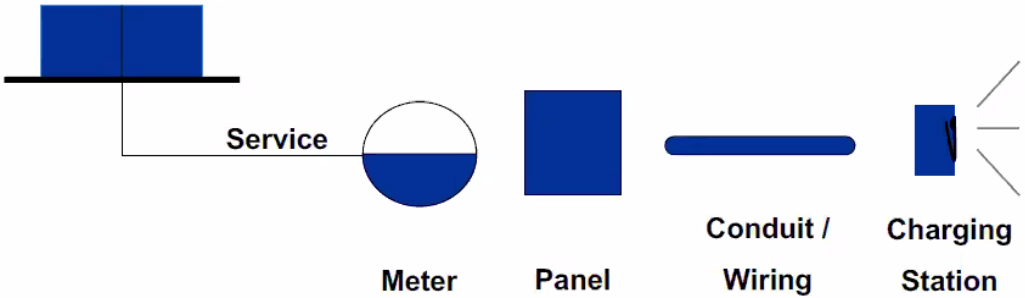
Ownership Structures

- Multiple ownership structures allow 2nd phase pilots to support NCUC directive to explore “additional ownership and partnership models.”



Legacy Operations	Utility	Customer	
Utility Operated			Public, Multifamily
Make-Ready Credit C&I		Utility funding, customer-owned	All C&I Customers
Make-Ready Credit Res		Utility funding, customer-owned	Residential
Tariffed EVSE		Customer-Operated, Customer Choice	All C&I Customers

Second Phase and Additional Pilots

	1st Phase	2nd Phase	Additional Pilots
Fast Charging	Public, Utility-Owned	Public, Utility-Owned Make-Ready Credit Utility owned, customer operated and choice	
C&I Level 2	Public, Utility-Owned MUD, Utility-Owned		
School Bus	Utility-Owned EVSE Right to repurpose battery.	TBD	
Residential			Make-Ready Credit Off-Peak Credit Firm Load Management EVSE Subscription (Managed)
Rate Design			Residential Dynamic TOU Pilot Commercial Dynamic TOU Pilot Commercial Hourly Pricing Pilot

Level 2 Charging Stations

Public Charging
(160 chargers at 80 host sites)

Pilot Goal

Gain better understanding and insights about the impacts of EVs on the North Carolina electric system

Potential Metrics	
Energy and demand requirements of Level 2 charging	Costs of hardware and installation
Hourly load profiles and seasonality	Costs of on-going operation, and maintenance.

Pilot Goal

Deploy EV charging infrastructure to accelerate EV adoption consistent with North Carolina policies

Potential Metrics	
Geographic dispersion of customers using Level 2 infrastructure	Customer awareness of Level 2 charging availability
Track non-Pilot Level 2 charging deployments within DE territory. (new installs per AFDC over time)	Income distribution in area of deployment

Multi-Family Charging
(80 chargers at 40 host sites)

Pilot Goal

Gain better understanding and insights about the impacts of EVs on the North Carolina electric system

Potential Metrics	
Energy and demand requirements of Level 2 charging	Costs of hardware, installation
Hourly load profiles and seasonality	Costs of on-going operation, and maintenance.

Pilot Goal

Deploy EV charging infrastructure to accelerate EV adoption consistent with North Carolina policies

Potential Metrics	
Geographic dispersion of customers using Level 2 infrastructure	Customer awareness of Level 2 charging availability
Track non-Pilot Level 2 charging deployments within DE territory. (new installs per AFDC over time)	Income distribution in area of deployment

Pilot Goal

Remove barriers and support the adoption of electric transportation options at multi-family residence

Potential Metrics	
Multi-family – Occupancy rates before and after installation	EV Registrations tied to addresses in multi-family residence

School Bus Pilot

Electric Vehicle School Bus Pilot

(30 buses Proposed)

Pilot Goal

Gain better understanding and insights about the impacts of EVs on the North Carolina electric system

Potential Metrics	
Energy and demand requirements of electric school buses	Costs of school buses, cahrging infrastructure hardware and installation
Hourly load profiles and seasonality of electric school buses	Costs of on-going operation, and maintenance.

Pilot Goal

Deploy EV charging infrastructure to accelerate EV adoption consistent with North Carolina policies

Potential Metrics	
Reliability of electric vehicle school buses as replacement for diesel buses, i.e. uptime/time in service.	Geographic distribution of electric vehicle school buses deployed under the Pilot
Community awareness of electric vehicle school buses deployment	Income distribution in school districts/area of deployment

Pilot Goal

Conduct research to demonstrate the potential electric system/customer benefits and potential for utility-managed charging to enhance those benefits.

Potential Metrics	
The time periods when will buses be available for dispatch	The amount of energy can be dispatched at different times without impacting transportation operations
Impact of electric vehicle school bus dispatch on battery life	

DC Fast Charging Stations

Public DC Fast Charging

(40 chargers at 20 host sites

Pilot Goal

Gain better understanding and insights about the impacts of EVs on the North Carolina electric system

Potential Metrics	
Energy and demand requirements of DC Fast Charging	Costs of hardware, installation
Hourly load profiles and seasonality of DC Fast Charging	Costs of on-going operation, and maintenance.

Pilot Goal

Deploy EV charging infrastructure to accelerate EV adoption consistent with North Carolina policies

Potential Metrics	
On-going tracking of and reporting of DC fast charge rate	Customer awareness of DC fast charging availability
Track and moniter non-Pilot DC fast charging deployments within DE territory.	Income distribution in areas surrounding DC fast charging deployment

Pilot Goal

Create a fast charging network to facilitate inter and intra-state travel

Potential Metrics	
Geographic dispersion of customers using DC fast charging infrastructure (i.e. nearby customers or traveling from out of state).	Trends in customer usage rates associated with DC fast charging infrastructure

Metrics and Associated Data Sources

Utility Data

- Energy and demand requirements
- Hourly load profiles and seasonality
- Trends in customer usage rates associated with DC fast charging infrastructure
- Costs of hardware, installation
- Costs of on-going operation, and maintenance.
- Report Fast Charge Fee calculation over time
- The time periods when will buses be available for dispatch

External/Participant Data

- Geographic dispersion of customers
- Track non-Pilot Level 2 charging deployments within DE territory
- Track non-Pilot DC fast charging deployments within DE territory
- Income distribution in area of deployment –
- Multi-family – Occupancy rates before and after installation
- Impact of electric vehicle school bus dispatch on battery life

Surveys

- Community awareness of electric vehicle school buses deployment
- Customer awareness of Level 2 charging availability
- Customer awareness of DCFC availability
- The amount of energy can be dispatched at different times without impacting transportation operations
- Reliability of electric vehicle school buses as replacement for diesel buses, i.e. uptime/time in service.

Next Steps

- Stakeholders to provide input.
- Further refine program details.
- Schedule next meeting(s) for further detail on revised proposal.