North Carolina Electricity Generation By Source Type (2005 & 2017)

2005 Electricity Generation
- Coal: 61%
- Natural Gas: 3%
- Petroleum: <1%
- Nuclear: 31%
- Renewable: 5%

- NC Reductions: 34% GHG, 90% SO2, 37% NOx
- NC Imports about 10% of its electricity each year
- 79 MMT CO2e

2017 Electricity Generation
- Fossil: 56%
- Nuclear: 32%
- Renewable: 11%
- Biomass: 2%
- Hydro: 5%
- Solar: <1%
- Wind: <1%
- Other: 1%

- Gas Grows: 3% to 30%
- RE Grows: 5% to 11%
- Coal Shrinks: 61% to 27%
- 53 MMT CO2e

Source: NC GHG Inventory, 2019
**NC Today**

- Large Agricultural Industry in NC
  - Large tracts of cleared, flat and available land
  - Less than 0.2% farmland used for solar farms (2016)
- NC has primarily utility scale solar
  - Large utility scale solar
    - Over 5,000 MW installed solar capacity – mostly in east
    - 2nd in US in installed capacity

*Source: NC Sustainable Energy Association*
Annual NC Solar Capacity Installations

Source: https://www.seia.org/state-solar-policy/north-carolina-solar
Solar – How did we get here?

- 2007 Senate Bill 3
- Tax Credits
- PURPA
- USDA Loan Guarantee
- Other helpful items
- Other Renewable Energy
Renewable Energy and Energy Efficiency Portfolio Standard (REPS)

- With the signing of Session Law 2007-397 (Senate Bill 3), North Carolina became the first state in the Southeast to adopt a Renewable Energy and Energy Efficiency Portfolio Standard (REPS). Under this new law, investor-owned utilities in North Carolina will be required to meet up to 12.5% of their energy needs through renewable energy resources or energy efficiency measures. Rural electric cooperatives and municipal electric suppliers are subject to a 10% REPS requirement.

- Although the new law sets forth a number of details, these electric power suppliers generally may comply with the REPS requirement in a number of ways, including the use of renewable fuels in existing electric generating facilities, the generation of power at new renewable energy facilities, the purchase of power from renewable energy facilities, the purchase of renewable energy certificates, or the implementation of energy efficiency measures. Renewable energy facilities include facilities that generate electric power by the use of a renewable energy resource, combined heat and power systems, and solar thermal energy facilities. Renewable energy resource includes a solar electric, solar thermal, wind, hydropower, geothermal, or ocean current or wave energy resource; a biomass resource, including agricultural waste, animal waste, wood waste, spent pulping liquors, combustible residues, combustible liquids, combustible gases, energy crops, or landfill methane; waste heat derived from a renewable energy resource and used to produce electricity or useful, measurable thermal energy at a retail electric customer's facility; or hydrogen derived from a renewable energy resource.

[https://www.ncuc.net/Reps/reps.html](https://www.ncuc.net/Reps/reps.html)
Tax Credits

• Federal Tax Credit
  • 30% Investment Tax Credit (ITC)

• North Carolina Tax Credit for investment in RE projects
  • 35% Spread over 5 years
  • Ended December 31, 2015

• 80% Property Tax Abatements
  • Factors and justifications for tax abatement approval
    • No major road or water infrastructure needed from County
    • Net increase in property tax revenue
Property Tax Abatement

Even though the personal property tax on the new solar equipment receives an 80 percent reduction in valuation (N.C. G.S. § 105-275 section 45), the personal property tax collected after solar has been developed is significantly more than what was previously collected. Furthermore, the real property taxes are still assessed at a 100 percent valuation.

Utilities and Utilities Commissions

Engage your Utilities and your Utilities Commission

• Electric, Natural Gas, and other Utilities
  • Investor Owned
  • Municipal
  • Cooperative

They can help navigate:

• Interconnection Que – having clear interconnections rules and reasonable timelines
• PURPA rules and Qualifying Facilities
• Offtake agreements
PURPA

• PURPA
  • Requires utility purchase of power from Qualifying Facilities (QFs)

• NC 2007-2017
  • 5MW (Below = guaranteed PPA price and term. Above = negotiated PPA and term)
  • 15 year term

• NC 2017-present
  • 1MW
  • 10 year term
Other Financial Incentives

- USDA Loan Guarantees
  - Helped secure project financing

- Land lease payments to property owners
  - Some farmers developed a portion of their land which helped stabilize farm revenue streams
Other

- Drop in solar panel pricing
**NC Permits**

- Need to figure out the necessary governmental units involved in your state
  - Having a list of these approval pathways is helpful to developers

- NCUC certificate of necessity

- NC DEQ permits for sediment and erosion control

- Local zoning, ordinances, and permits

- Model Solar Ordinance developed for NC Counties

- Decommissioning rules – To be developed
Other North Carolina RE

• Energy Efficiency
  • Farm efficiency programs

• Wind

• Biogas
Wind

Amazon Wind Farm developed by Avangrid Renewables
- Agreements with military clearinghouse
- Complex federal development process
- 208 MW (104 Turbines) on 22,000 acres
- Land lease payments to farmers
- Local taxes
State Renewable Natural Gas Potentials

Source: Biogas State Profiles
American Biogas Council

Estimated methane generation potential for select biogas sources by state

Estimated contribution of select biogas sources to states’ total methane generation potential
State Renewable Natural Gas Potentials

North Carolina currently has 75 operational biogas systems

Operational Systems

- Food Waste: 46
- Agriculture: 19
- Waste Water: 10
- Landfill: 12

Potential Systems

- Food Waste: 161
- Agriculture: 704
- Waste Water: 12
- Landfill: 22

Source: Biogas State Profile: North Carolina; American Biogas Council
Innovative Biogas NC Developments

- Optima KV – Directed Biogas from multiple farms

- Butler Farms – Electric Microgrid partnership with NC Electric Cooperatives
This cluster of farms in close proximity met with Optima Bioenergy and decided to aggregate their wastes to achieve cost efficiencies. Optima KV obtained an agreement with Duke Energy to use the directed biogas to help the utility satisfy NC RPS requirements. North Carolina’s RPS requires electrical utilities to supply 12.5% of electric generation from renewable sources, with specific set-asides for poultry and swine waste.

The project was financed by:
- Owner equity,
- A NC Department of Commerce grant,
- A federal Qualified Energy Conservation Bond, and
- a USDA REAP loan.

The $6,500,000 REAP loan was funded by Live Oak Bank and 70% guaranteed by the USDA.

View source case study
Butler Farms – NCEMCs Microgrid Pilot

This microgrid integrates components owned by North Carolina’s Electric Cooperatives with resources owned by Butler Farms and incorporates alternative energy sources, including biogas, solar and battery storage.

During normal conditions, the microgrid supplements traditional power resources. During outages, it can operate in island mode to power the farm and surrounding homes.

This pilot project demonstrates how a microgrid located on a member’s property can be incorporated into the electric cooperatives’ distribution system, and it serves as a case study for the ways agribusiness and utilities can work together to develop innovative grid solutions.

NCEMC Spotlight – Butler Farms
RE Development Conclusions

RE Business Development Needs Certainty

- Robust stakeholder engagement process
- Educate decision-makers about your project
- Provide examples whenever possible – ex. solar ordinance
- Provide lists with contacts of local/state/federal agencies involved
- REPS – Legislative mandates and targets
- Fed and State tax credits
- Engage with your utilities
  - PURPA – Qualifying Facilities
  - Clear and consistent interconnection standards/rules
  - Identifying interested parties with aligned interests
  - Help with offtake contracts
- Securing financing is key – USDA has been very helpful in NC
Thank you!

Kevin Martin
State Energy Office - Renewable Energy Program Manager
North Carolina Department of Environmental Quality
(919) 707-8754
kevin.martin@ncdenr.gov