NC Policy Collaboratory

POLICY BRIEF
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ENERGY STORAGE

OPTIONS FOR NORTH CAROLINA

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BACKGROUND

Energy storage has the potential to drive down electricity costs, reduce emissions, and help integrate renewables such as wind and solar power, which only produce electricity when the resource is available.

Energy Storage Options for North Carolina assesses the costs and benefits of various energy storage technologies, including batteries, flywheels, ice storage, pumped hydro, and compressed air energy storage. The study was authorized by the North Carolina legislature in 2017 under House Bill 589, which mandates a study to "**address how energy storage technologies may or may not provide value to North Carolina consumers**." Several storage technologies were evaluated based on current data using cost-benefit analysis. The study outlines the opportunities and challenges of each technology and offers a range of policy options to prepare, facilitate, or accelerate energy storage deployment.

RESEARCH FINDINGS

According to the study, several energy storage technologies are already cost-effective or will be by 2030. The report finds that lithium-ion batteries have significant potential for widescale usage, owing to rapidly declining costs and few resource limitations. Lithium-ion battery storage can already yield significant economic benefits when used for frequency regulation and is projected to show a net benefit in all service categories (end-user services, distribution, and generation and resource adequacy) by 2030.

In addition, pumped hydro and compressed air energy storage are currently cost-effective for large scale energy storage, though they are highly limited by site-specific conditions.

Commercial and industrial customers can realize economic benefits by installing storage behind-the-meter in order to save on monthly electricity bills. For example, ice storage is currently a cost-effective option to shift peak electricity loads associated with building cooling. Over 80 storage projects have already been implemented in North Carolina. Lithium-ion batteries can also be cost-effective for commercial and industrial

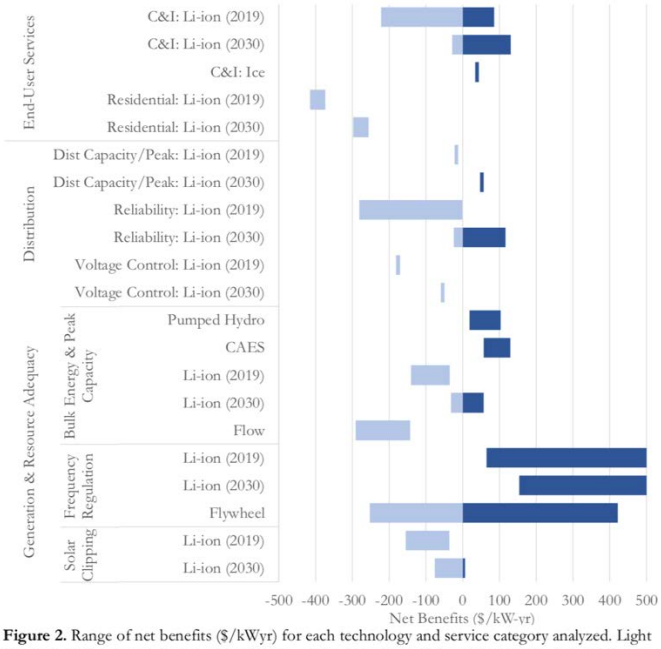
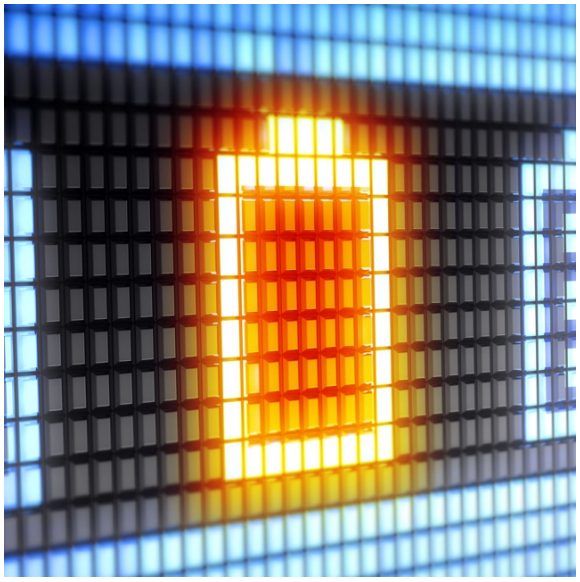


Figure 2. Range of net benefits ($/kWyr) for each technology and service category analyzed. Light blue bars represent negative net benefits (i.e., costs exceed benefits), while dark blue bars represent positive net benefits (i.e., benefits exceed costs). Results assuming current Li-ion battery costs in 2019 and projected 2030 costs are presented separately. Note that Li-ion battery benefits for frequency regulation exceed $500/kWyr, but are truncated for readability.



customers, particularly with expected cost reductions by 2030. Residential battery storage is not cost-effective under current electricity rate design, but the study did not attempt to capture resilience benefits, which could be significant.

Today, North Carolina has approximately one megawatt of installed battery storage out of approximately 35,000 megawatts of installed generation capacity. Overall, the report authors envision the potential for cost-effective energy storage capacity to exceed 1,000 megawatts by 2030.

Information gathered from the current literature, energy-related policy in the state, and at study stakeholder meetings led the research team to conclude that there are few policies or programs in North Carolina specifically targeted to storage, but several that are potentially applicable to the technology.

POLICY OPTIONS

To accommodate the integration of storage in the state, the study presents three categories of recommendations roughly corresponding to the magnitude of intervention: Prepare, Facilitate, and Accelerate. These categories are not necessarily mutually exclusive, nor do they judge the relative merit of the options within each category. Careful consideration should therefore be given to interactions or trade-offs between any particular subset of selected options, as well as the sequencing thereof.

- **Prepare** (address areas of uncertainty that hinder deployment of cost-effective energy storage)
  - Update and clarify the definition and ownership of storage
  - Evaluate net metering rules in relation to the utilization of storage
  - Update interconnection rules
  - Provide guidance for the updating and adoption of local codes and permitting standards

- **Facilitate** (increase the value or decrease the cost of energy storage in the near-term)
  - Develop competitive procurement process to monetize storage services
  - Develop a standard offer program to monetize services provided by smaller projects
  - Develop new tariff structures
  - Create an expedited or streamlined interconnection process for behind-the-meter systems
  - Promote data access and transparency
  - Develop a targeted renewable energy portfolio standard cost-recovery funding stream
  - Establish a procurement goal

- **Accelerate** (increase the pace of energy storage deployment)
  - Develop storage-specific incentives
  - Incorporate storage within the North Carolina renewable energy portfolio standard
  - Update and clarify planning provisions
  - Develop a clean peak standard
  - Establish a procurement requirement

The full Energy Storage Study Report can be found at the project website: energy.ncsu.edu/storage/