NC Executive Order 80 - NC Clean Energy Plan & Modeling

March 27, 2019

NASEO

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Executive Order 80
Governor Cooper

• By 2025
  • Reduce NC greenhouse gas emissions 40%
  • Increase ZEVs to 80,000
  • Reduce energy consumption per sq.ft. in state buildings by 40% from 2002-2003 levels

• DEQ to develop a NC Clean Energy Plan – facilitate a modern electric grid, collaborate with stakeholders, and increase clean energy, energy efficiency, & clean transportation

• DOC to support clean energy businesses and develop clean energy workforce assessments

• Cabinet agencies to integrate climate adaptation and resiliency planning into their work
NC DEQ - Develop A NC Clean Energy Plan

A. Outreach to stakeholders
   • Workshops in Raleigh
   • Regional listening sessions
   • Online feedback portal

B. Technical analysis
   • Resource discussion
   • NC energy landscape
   • Use of predictive energy modeling

C. Recommended action areas
   • Policies, regulatory changes, administrative rules, incentives, carbon markets, CEP implementation funds, etc.

*NC CEP must be completed late summer as it is due to the Governor Oct 1, 2019*
NC Clean Energy Plan
-Help From Outside Organizations-

• Regulatory Assistance Project and Rocky Mountain Institute – help organizing & facilitating workshops and listening sessions
• Assistance from NC University Energy Centers with technical information
• Energy portfolio modeling:
  • Natural Resources Defense Council
  • Resources for the Future
  • NCSU
  • Environmental Protection Agency & Department of Energy
• Studies & reports from a variety of agencies, NGOs & energy stakeholders, & other organizations
NC CEP Information Sources

• Stakeholder process
  • Facilitated workshops
  • Regional listening sessions
  • Targeted events
• Modeling
• Technology research
• NC studies & reports
  • Utility Integrated Resource Plans
  • NC storage study
  • NC greenhouse gas inventory
  • NC clean energy economic impact study
• Outside organizations and NGOs
  • Government – EPA, DOE, EIA, NREL
  • Associations – NASEO, NGA, CESA, SEPA, SEIA
  • Environmental organizations
  • Business groups
Modeling Rationale

• Add data-driven projections to NC CEP report (NC CEP will be more than a discussion of policies & recommended actions)

• Use alternative data-driven models to visualize NC clean energy scenarios
  o Modeling is not intended to build a new utility grid but to identify alternative, NC system-wide energy portfolios

• Bring outside expertise to NC CEP development

• Use multiple modeling tools to gain confidence
Models

Energy modeling is being run and provided by outside organizations. NC DEQ will use modeling as another source of information for the CEP

• Modeling organizations
  • Resources For the Future – using Haiku modeling tool
    Haiku models regional electricity markets. It shows capacity planning, investment, and retirement over a multi-year horizon and for system operation over seasons of the year and times of day. Changes in electricity demand can be shown through investments in energy efficiency, time of day pricing, and other regulatory changes. The model identifies least-cost strategies for compliance with various types of regulations or policy scenarios.
  • Natural Resources Defense Council – using IPM modeling tool
    The IPM (Integrated Planning Model) uses power capacity and generation, technology performance, transmission, energy demand, electricity and fuel prices, policies, and other factors to identify portfolio mixes based on cost-effectiveness. It can add new power plants, retire existing plants, or ramp them up and down to meet demand in the lowest cost way.
  • NC State University – using Temoa modeling tool
    Temoa (Tools for Energy Model Optimization and Analysis) is an energy economy optimization modeling tool. Energy conversion technologies are defined by a set of engineering, economic, and environmental characteristics (e.g., capital cost, efficiency, emissions rate). Temoa minimizes the cost of energy by using appropriate energy technologies over time to meet specified end-use demands (e.g., policies). Note that Temoa is an open source tool. We may be able to do customized, more detailed scenario analysis using Temoa as NCSU has a team that operates the tool.

We are also considering using some of the EPA modeling tools.
Modeling Inputs

- Update models providing current operations capacity and fuel mix for fossil units (dual fuel units)
- Identified new independent gas units not in EIA data for NC
- Provided specific NC studies and policy drivers
  - NC Greenhouse Gas Inventory
  - HB 589 (new solar generation programs for NC)

*The intent was to enable each model to have the same basic starting point. We also wanted to provided organizations with relevant NC policies.*
North Carolina Electricity Generation By Source Type (2005 & 2017)

### 2005 Electricity Generation
- **Fossil**: 64%
- **Nuclear**: 31%
- **Renewable**: 5%

- **Coal**: 61%
- **Natural Gas**: 3%
- **Petroleum**: <1%
- **Biomass**: 1%
- **Hydro**: 4%
- **Other**: <1%

**79 MMT CO2e**

### 2017 Electricity Generation
- **Fossil**: 56%
- **Nuclear**: 32%
- **Renewable**: 11%

- **Coal**: 27%
- **Natural Gas**: 30%
- **Petroleum**: <1%
- **Biomass**: 2%
- **Hydro**: 4%
- **Solar**: 5%
- **Wind**: <1%
- **Other**: 1%

**53 MMT CO2e**

- **Gas Grows**: 3% to 30%
- **RE Grows**: 5% to 10%
- **Coal Shrinks**: 61% to 27%

**NC Reductions**
- 34% GHG
- 90% SO2
- 37% NOx

**NC Imports** about 10% of its electricity each year

Source: NC GHG Inventory, 2019
Scenarios for Models

Being considered:

- Enlarged RE, EE, & storage portfolios
  - Solar, offshore wind, grid storage
- Expanded zero emission fleets
  - EO 80 calls for 80,000 ZEVs in 2025
- NC to be part of carbon trading market
Model Outputs

• Future energy portfolio mix
  o Capacity
  o Generation
  o Peak
• Projected emission impacts
• Economic impacts
  o State economic impacts
  o Job creation
  o Ratepayer costs
• Health impacts
Incorporation of Modeling Results

- Modeling organizations will provide DEQ with a report summarizing modeling projections and discussing output results
- DEQ will evaluate multiple modeling efforts, comparing projections and looking for convergence
- Work with modelers to make high level conclusions
Future Work

• Detailed policy scenario analysis
• Funding CEP pilot programs
• Revision to portfolio projections based on market/technology changes
  o Capacity/generation
  o Outputs – emission profile changes, ratepayer costs, etc.

…..NC CEP will be a living document…..
Thank you!

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Extra Slides Follow
North Carolina’s Greenhouse Gas (GHG) Inventory

Quick Facts: 2005 - 2017

As of 2019, NC is now at 33% reduction. Much of the reduction is a result of coal to gas switch from 2011-2014 with some help from REPS. Need to get to 40% by 2025 for EO 80.

Full GHG Report
https://deq.nc.gov/energy-climate/climate-change/greenhouse-gas-inventory
BAU – Duke IRP