New North Carolina Energy Legislation & Its Business Implications
November 1, 2017
Mission

Accelerate the cleantech economy through collaboration and partnerships which promote innovation and sector growth
Board of Directors
Upcoming Events

November 2: The Role of Data Analytics in Revolutionizing the Energy Market

January 23-25: DistribuTECH Delegation
New North Carolina Energy Legislation & Business Implications HB 589
Ben Snowden
Environmental Lawyer
North Carolina HB 589

*How did we get here and where are we going?*

Presented to

**RESEARCH TRIANGLE CLEANTECH CLUSTER**

» Transformation Through Collaboration

November 1, 2017
The environment for renewables in North Carolina before HB 589

- Tremendous growth in renewables over the last several years, driven largely by utility-scale solar
  - NC is second in the nation in installed solar capacity
  - NC companies have leveraged in-state experience to go national
  - A few gigawatts in the development pipeline

- Deployment of other renewables is limited in comparison to solar
Policy drivers for renewable development in NC

• REPS program (SB 3, 2007)
  – 3% of retail sales in 2012, up to 12.5% in 2021
  – Set-asides for solar, swine waste, and poultry waste
  – Not a significant factor for new solar projects

• State tax credit (expired in 2015)

• Federal investment tax credit
  – 30% now; drops off in 2020 and goes to 10% in 2022

• Favorable implementation of federal PURPA statute
  – Focused on utility scale projects up to 80 MW
  – Particularly favorable for projects 5 MW and under
Renewable policy in NC - Limitations

• No retail sales by non-utilities
  – Limited ability for customers to procure “green power” from specific suppliers

• No solar leasing

• No community solar (in IOU service territories)

• Prodigious development of PURPA solar facilities has caused issues for utilities
  – Long interconnection queues
  – Duke has raised the potential for safety and reliability issues
Development of HB 589

- Stakeholder discussions started in 2016
  - Utilities, solar industry participants, trade associations, NGOs
- Negotiations were extensive & difficult
- Bill sponsored by Reps. Dean Arp, John Szoka, Sam Watford
- Wind moratorium introduced
- Bill passed on June 30, signed by Gov. Cooper on July 27
  - Executive Order issued to mitigate wind moratorium
HB 589: Key bill provisions

• Major changes to utility-scale solar
  – Move from PURPA model to competitive procurement
• Solar leasing
• Direct renewable procurement (new Green Source Rider)
• Community solar
• Solar rebate
• Energy storage study
• Moratorium on wind project permitting
HB 589: Our speakers

Brian Lips
Senior Project Manager for Policy, NC Clean Energy Technology Center

Randy Wheeless
Communications Manager, Duke Energy

Gary Rackliffe
Vice President, Smart Grids North America (ABB)

Kyle Touchstone
President, Chatham Economic Development Corporation
Brian Lips
Senior Project Manager for Policy
HB 589
Situating North Carolina

Brian Lips
11/1/17
Key Provisions

• Limits to Standard Offer
Key Provisions

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- Introduction of RFP Process
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- Revised Green Source Tariff
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• Solar Rebate
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- Net Metering Changes
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- Community Solar Mandate
- Solar Rebate
- Energy Storage Study
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• Net Metering Changes
• Leasing Authorized
• Community Solar Mandate
• Solar Rebate
• Energy Storage Study
• Wind Energy Moratorium and Study
Net Metering

“The rates shall be nondiscriminatory and established only after an investigation of the costs and benefits of customer-sited generation. The Commission shall establish net metering rates under all tariff designs that ensure that the net metering retail customer pays its full fixed cost of service. Such rates may include fixed monthly energy and demand charges.”
24 States + DC have conducted or committed to DG valuation studies
Leasing

“The General Assembly of North Carolina finds that as a matter of public policy it is in the interest of the State to encourage the leasing of solar energy facilities for retail customers. The General Assembly further finds and declares that in encouraging the leasing of solar energy facilities pursuant to this act, cross-subsidization should be avoided by holding harmless electric public utilities' customers that do not participate in such arrangements.”
At Least 26 States + Washington DC and Puerto Rico Authorize or Allow 3rd Party Power Purchase Agreements for Solar PV
Community Solar

“The General Assembly of North Carolina finds that as a matter of public policy it is in the interest of the State to encourage the subscription to shared community solar energy facilities. The General Assembly further finds and declares that in encouraging the subscription to solar energy facilities pursuant to this act, cross-subsidization should be avoided by holding harmless electric public utilities' customers that do not participate in such arrangements.”
Community Solar

15 States + DC have authorized community solar
Energy Storage Study

“The North Carolina Policy Collaboratory (Collaboratory) at the University of North Carolina at Chapel Hill shall conduct a study on energy storage technology. The study shall address how energy storage technologies may or may not provide value to North Carolina consumers based on factors that may include capital investment, value to the electric grid, net utility savings, net job creation, impact on consumer rates and service quality, or any other factors related to deploying one or more of these technologies. The study shall also address the feasibility of energy storage in North Carolina, including services energy storage can provide that are not being performed currently, the economic potential or impact of energy storage deployment in North Carolina, and the identification of existing policies and recommended policy changes that may be considered to address a statewide coordinated energy storage policy. The Collaboratory shall provide the results of this study no later than December 1, 2018, to the Energy Policy Council and the Joint Legislative Commission on Energy Policy.”
6 States have committed to studying Energy Storage in 2017
Randy Wheeless
Communications Manager
- North Carolina is #2 in the nation for solar energy capacity.
- Duke Energy has 35 solar facilities in N.C.
- 2,500 MW connected to the Duke Energy system.
- We buy a lot more solar than we generate.
More, More, More
HB 589 – Four BIG Things

- More, More, More
- Here Comes the Sun
HB 589 – Four BIG Things

- More, More, More
- Here Comes the $un
- Walkin’ on the Sun
HB 589 – Four BIG Things

- More, More, More
- Here Comes the $un
- Walkin’ on the Sun
- It’s Not Easy Being Green
Delivering the grid of the future
New North Carolina Energy Legislation & Its Business Implications
Renewables and storage driving unprecedented change
Consider these developments

Renewables growth

+27%
Already over 27% of all energy generation in Europe comes from renewables, while in the US 15%

Energy storage price reductions

$36/Month
Average American consumes 903 kWh/month → ~30kWh/day
By 2020 it will cost $36.8/month ($1.2/day) for a full day of electricity storage

New regulations & incentives

8-10%
Global renewables capacity has increased by 8-10% y-o-y since 2010 and the trend is to continue, with over 150GW added annually (2/3 of all capacity addition)

Renewables penetration

85%
At certain times of year in Germany the Max hourly variable renewable generation rate already above 85% of hourly demand

Disruption through new business models

$0
EV Startup Volta offering FREE EV charging in exchange for media rights at prime high-value properties.
If this business model succeeds, the EV MARGINAL COST of energy will be ZERO

The Green agenda

$350 billion
China recently said it would shut 85 coal plants and instead invest $350 billion in renewable sources of energy
Energy Storage Initiative

Goals of the Study

“The Commonwealth’s plans for energy storage will allow the state to move toward establishing a mature local market for these technologies that will, in turn, benefit ratepayers and the local economy,”

- Analyze the storage industry landscape, review economic development and market opportunities for energy storage, and examine potential policies and programs that could be implemented to better utilize energy storage in Massachusetts.
- Provide policy and regulatory recommendations along with cost-benefit analysis
- Engage stakeholders such as ISO-NE, utilities, the Massachusetts Department of Public Utilities (DPU), storage industry, U.S. Department of Energy (DOE) labs, and other interested parties

The Commonwealth can nurture and grow the energy storage industry through programs and initiatives aimed at both attracting business and deploying the technology.
Advanced Energy Storage Technologies

- **Mechanical**
  - Pumped Hydro (Conventional Storage)
  - CAES (Compressed Air Energy Storage)
  - Flywheel

- **Electrochemical**
  - Lead acid, Lithium Ion, Sodium Sulfur, and Sodium Nickel Chloride
  - Flow batteries - Vanadium redox, Zinc-bromine

- **Thermal**
  - Sensible - Molten salt, chilled water
  - Latent - Ice storage, Phase change materials
  - Thermochemical storage

- **Electrical**
  - Supercapacitors
  - SMES (Superconducting Magnetic Energy Storage)

- **Chemical (Hydrogen)**
  - Power-to-Power (Fuel Cells, etc)
  - Power-to-Gas

- Pumped Hydro Storage is often referred to as a “conventional” storage technology
- More recent emerging forms of energy storage such as batteries, flywheels, and new compressed air energy technologies are often referred to as “advanced energy storage”
Advanced Energy Storage is Growing Rapidly

Annual US Energy Storage Deployment: > 1 GW by 2019, 1.7 GW by 2020

Cumulative US Energy Storage Deployment: 4.5 GW by 2020
Cost of Advanced Storage is Decreasing

Forecast of Estimated Equivalent Energy Cost

SOURCE: Customized Energy Solutions

- Lead Acid
- Sodium Sulfur
- Lithium Ion
- Flow Battery
- Compressed Air Energy Storage

Capital Cost / Cycle ($/kWh-cycle)


Pumped Hydro
Growing Deployment in Other States

Other states using storage to address grid challenges:

California – 1.3 GW of storage is part of plan to replace 2.2 GW of nuclear generation retirements

Texas – Leads nation with 17.7 GW of wind generation and is analyzing how storage can address the variability of this renewable generation resource.

New York – Energy storage is part of the Non-Wires Alternatives that Con Ed is using to avoid major infrastructure upgrades

North Carolina currently ranks 17th in energy storage deployment
Storage Use Cases

The Study analyzed the economics and business models of ten storage use cases to inform specific policy and program recommendations.

Energy Storage has potential applications across the entire electricity value chain.

Source: EPRI
Study Findings Summary

Opportunities:
Energy Storage has potential to provide benefits to the Massachusetts ratepayers, including:

- Reducing the price of electricity
- Lowering peak demand and deferring investment in new infrastructure
- Reducing the cost to integrate renewable generation
- Reducing greenhouse gas (GHG) emissions
- Increasing the grid’s overall flexibility, reliability and resiliency
- Generating nearly $600 million in new jobs

Barriers:
- Business models for storage in very early stages
- Energy storage systems need a way to be compensated for a greater portion of their value to ratepayers in order to achieve market viability
## System Benefits

<table>
<thead>
<tr>
<th>Benefit Categories</th>
<th>Benefit Description</th>
<th>Total System Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Cost Reduction</td>
<td>Energy storage replaces the use of inefficient generators at peak times causing: 1) reduced peak prices which 2) reduces the overall average energy price. This also benefits the natural gas supply infrastructure.</td>
<td>$275M</td>
</tr>
<tr>
<td>Reduced Peak</td>
<td>Energy storage can provide peaking capacity to 1) defer the capital costs peaker plants and 2) reduced cost in the the capacity market</td>
<td>$1093M</td>
</tr>
<tr>
<td>Ancillary Services Cost Reduction</td>
<td>Energy storage would reduce the overall costs of ancillary services required by the grid system through: 1) frequency regulation, 2) spinning reserve, and 3) voltage stabilization</td>
<td>$200M</td>
</tr>
<tr>
<td>Wholesale Market Cost Reduction</td>
<td>Energy storage can be a flexible and rapid tool that help generators operate more efficiently through: 1) less wear and tear, 2) less start up and shut down costs, and 3) reduced GHG emissions.</td>
<td>$197M</td>
</tr>
<tr>
<td>T&amp;D Cost Reduction</td>
<td>Energy storage 1) reduces the losses and maintenance of system, 2) provides reactive power support, 3) increases resilience, and 4) defers investment</td>
<td>$305M</td>
</tr>
<tr>
<td>Increased Renewable Integration</td>
<td>Energy storage reduces cost in integrating renewable energy by 1) addressing reverse power flow and 2) avoiding feeder upgrades</td>
<td>$219M</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>$2,288M</strong></td>
</tr>
</tbody>
</table>
Study Results

• Recommends a suite of policies designed to promote the development of **600 MW of advanced energy storage in Massachusetts by 2025**.

• Provides $800 million in system benefits to Massachusetts ratepayers.

• Policies will increase grid resiliency and reduce greenhouse gas emissions.

• Recommendations include:
  
  • *Demonstration funding through the ESI, Inclusion in existing DOER and MassCEC grant programs, encouraging expanded use of energy storage in existing energy efficiency programs, considering energy storage as a utility grid modernization asset, amending the Alternative Portfolio Standard (APS) to include all types of advanced energy storage, inclusion of solar plus storage in the next solar incentive program, and enabling pairing storage with renewables in future long-term clean energy procurements.*
Study Recommendations

The Commonwealth can nurture the energy storage industry and grow the deployment of storage in Massachusetts through programs and initiatives

- Funding for Demonstration projects
- Establish and Clarify Regulatory Treatment of Utility Storage
- Grant and Rebate Programs
- Storage in State Portfolio Standards
- Paired with Clean Energy procurements
- ISO Market Rules
- Initiatives to Grow Companies

If adopted, the Study recommendations have the potential to yield:

- 600 MW of new energy storage by 2025
- $800 million in cost savings to ratepayers
- 350,000 metric tons reduction in GHG emissions over a 10 year time span
- Equal to taking over 73,000 cars off the road
Sources


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New North Carolina Energy Legislation & Business Implications

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