SEEA
SOUTHEAST ENERGY EFFICIENCY ALLIANCE

Electric Vehicle Programs

How to strike a balance between excitement and execution

Wednesday, December 15, 2021

About SEEA

OUR MISSION & VISION

Our mission is to optimize the use and impact of energy to enhance the quality of life in the Southeast. We want to see all people in the Southeast live and work in healthy and resilient buildings, utilize clean and affordable transportation, and thrive in a robust and equitable economy.

Energy-Efficient Policy

Supports decision-makers at the state, local, and utility levels by identifying energy-efficient solutions to fit stakeholder needs

Built Environment

Empowers partners to strengthen energy and building codes to increase access to healthy and resilient housing

Energy-Efficient Transportation

Advances policies and programs that expand efficient transportation options, drive innovation, and improve air quality

Diversity & Equity

Pursues equitable energy solutions and works to leverage the collective knowledge and strength of the Southeast

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Our moderator and speakers

Peter Westlake

Manager, New Products & Services

Orlando Utilities Commission

Chris Neme

Principal

Energy Futures Group

Amanda Best

Senior Commission Advisor

Maryland Public Service Commission

Evan Lawrence

Public Utilities Engineer

North Carolina Utilities Commission

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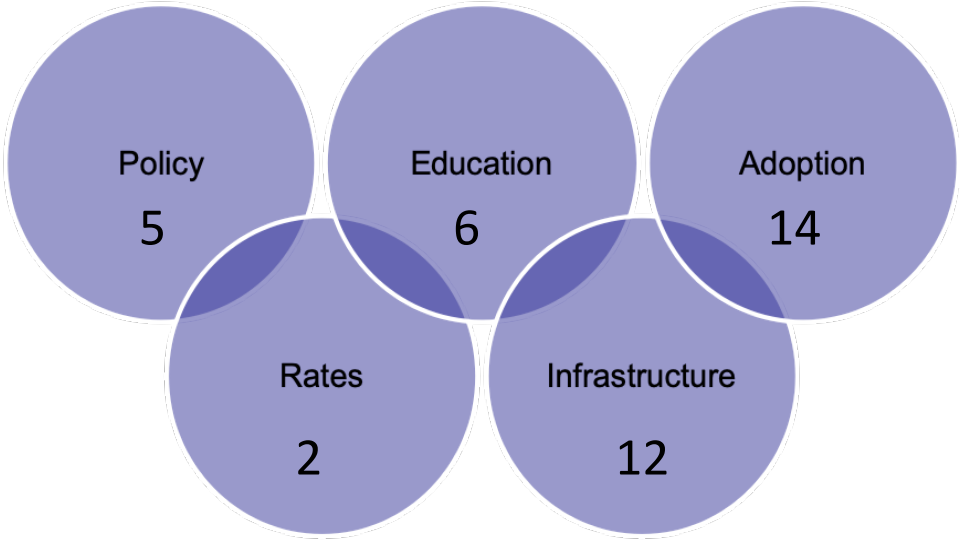
Orlando Utilities Commission

Why is a solid framework needed for EV business case?

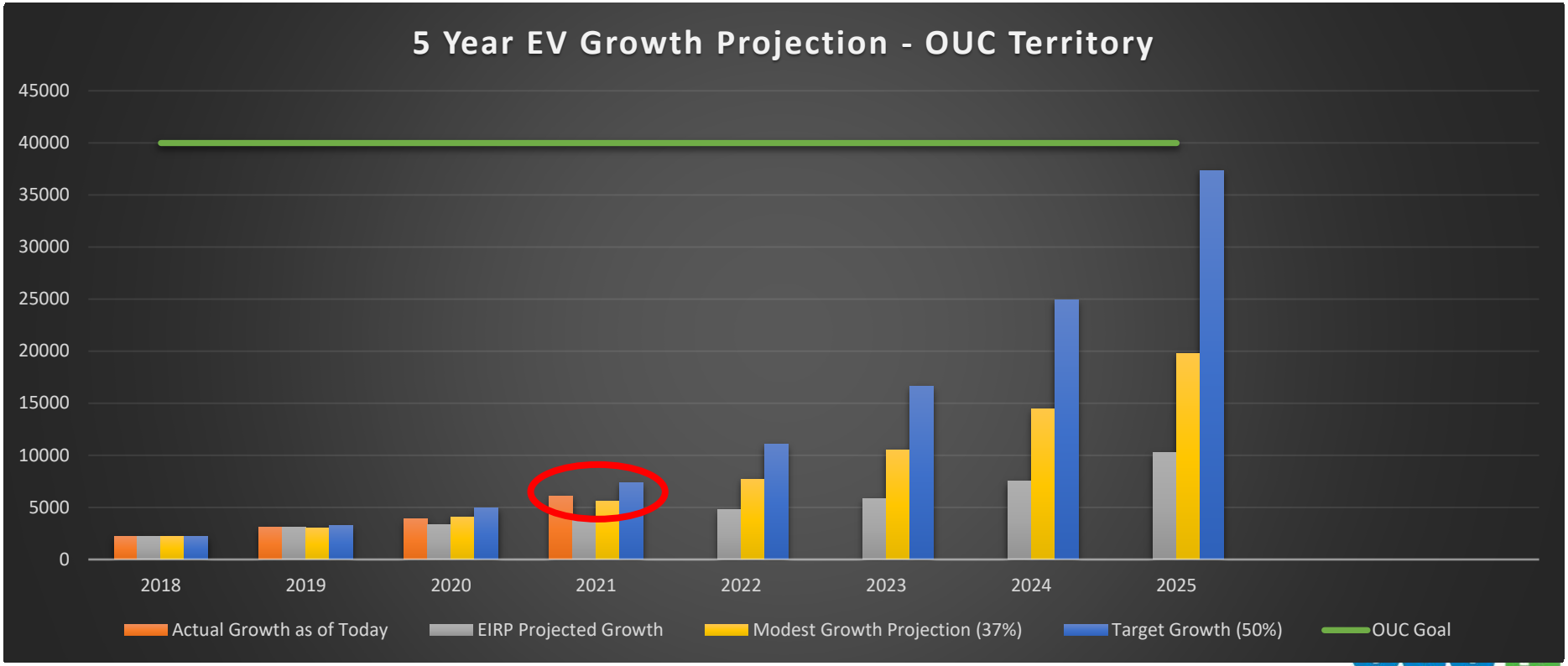
OUC's Electrification Program

- Five-year goal: increase EVs in OUC's territory by 35,000 (5% penetration) by 2025
- $45M Commitment
  - Up to eight charging hubs
  - Education center
  - Electric bus infrastructure
  - Airport ground support infrastructure
  - Commercial fleets infrastructure
  - Residential transportation

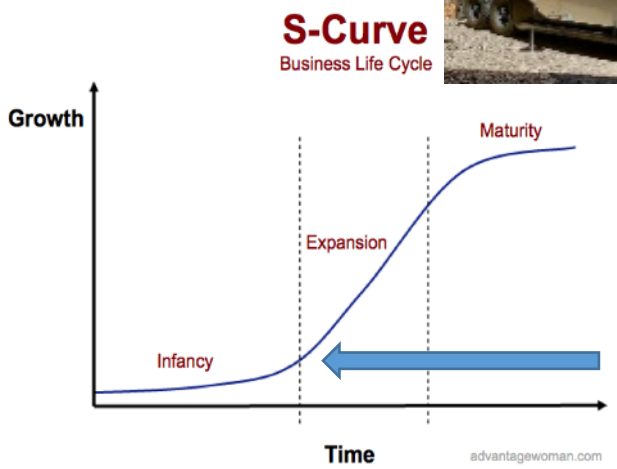
5 Strategic Pillars Supported By Multiple Coordinated Projects



Adoption Rate - Orlando



The bottom of the S-Curve?



RELIABLE • AFFORDABLE • SUSTAINABLE

OUC The Reliable One®

OUC Load Pattern adding EV forecasts

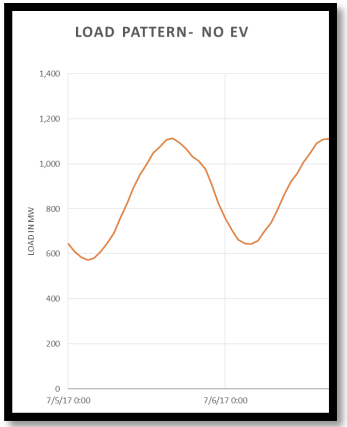
- Peak around 4pm

- $14million revenue
- Peak around 4pm

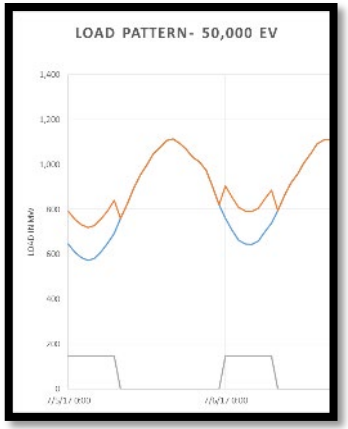
- $28million revenue
- Peak around 4pm

- $84million revenue
- Peak increase 530 mW, new peak 1am

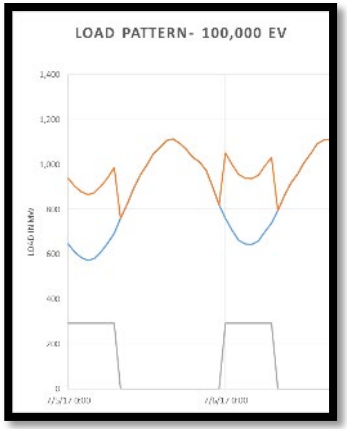
2016



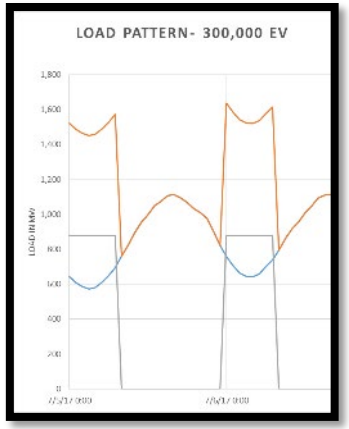
2025



2028



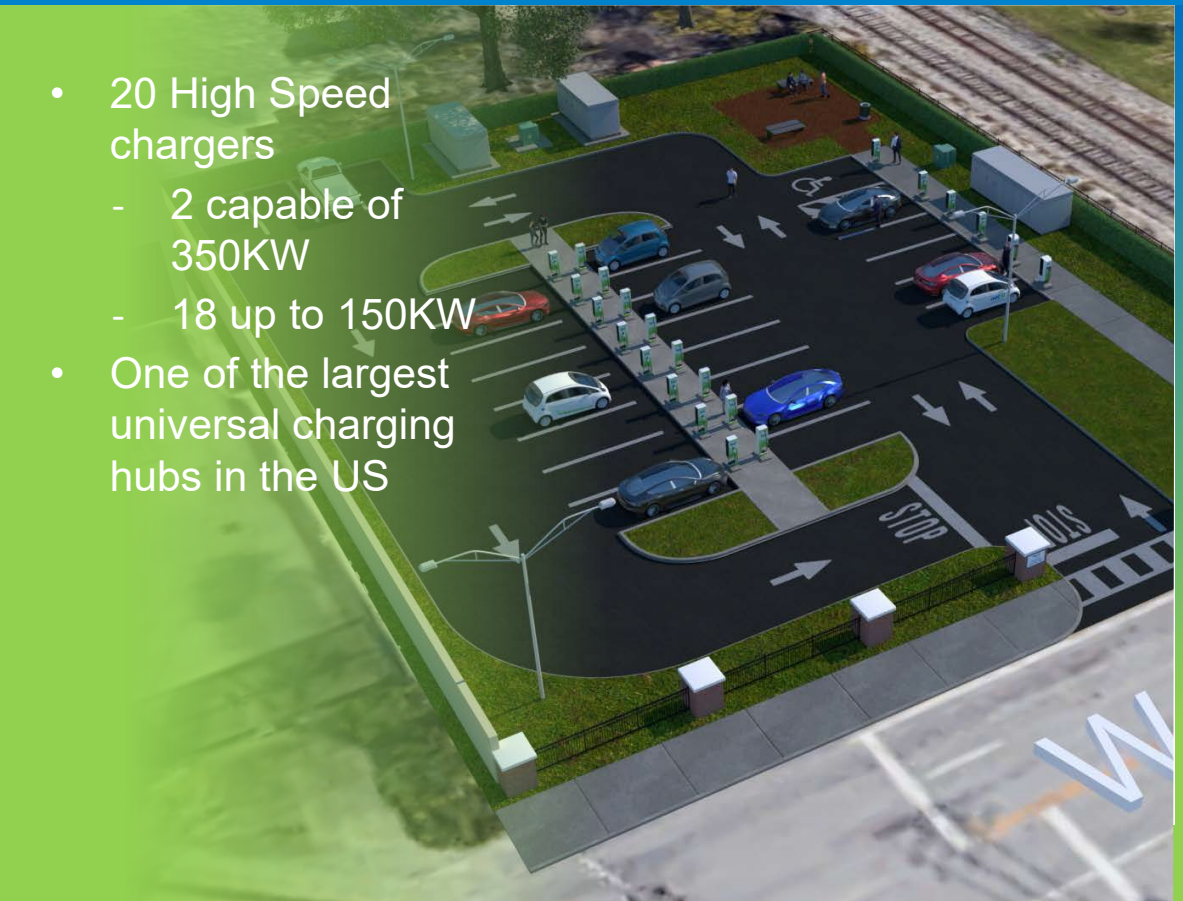
2030



OUC's First Recharge Mobility Hub

One of the largest universal charging hubs in US

- 20 High Speed chargers
  - 2 capable of 350KW
  - 18 up to 150KW
- One of the largest universal charging hubs in the US



Dealership Program

Incentives

Earn and save money with these EV deals.

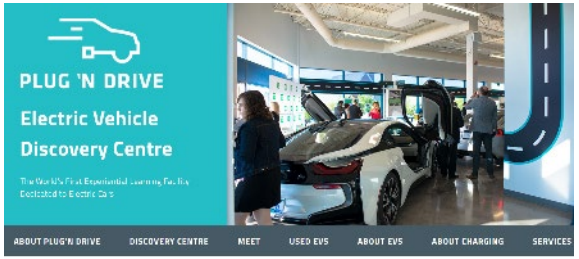
Test Drive an EV and Earn **$50**!

Visit an eligible dealership to test drive an EV and receive a $50 gift card! Get more details and find a participating dealer.

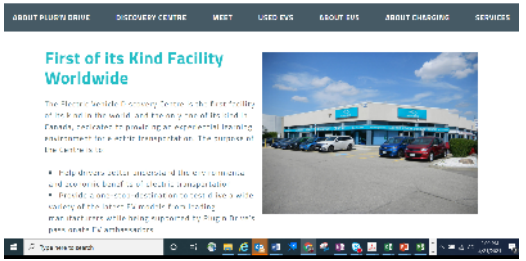
LEARN MORE

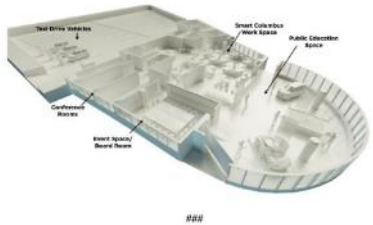
Receive
$50
after an EV test drive

Education Centers

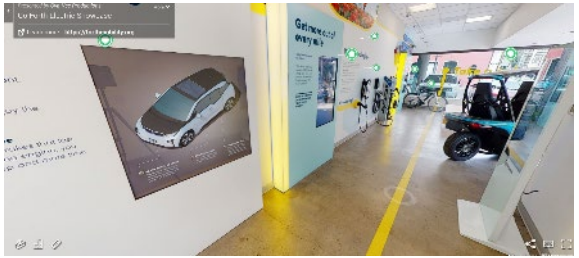


York, Ont Canada
Process 800/month
25% conversion rate





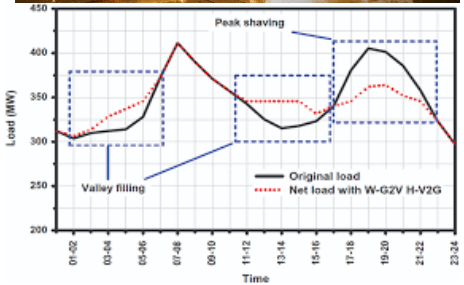
Columbus OH
Process 480/month
Conversion rate 40%



Portland OR

Other considerations

- Electric vehicles are rolling generators – public vehicles can be put to use during emergency situations
- V2G – as this matures building owners can solicit participation to help them curtain demand peaks
- Emergency situations – fueling stations needed along evacuation routes



Electric Vehicle Programs: How to Strike a Balance Between Excitement and Execution

Applying the NSPM for DERs to Benefit-Cost Analysis of Utility EV investments

Chris Neme, Energy Futures Group

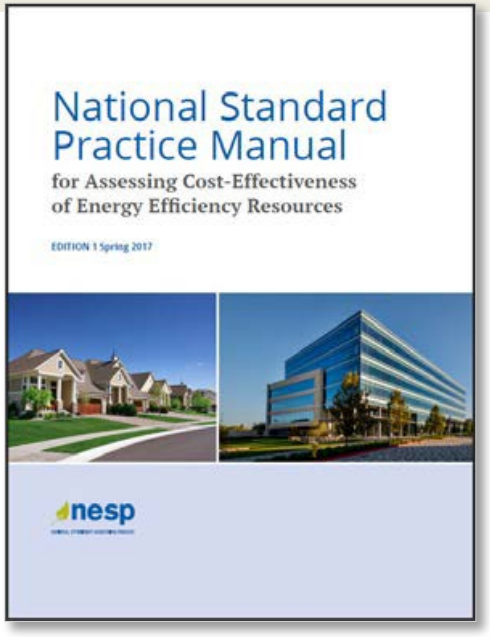
SEEA Webinar
December 15, 2021

Presentation Overview

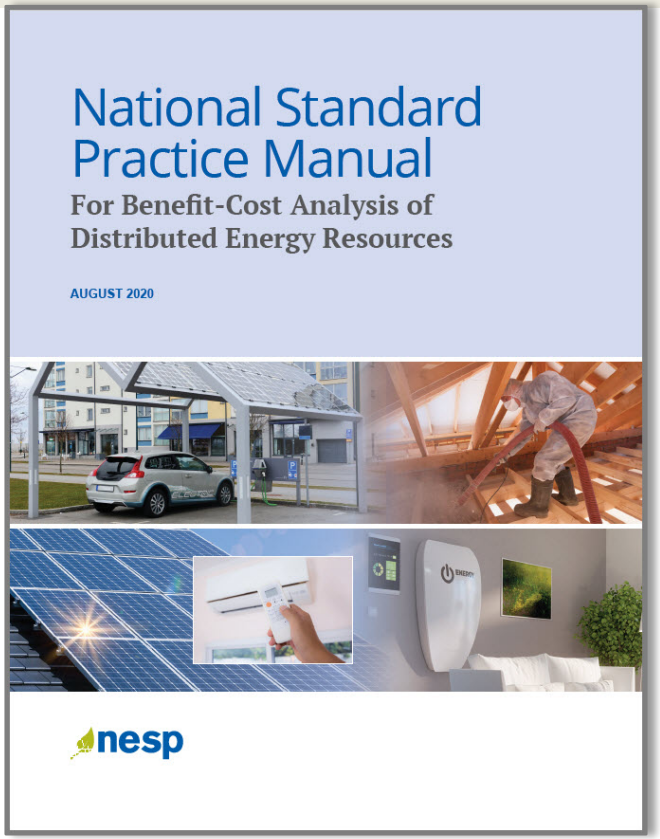
1. Overview of NSPM
2. Application of NSPM to EVs – Using MD as Example
   - Programs to increase EV adoption
   - Programs to manage EV loads (managed charging)

Overview of NSPM

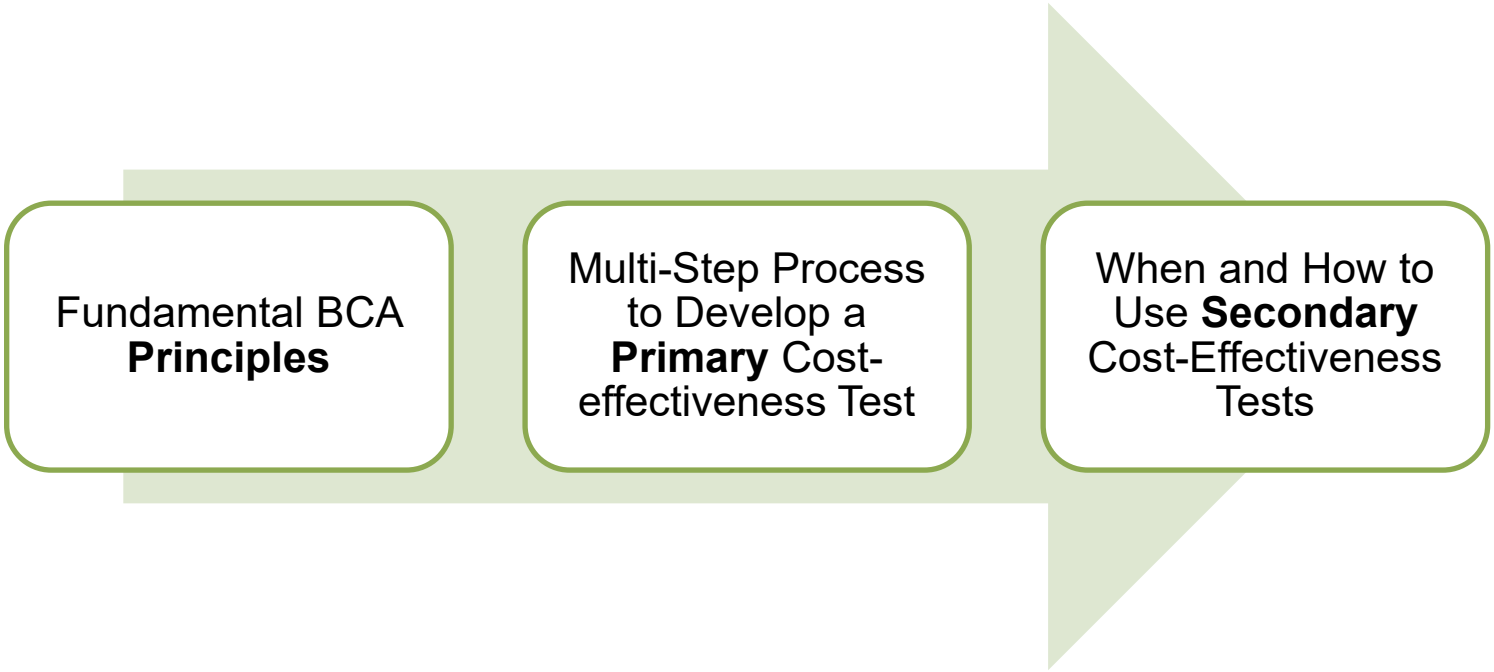
NSPM for EE
May 2017



NSPM for DERs
August 2020



NSPM BCA Framework

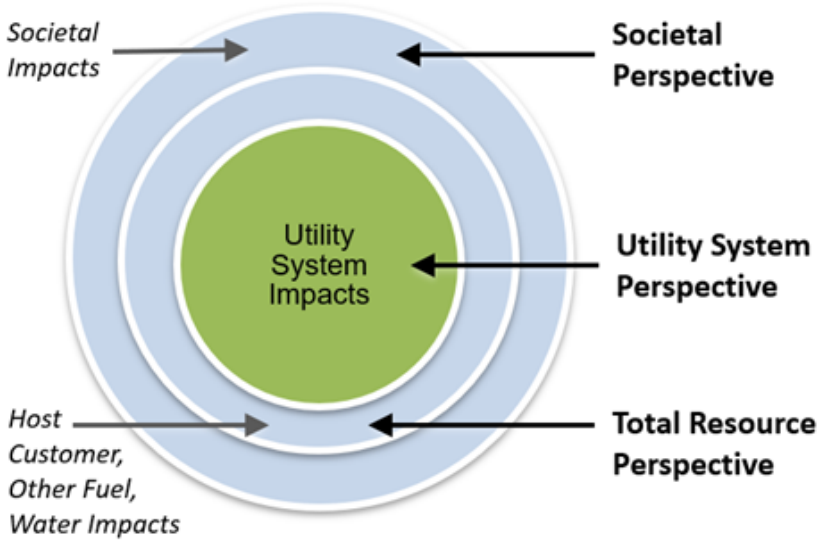


NSPM BCA Principles

1. Recognize that DERs can provide energy/power system needs and should be compared with other energy resources and treated consistently for BCA.
2. Align primary test with jurisdiction's applicable policy goals.
3. Ensure symmetry across costs and benefits.
4. Account for all relevant, material impacts (based on applicable policies), even if hard to quantify.
5. Conduct a forward-looking, long-term analysis that captures incremental impacts of DER investments.
6. Avoid double-counting through clearly defined impacts.
7. Ensure transparency in presenting the benefit-cost analysis and results.
8. Conduct BCA separate from Rate Impact Analyses because they answer different questions.

BCA from whose perspective?

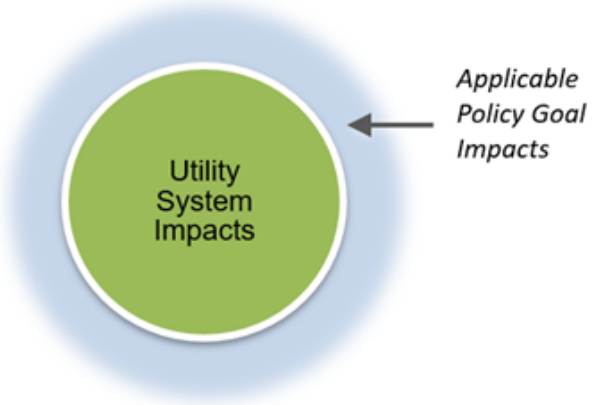
Traditional Perspectives



- Three perspectives define the scope of impacts to include in the most common traditional cost-effectiveness tests.

NSPM for DERs

Regulatory Perspective

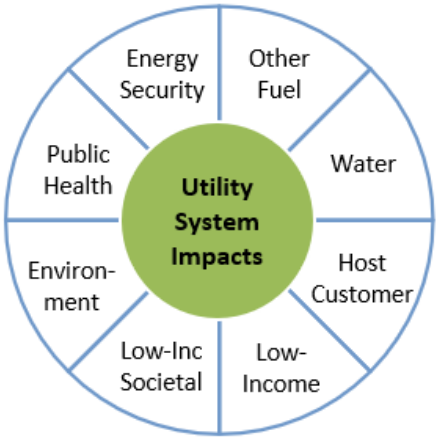


- Perspective of public utility commissions, legislators, muni/coop boards, public power authorities, and other relevant decision-makers.
- Accounts for utility system plus impacts relevant to a jurisdiction's applicable policy goals (which may or may not include host customer impacts).
- Can align with one of the traditional test perspectives, but not necessarily.

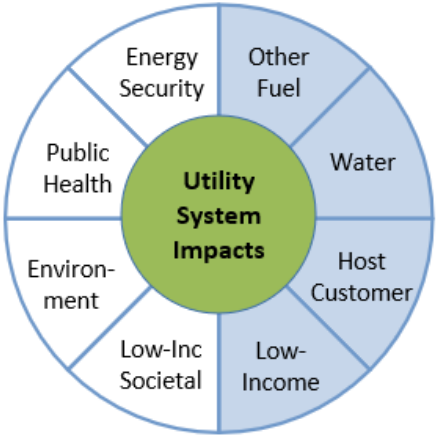
Primary Test = Jurisdiction Specific Test (JST)

Hypothetical JSTs as compared to traditional tests

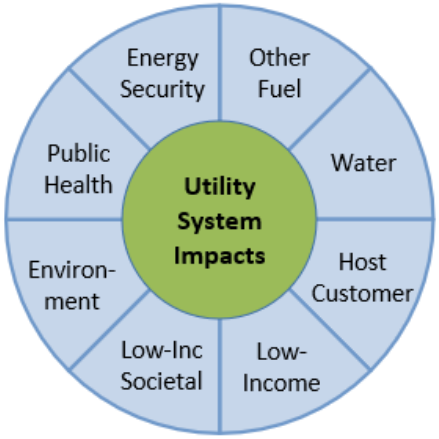
JST 1 = UCT/PACT



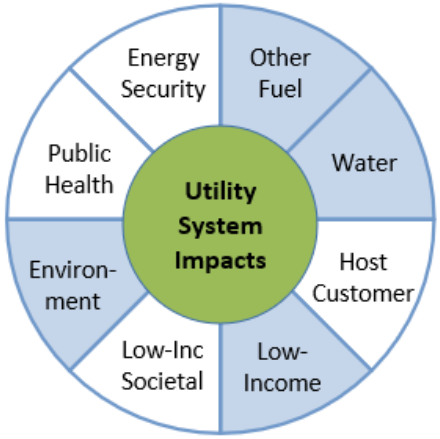
JST 2 = TRC Test



JST 3 = SCT



JST 4 ≠ traditional CE test *



UCT = Utility Cost Test (or PACT = Program Admin Cost Test)
TRC = Total Resource Cost Test
SCT = Societal Cost Test

All utility system impacts included

Non-utility system impacts included

Non-utility system impacts *not* included

*JST 4 includes a different set of non-utility system impacts based on *its applicable policies.*

JSTs may or may not align with traditional tests.

NSPM Application to EVs

Using Recent Maryland Work as Useful Reference

Key EV Issues that Arose in Maryland

- What should the primary cost-effectiveness test be?
- How should rate impacts be considered?
- Boundary issues - “global” impacts or just w/in state borders?
  - GHG emissions
  - Criteria pollutant emissions
  - Effects on market clearing prices for energy/capacity
  - Federal tax credits
- What discount rate is appropriate?
- Applicability of EV benefit-cost test to other DERs
- Detailed itemization of costs and benefits by category
  - EV adoption programs
  - Managed charging programs

Primary Cost-Effectiveness Test

Issues:

- Initial utility proposal was weighted average of SCT, RIM, PCT
- Several concerns raised in discussion:
  - Need single primary test
  - Primary test needs to reflect state energy policy objectives
  - Inclusion of RIM conflates cost-effectiveness and rate impacts
  - Participant test may help inform program design… but not appropriate for regulatory "yes-no" decisions

MD Conclusion:

- MD policies suggest primary ben-cost test akin to societal test
  - Interest in "all fuels" perspective
  - Interest in environmental impacts
  - Interest in participant impacts
- Separate "assessment" of impact on non-participants/rates

BCA vs Rate Impact Analysis

NSPM Principle #8: these are complementary but should be separate

	Benefit-Cost Analysis	Rate Impact Analysis
Questions Answered	What are the future costs and benefits of DERs?	Will customer rates increase or decrease, and by how much?
Results Presented	• Cumulative costs (PV$) • Cumulative benefits (PV$) • Cumulative net benefits (PV$) • Benefit-cost ratios	• Rate impacts (c/kWh, %) • Bill impacts ($/month, %) • Participation rates (#, %)

Appendix A of NSPM for DERs

MD Conclusion:

"Aggregate Non-Participating Ratepayer Impact" (ANRI) Assessments

Method #1: Rate impacts alone
Method #2: Rate impacts + environmental impacts

Results presented in useful format for regulators, stakeholders:

NPV of change in bills for non-participants
Average $/month change per residential customer

Boundary Issues

Issues

- Global benefits of GHG emission reductions, or just MD portion of benefits?
- Global benefits of criteria pollutant reductions, or just MD portion?
- Price impacts across entire multi-state/PJM region, or just MD portion
- Are federal tax credits a benefit (MD boundary view)…or a transfer payment (national/global perspective)

MD Conclusion:

- Decision based on interpretations of state policies:
  - Global boundary for environmental benefits
  - Maryland boundary for direct economic impacts (energy prices and tax credits)

Discount Rates

Issues

- Discount rates should be based on state policy objectives – suggests societal discount rate
- Societal discount rates vary from 0% to 3% (real) - which one is most applicable?
  - Different rates used by different government entities for different purposes
  - Long-term U.S. Treasury Bond yields imply 0.5% to 1.0% (real)
  - Federal analysis of social cost of carbon historically calculated only down to 2.5% (real)
- Estimated Social Cost of Carbon varies greatly with discount rate
  - ~$60/ton at 3% real discount rate
  - ~$400/ton at 1% real discount rate

MD Conclusion:

- Placeholder of 2.5% (real)
- To be applied to both cost-effectiveness test (Maryland JST) and rate impact assessments
- To be updated consistent with work underway in Maryland energy efficiency working group.

Applicability of Test to Other DERs

Issues

- NSPM & econ principles suggests same BCA test/framework for all DERs
  - Same impact categories
  - Though specific impacts – and whether cost or benefit – will vary by DER
- EV working group only set up to address BCA for EVs
  - Didn't have the benefit of considering questions from multi-DER perspective
  - Some parties reluctant to draw definitive conclusions about broader applicability

Conclusion:

- Framework adopted for EVs
- Some cross-fertilization w/Energy Efficiency working group currently meeting
- Commission Staff recommending new docket to explore consistent BCA framework across all DERs

Categorizing Costs and Benefits

Impact-Factor	MD EV-JST (UO-1): Residential Managed Charging	MD EV-JST (UO-2): Multi-Family Charging	MD EV-JST (UO-3): Utility Owned Public Chargers	Market-Wide Test
Computation Scope:	**Induced Charging Behavior**	**Induced Adoption**	**Induced Adoption**	**All EVs On The Road**
Baseline:	**EV Owner, Nat-Chrging**	**No EV Adoption**	**Pull-Through Adoption**	**Depends on Scenario**
Utility (and Power Sector) Impacts				
Utility Program Administration Costs	Cost	Cost	Cost	Cost
Utility Program Implementation Costs	Cost	Cost	Cost	Cost
Impacts On Capacity Costs	Benefit	Cost	Cost	Cost or Benefit
Impacts On Transmission Costs	Benefit	Cost	Cost	Cost or Benefit
Wholesale Energy Cost Impacts	Benefit	Cost or Benefit	Cost or Benefit	Cost or Benefit
Increased Electricity (KWHr) Costs (for EV charging)	N/A	Cost	Cost	Cost
Impacts on Grid Reinforcement	Benefit	Cost	Cost	Cost
Utility-Owned EV Chargers - Costs	N/A	N/A	Cost	Cost
Utility-Owned EV Chargers - Usage $ From EV Drivers	N/A	N/A	Transfer	Transfer
Increased RPS Compliance Costs	N/A	Cost	Cost	Cost
T&D Losses	Benefit	Cost	Cost	Cost
Utility Equipment Incentives	Transfer	Transfer	Transfer	Transfer
Utility Rate Incentives	Transfer	Transfer	Transfer	Transfer
Increased Utility Revenues	Transfer	Transfer	Transfer	Transfer
Participant Impacts(from EV Driver Perspective)				
Incremental EV Purchase Costs	N/A	Cost	Cost	Cost
EV Charger Costs (equipment and installation)	N/A	Cost	Cost	Cost
Avoided Vehicle Fuel Costs	N/A	Benefit	Benefit	Benefit
Savings From Decreased Vehicle Maintenance	N/A	Benefit	Benefit	Benefit
Federal Tax Incentive (EV purchase)	N/A	Benefit	Benefit	Benefit
Societal Costs or Benefits (from Society's Perspective)				
Value Of Reduced GHG Emissions	N/A	Benefit	Benefit	Benefit
Public Health Value Of Reduced/Shifted Emissions	N/A	Benefit	Benefit	Benefit

Answers differ for initiatives driving EV adoption vs. initiatives promoting managed charging.

Questions?

Chris Neme – Energy Futures Group
cneme@energyfuturesgroup.com

Julie Michals – E4TheFuture
jmichals@e4thefuture.org

Extra Slides

Transportation Electrification
Key BCA Considerations (NSPM for DERs Ch 10)

- Electrification resources will increase net electric utility system costs because they require increased electricity generation. However, they will also reduce costs associated with the other fuels that they replace.
- The amount of added costs to the electric grid due to electrification will depend upon when the technologies are utilized, which in turn will be influenced by the host customer rate structure. This is particularly true for electrification measures whose demands can be most flexibly managed by customers, such as EVs.
- The added costs to the electric grid due to most electrification technologies may also be reduced when combined with DR, such as “managed charging” of EVs and direct load control of heat pumps.
- EVs with V2G capability can further mitigate increased costs to the grid as a result of electrification, and potentially even reduce net *electric utility* system costs, because of their ability to function as storage.
- Electrification measures can reduce net air emission impacts (both GHG and other pollutants), as long as the marginal emissions from the electricity grid are low enough relative to the marginal emissions of the displaced fuel.
- Different charging levels for EVs—particularly the prevalence and use of fast charging with short duration draws of large amounts of power—can potentially impact T&D capacity needs and costs.
- Electrification resources will typically create increased revenues for the electric utility. These might lead to reduced electricity rates, depending upon the magnitude of increased revenues, utility system costs, and utility system benefits. Rate impacts from electrification resources are more appropriately assessed using rate, bill, and participation analyses
- Electrification resources will sometimes create lost revenues for the gas utility. These might lead to increased rates, depending upon the magnitude of lost revenues and the magnitude of gas utility system benefits.

The Maryland Electric Vehicle Jurisdiction Specific Test

Amanda Best, Senior Advisor and Work Group Leader
Maryland Public Service Commission

SEEA Webinar:

Electric Vehicle Programs: How to strike a balance between excitement and execution

December 15, 2021

Public Conference 44 (PC44)

- PC44: Maryland's Grid Modernization Proceeding
  - Guiding Principles: affordable, reliable, customer-centered, and environmentally sustainable
  - Six areas of review: rate design, electric vehicles (EVs), energy storage, interconnection process, competitive markets and customer choice, and distribution system planning

The PC44 EV Pilot

- EV Portfolio Petition was filed in January 2018 after a year-long meeting process for the PC44 EV Work Group.
- Commission approved a modified EV pilot in January 2019.
- Required BCA to be included in future rate cases in support of cost recovery for the EV pilot.

Summary of Approved Programs				
Utility	Residential Rebates	Multifamily Rebates	Public Chargers	Total
BGE	1,000	700	500	2,200
Delmarva	287	50	100	437
PE	1,000	50	59	1,109
Pepco	850	200	250	1,300
SMECO	N/A	N/A	60	60
Statewide	3,137	1,000	969	5,106

Procedural History of EV-BCA

- First utility (BGE) filed rate case requesting cost recovery with supporting BCA.
- Parties in the case raised issues with the BCA.
  - Appropriate costs and benefits, appropriate tests, etc.
- The Commission directed the PC44 EV Work Group to develop a consensus BCA by December 1, 2021.
  - Required to consider the National Standard Practice Manual and EmPOWER EM&V framework.

Issues

- What is the appropriate scope and purpose of the BCA for utility EV programs?
- What are the key assumptions?
  - Costs, benefits, assumptions, sources, etc.
- How to ensure transparency?
- Which tests are appropriate?

NSPM and EmPOWER

- NSPM: developed by industry experts, informs states and other jurisdictions how to develop their own cost-effectiveness assessments that meet the needs of their policies.
- EmPOWER: Maryland's energy efficiency programs. Started in 2009. Required to conduct cost-effectiveness testing to ensure ratepayer dollars are achieving the goals included in law.

Final Proposal

- The Maryland EV-BCA Framework
  - Primary test: Maryland EV Jurisdiction Specific Test
  - Supporting tests: Market-Wide Test and Aggregate Non-Participating-Ratepayer Impact Assessments
  - Impact Factors: utility, participant, and societal such as utility program costs, market and energy costs, participant EV costs and savings, emissions benefits, and health benefits.

Thank you!
Contact: amanda.best@maryland.gov

www.psc.state.md.us

SEEA Webinar on Electric Vehicle Programs: How to strike a balance between excitement and execution

Evan Lawrence, Utilities Engineer
Public Staff, North Carolina Utilities Commission

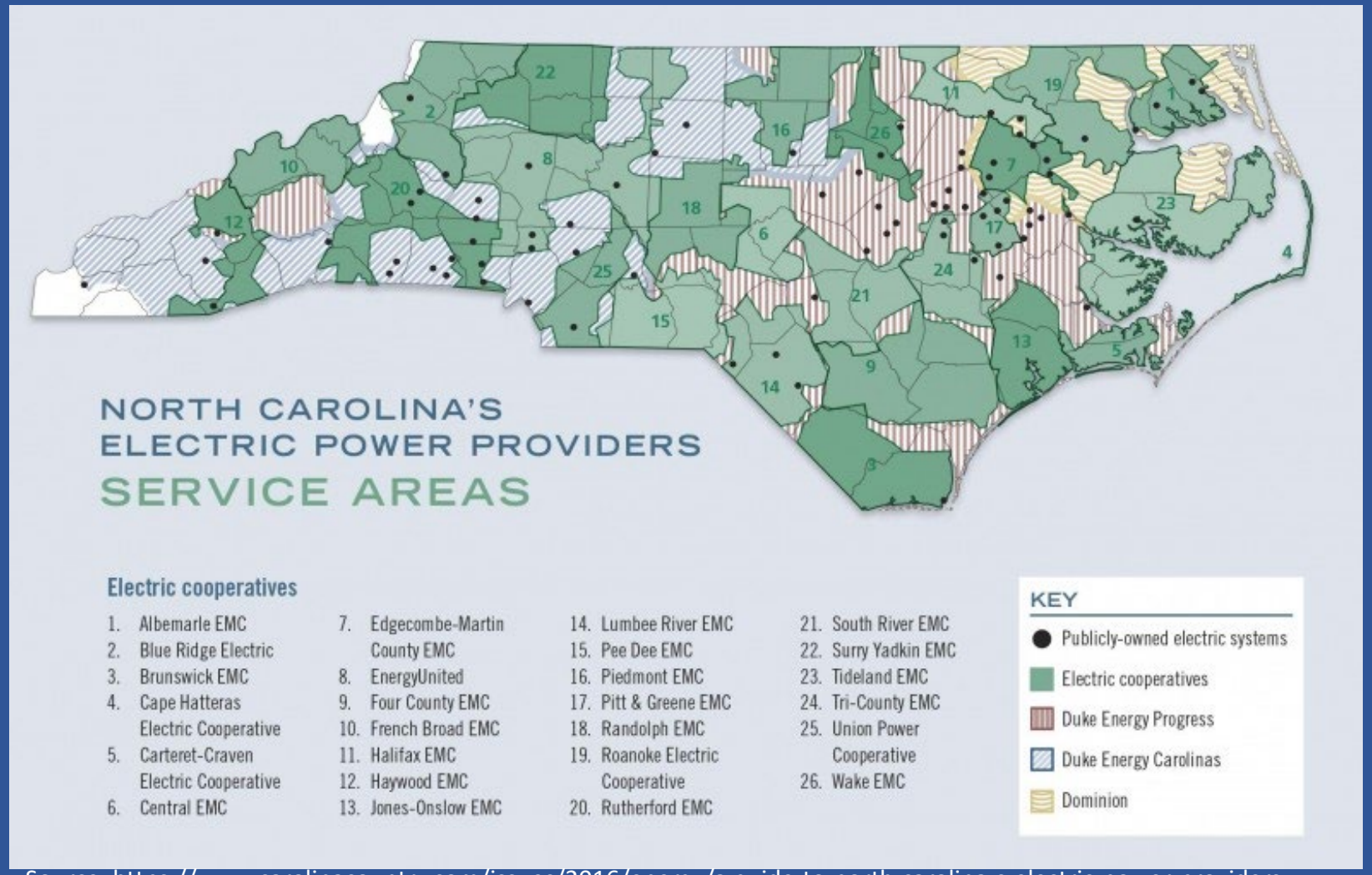
December 15, 2021

Overview of the NC Public Staff

- Established in 1977
  - N.C. Gen. Stat. §62-15
- Represents the using and consuming public in North Carolina Utilities Commission (NCUC) proceedings

Disclaimer: *Any views or opinions expressed today are my own and should not be interpreted to reflect the policy of the Public Staff or the State of North Carolina.*

NC Electric Service Territories



Source: https://www.carolinacountry.com/issues/2016/energy/a-guide-to-north-carolina-s-electric-power-providers

Duke Energy Electric Transportation Pilot

- Filed requesting pilot program on March 29, 2019.
- Included 7 programs, totaling $76 million across two utilities.
- Previously had filed a similar pilot in SC, and Florida.
- Offerings were generally split 60/40 DEC/DEP.
- Dockets E-2, Sub 1197 (DEP) and E-2, Sub 1195 (DEC).

ET Pilot Offerings

- Residential Rebate
  - Provided rebates of $1000 for the install of EV charging equipment.
- Commercial and Industrial (C&I) Fleet
  - Provided rebates of $2500 for the install of EV charging equipment.
- EV School Bus
  - Provided $215,000 per bus.
  - Would test the bi-directional capabilities.
  - Duke would retain ownership of the batteries after useful life in bus.

ET Pilot Offerings (continued)

- EV Transit Bus
  - Duke would install and own EV supply equipment selected by transit agencies.
- Multi-Family L2 Charging
  - Duke would install and own L2 chargers at multi-family residences.
- Public L2 Charging Infrastructure
  - Duke would install, own, and operate L2 chargers at eligible key public destination locations.
- DC Fast Charge Network
  - Duke would install, own and operate DC fast chargers.
  - Fee would be average of all DC fast chargers across the state.

Public Staff's Comments

- PS was largely against the proposed pilot.
- Seemed as if this was mostly a request for pre-approval of infrastructure programs.
- Stated objectives did include analysis of impact of charging on the grid, but as we had more discussions it was very unclear of how this would be measured and quantified.
- Stated objectives also included advancing deployment of EVs in NC to reach governors goal of 80,000 zero emission vehicles in executive order.

Commission's Order

- Approved scaled back versions of the Public L2 charging, DC Fast Charging, and Multi Family L2 charging.
- Issued criteria for future pilot programs.
- Required collaborative stakeholder process to provide input and feedback on second phase of pilot programs.

Pilot Program Requirements

- Proper Scale and Scope
- Rate Design
- Cost-Benefit Analysis
- Leverage Other Funding
- Make-Ready Approach
- Objectives, Metrics, and Verification
- Reporting and Stakeholder Engagement

Second Phase Programs

- Expanded the approved EV School Bus program, DC Fast Charging, Public L2 Charging, and Multi Family L2 charging.
- A request for a make ready credit was filed separately from the second phase pilot.
- With the exception of the make ready credit, second phase was much of the same of the first phase.

Thoughts and Reactions

- Having a well thought out cost-benefit analysis is necessary for a public advocate to ensure the program is in the public interest
- Detailed plan showing costs and benefits.
  - Who pays?
  - Who benefits?
- What alternatives are available?
  - Is this the best use of resources?
- What are the goals?
  - Are the goals necessary, quantifiable, and attainable?

Contact Information

Evan Lawrence
Utilities Engineer, Operations and Management Division
(919) 715-7847
4326 Mail Service Center 27699-4326
www.pubstaff.commerce.state.nc.us
Evan.Lawrence@psncuc.nc.gov

Thank you!

We'd like to hear from you. Please give us your feedback on today's webinar. https://forms.office.com/r/8RsGLJJEnJ

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