State Brief: South Carolina

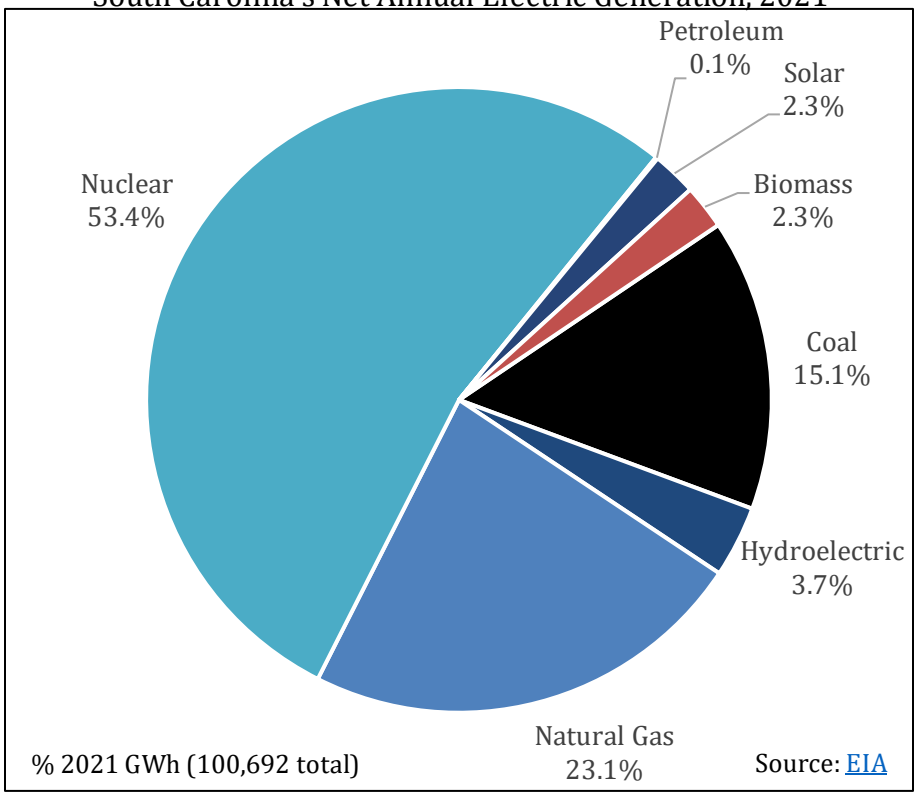
BACKGROUND

The majority of South Carolina's electricity portfolio is supplied by nuclear power, comprising over half of the state's electricity generation in 2021. South Carolina consistently ranks as one of the most nuclear-dependent states in the nation, ranking third in the nation in total nuclear generation capacity.

Natural gas and coal are the second and third largest contributors to the energy mix, respectively, together supplying roughly 38% of the state's electricity.

While dependent upon these resources, South Carolina has no in-state coal or gas production and relies on imports from out of state. The proportion of electricity generated from coal has declined significantly over the past decade, dropping from 41% in 2008 to 15.1% in 2021. Conversely, natural gas-fired generation more than doubled in the same period, up to 23% in 2021.

South Carolina's Net Annual Electric Generation, 2021



Contributions from solar and hydroelectric resources increased only marginally between 2018 and 2021.

South Carolina boasts substantial solar and biomass energy potential. In 2022, the Solar Energy Industries Association (SEIA) ranked the state 14th in the country in terms of installed capacity (1,935.8 megawatts (MW)) and 29th for projected growth over the next five years (1,069.5 MW). The Palmetto State does not have a mandatory renewable portfolio standard, but adopted a voluntary Distributed Energy Resource Program (via Senate Bill 1189 of 2014), which established a goal of 2% of aggregate generation capacity from distributed sources by 2021. Because Duke Energy Carolinas met this 2% goal, they are now able to invest in renewable energy facilities between 1 MW and 10 MW with a cumulative installed capacity equal to 1% of their previous five year retail peak demand average.

In 2022, South Carolina's solar capacity continues to boom – major expansions in solar capacity are planned in the state. The majority of new solar capacity is a result of several utility-scale projects coming online. State policy is also supportive of residential solar installations. The Energy Freedom Act of 2019 (House Bill 3659) eliminated the 2% net metering cap and requires that the Public Service Commission (PSC) establish a net metering tariff for customer-generators (i.e., the billing process for customers who put energy back into the grid). Thus, in May 2021, the PSC approved the Solar Choice net metering agreement, a time-variable net metering tariff, proposed by Duke Energy in collaboration with community stakeholders. Also in May 2021, Governor Henry McMaster signed House Bill 3354, which exempts leased and third-party owned residential renewable energy resource property from property taxes. In May 2022, Duke Energy released its Carolinas Carbon Plan following months of stakeholder input, which would set goals of 70% reductions in carbon emissions by 2030 and carbon neutrality by 2050.

The 2021 U.S. Energy and Employment Report found that South Carolina has 45,606 traditional energy workers (2.7% of total state employment). In 2021, South Carolina ranked twenty-fourth nationally for clean energy jobs,

with 41,888 South Carolinians employed by the industry. Of these workers, 26,815 were employed in energy efficiency, 6,918 in renewables, and 5,804 in clean vehicles.[1]

The South Carolina PSC regulates two natural gas companies, four investor-owned utilities (IOUs), and exercises limited jurisdiction over 24 electric cooperatives in the state. The PSC has seven non-term-limited members appointed via an election held by the General Assembly. Currently, there are seven commissioners, four are Republican and three are Independent. Justin T. Williams serves as Chair of the PSC. Republican majorities control both chambers of the state legislature, and Governor Henry McMaster is a Republican.

POLICY STRENGTHS AND OPPORTUNITIES

The National Renewable Energy Laboratory (NREL) developed the notion of "policy stacking,"[2] an important framework for policymakers to consider. The basic idea behind policy stacking is that there is an interdependency and sequencing of state policy that, when done effectively, can yield greater market certainty, private sector investment, and likelihood of achieving stated public policy objectives.

In theory, but not always in practice, clean energy policies can be categorized into one of three tiers of the policy stack. Tier 1, market preparation policies, remove technical, legal, regulatory, and infrastructure-related barriers to clean energy technology adoption. Tier 2, market creation policies, create a market and/or signal state support for clean energy technologies. Tier 3, market expansion policies, create incentives and other programs to expand an existing clean energy market by encouraging or facilitating technology uptake by additional market participants.

For example, before financial incentives for combined heat and power (CHP) will be successful, two key considerations for deployment are having clear interconnection standards and favorable stand-by rates for customers who opt to add CHP. In this example, states should adopt policies to address interconnection and stand-by rates before adopting financial incentive programs.

MODERNIZING UTILITIES AND EMPOWERING COMMUNITIES

Digital technologies have enabled utilities to better manage the grid and provide opportunities for consumers to customize their services to fit their priorities. These technologies allow a two-way flow of information between the electric grid and grid operators and between utilities and their customers.

Emerging technologies improve system reliability and resiliency by enabling better tracking and management of resources. These technologies allow grid operators to incorporate central and distributed energy resources, energy storage technologies, and electric vehicles, and assist in addressing the challenges associated with planning, congestion, asset utilization, and energy and system efficiency.

On the customer's side of the meter, dynamic pricing, advanced metering infrastructure, and other technologies allow an exchange of information and electricity between a consumer and their electric provider. Grid modernization is associated with greater consumer choice by allowing customers to meet their energy priorities by producing their own energy or through contracting innovative clean energy services from different providers. Grid modernization will require a suite of state and federal policy changes to support advancements in grid technologies, grid management, and utility regulation.

Among other recent grid modernization activity, Duke Energy, with assistance from the Rocky Mountain Institute (RMI), undertook a stakeholder engagement process which included two Grid Improvement Initiative workshops in August and October of 2018. The workshop objectives were (1) to educate stakeholders about the grid improvement initiative, (2) solicit stakeholder feedback, and (3) create a foundation of collaboration for the future. Duke Energy proposed a $454 million South Carolina Grid Improvement Plan in 2017, which includes programs to develop self-optimizing grids, voltage optimization, energy storage, distributed energy resource (DER) dispatch, and

[1] Clean vehicles include hybrid electric vehicles, plug-in hybrid vehicles, electric vehicles, natural gas vehicles, and hydrogen and fuel cell vehicles.

[2] V.A. Krasko and E. Doris, *National Renewable Energy Laboratory*, 2012. Strategic Sequencing for State Distributed PV Policies: A Quantitative Analysis of Policy Impacts and Interactions. *http://www.nrel.gov/docs/fy13osti/56428.pdf*.

transmission upgrades.[3] As part of this docket, Duke Energy Progress and Duke Energy Carolinas filed a request to establish a consolidated informational docket to track grid modernization progress in December 2019, with the PSC maintaining records of ongoing progress for the plan.

In February 2021, several utilities operating in Alabama, Georgia, Kentucky, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, and Tennessee filed plans with the Federal Energy Regulatory Commission (FERC) to establish the Southeast Energy Exchange Market (SEEM), aimed at improving their ability to trade power across the region. Proponents of renewable energy and FERC raised concerns about the market's lack of transparency, and some have argued that it will not incentivize the development of clean energy resources or reduce costs to ratepayers. On the other hand, some argue that SEEM is an important first step in increasing renewable energy integration in the southeast. In June 2021, the utilities amended the proposal to create greater transparency and provide for additional oversight by FERC.

The Infrastructure Investment and Jobs Act of 2021 (IIJA) is a landmark federal spending bill that includes earmarked funding for grid modernization projects. This funding includes $11 billion for Department of Energy grants directed specifically towards electric infrastructure to enhance resiliency (including grid hardening against severe weather and cybersecurity improvements), $2.5 billion for transmission development, and $3 billion for the Smart Grid Investment Matching Grant Program.[4]

There are policies that South Carolina's policymakers could adopt to support in-state grid modernization efforts:

1. Develop a grid modernization strategy through a stakeholder process. Duke Energy's collaborative stakeholder process to develop the Solar Choice net metering program has been much lauded. Such a process may serve as a stakeholder model going forward. Alternatively, states might decide to require that utilities develop and propose a ten-year grid modernization plan to the PSC within a specified timeframe. Utilities would then be required to implement that plan within another specified timeframe. Strategies and/or plans should outline a clear set of grid modernization goals and describe methods to measure, report, verify, and enforce progress towards those goals. Further action following Duke's 2018 grid modernization stakeholder workshops has yet to take place, and advancement of the utility's plan may depend upon the ongoing case before the Commission.

2. States might also provide incentives or cost recovery mechanisms for utilities that meet grid modernization goals. Policymakers could consider directing the PSC to evaluate alternative ratemaking mechanisms, performance-based regulation, and/or new utility business models that support grid modernization. In its current form, the grid improvement plan proposed by Duke Energy would be financed through conventional cost-of-service regulation.

3. Require that utilities' integrated resource plans (IRPs) include plans to enhance cybersecurity, integrate DERs (including electric vehicles and energy storage), increase smart meter deployment and demand response and/or demand-side management (DSM) programs, and measure and report on the results of grid modernization efforts.

4. South Carolina does not have clear state policies governing customer data access and privacy protections. To address this, policymakers could develop legislation or rules that, at minimum, do the following: clarify who owns the energy data associated with consumer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible. The state could establish customer access to energy data through the Green Button Connect program, for example.

5. State departments of workforce services or their equivalent can be directed to work with utilities and other stakeholders to develop training programs for grid technicians and engineers. With new grid technology and

[3] See PSC Docket 2019-381-E. For a detailed analysis of The South Carolina Grid Improvement Plan, see GridLab's whitepaper: "Modernizing the Grid in the Public Interest: Getting a Smarter Grid for the Least Cost for South Carolina Customers" (2019).
[4] For more information on the grid-related earmarks included in the IIJA, see Potomac Law Group's January 2022 analysis: "The Infrastructure, Investment & Jobs Act of 2021: What's in It For You? (Part V: Grid Infrastructure and Resiliency)" https://www.potomaclaw.com/news-Infrastructure-Investment-Jobs-Act-of-2021-Whats-In-It-For-You-Part-V-Grid-Infrastructure-and-Resiliency.

distributed energy systems coming online, a new generation of workers can be trained to meet evolving needs, which will keep jobs local and contribute to economic development.[5]

The adoption of incentives for or a requirement to integrate a certain amount of renewable energy and energy storage on the grid alongside enhancing energy conservation and electric vehicle policies can support modernization efforts.

MAINSTREAMING RENEWABLES

As the renewable energy industry has matured, technology has improved, and global production of equipment has increased, renewable energy is increasingly seen as the least cost and lowest risk form of energy (excluding energy efficiency). With increased deployment, utilities are learning more about how to integrate renewables effectively, investors are becoming more comfortable with the technologies, and building code officials are recognizing common standards and best practices for integrating distributed renewable energy resources. In the U.S., the expansion of renewable energy has been one of the most consequential shifts in electricity generation over the last decade. The U.S. Energy Information Administration (EIA) predicts that most of the growth in U.S. electricity generation in 2022 and 2023 will be from new renewable energy sources. For these reasons, it is in the interest of policymakers to ensure that their states are well positioned to benefit from this shift.

While the IIJA doesn't provide money for specific renewable energy projects, the energy funding in the Act will benefit renewable energy development. Grid resiliency, energy storage, and updated transmission are all essential to the successful integration of renewable energy generation.

To reduce barriers to customer and utility participation in the renewable energy market, policymakers in South Carolina might consider several options.

Customer-Oriented Policies

1. **Interconnection, Net Metering, and Streamlined Permitting** – In general, customers want a clear, streamlined, affordable, and predictable system for connecting renewable energy systems to the grid. Indeed, the recent PSC approval of Duke Energy's time-variable net metering tariff helps to maintain affordability, choice, and transparency. South Carolina's policymakers could consider adopting the Interstate Renewable Energy Council's (IREC)'s model interconnection procedures. Allowing aggregated net metering would be especially beneficial to the state's agricultural operations. Other applications for aggregated net metering include commercial properties and public entities like state and local governments, universities, and schools. The state might also consider establishing either statewide standards for streamlined permitting processes, or resources to support local governments that voluntarily implement a streamlined program. State incentives, such as tax credits (for example, those established by House Bill 3354), loans, or other financial incentives can be tied to systems that are established within a designated streamlined permitting jurisdiction. In May 2021, NREL launched the SolarAPP+, an online platform designed to automate the solar permitting process. By running compliance checks and processing permit approvals, the service is intended to drastically reduce permit wait times. Currently restricted to rooftop solar, thirteen communities in Arizona and California have adopted the platform, processing nearly 5,000 permits for more than 31 MW of generation with an estimated 4,700 hours saved in permit review time.

2. **Shared Renewables** – Due to building and property attributes and ownership issues, many customers are unable to install renewable energy technologies where they live or work. Allowing shared, or community, renewable energy projects addresses these barriers. These projects have multiple owners or subscribers who pay for a portion of the project or the generation provided by the system. South Carolina might consider adopting a virtual net metering policy. Virtual net metering allows a customer to receive credits from a shared system as if the generation were on site. Virtual net metering is different from a power purchase agreement (PPA), which pays the customer for the proportion of power they produce. Because it is treated as a credit on the customer's bill, the customer can avoid the tax implications of a PPA payment - which can adversely affect the economics of the system (and may come as a surprise to the participant).

[5] For a discussion of specific workforce needs states might explore see: GridWise Alliance and U.S. Department of Energy. 2020. "Grid Modernization Index Insights into a Transformation: Principles for the Next Decade of Progress."

Low credit ratings often deter participation in renewable energy markets; this can affect low- and moderate-income (LMI) households' adoption of renewable energy solutions. Supportive policies for shared renewables can be designed to encourage participation by LMI households; this can increase adoption of renewable technologies and reduce energy costs. LMI participation can be ensured either through a percentage mandate for the overall annual contracted capacity, or by offering a higher rate of payment for the portion of shared solar capacity attributed to LMI customers. States that have a shared renewable program may want to coordinate this program with implementation of the federal Weatherization Assistance Program (WAP) to provide recipients of assistance with participation in a shared renewable system.

While the Energy Freedom Act does not establish a statewide community solar program, it does encourage utilities to implement their own shared renewables programs. The Act also directs the PSC to open an investigative docket to study existing utility programs in the state and establish best practices for increasing solar access for LMI customers. Currently, Duke Energy Progress, Duke Carolinas, Dominion Energy, and a number of electric cooperatives maintain community solar programs in the state.

There are several additional policy options that South Carolina might consider to promote renewable energy uptake by LMI consumers. Generally, successful state policies should be tailored to these customers, be cost-effective and financially sustainable, have measurable performance indicators, and be flexible enough to allow later changes in design.

3. **Energy Assistance Programs –** Programs such as the Low-income Home Energy Assistance Program (LIHEAP) and the federal Weatherization Assistance Program (WAP) provide assistance for paying utility bills and reducing household energy costs. Including distributed energy resources as eligible for funding under these programs can reduce energy costs and increase energy security for those LMI families who are able to benefit from WAP and LIHEAP. Colorado, for example, includes rooftop solar in their WAP program. For approval to add solar to a state's implementation of WAP, a state must show that the investment would be cost-effective – achieving a Savings to Investment Ratio (SIR) of 1.0 or more.[6] Since 2010, South Carolina has received $20.6 million from WAP and $7.9 million from the State Energy Program (SEP) which has helped to fund a number of energy initiatives in the state.

4. **Funding Distributed Generation (DG) for Community Organizations –** Organizations or groups that provide support services for LMI communities can be provided funding to install solar or other distributed energy resources. Sites such as homeless shelters, food banks, clinics, and community centers often have enough rooftop area for solar installations. After installation, these resources can reduce an organization's utility bills, freeing up funds for other activities that support the community.

5. **On-Bill Financing/Pay As You Save (PAYS) –** PAYS programs enable LMI consumers to invest in energy upgrades with no upfront payment. The utility or a third party will pay the initial costs to install the upgrade with the cost of that upgrade recovered through the utility bill. Because repayment includes consideration of the cost savings resulting from the energy upgrade, customers see monetary benefits almost immediately. Once equipment costs are recovered, the equipment belongs to the customer. State policies that reduce lending risk by creating a loan loss reserve and/or a credit enhancement fund can encourage lending to customers that might otherwise not qualify for a loan and can keep interest rates low.

6. **Corporate Procurement** – Many Fortune 100 and 500 companies have established either climate goals or commitments to purchase renewable energy. Since 2016, over 41 gigawatts (GW) of renewable contracts have been announced by corporate entities. In 2020 alone, corporations signed 100 agreements for over 10 GW of renewable energy. South Carolina's policy allows companies to purchase renewable energy credits (RECs), buy renewable energy through green tariffs, and develop or lease onsite renewable energy projects. With the recent passage of the Energy Freedom Act, companies can now enter into onsite PPAs. It is prudent to incorporate corporate renewable purchase commitments into the IRPs that utilities submit to regulators to plan for resource

[6] For guidance on the state approval process see the WAP Memorandum 024 (2017), the Solar Template for Incorporating Solar Photovoltaics into WAP (2018), and the Preliminary Assessment Guide for Integrating Renewable Energy into Weatherization (2019).

needs over multiple decades. By integrating these renewable purchase commitments into the IRP process, regulators can avoid over-building resources and stranding generation assets.

Utility-Oriented Policies

Some states have created programs that aim to reduce greenhouse gas (GHG) emissions and increase investments in clean energy resources. Utilities are also setting their own GHG reduction goals and are increasingly investing in clean energy resources. South Carolina's voluntary Distributed Energy Resource Program set a goal of 2% renewable energy by 2021, which was met by Duke Energy Carolinas (DEC) in Spring 2020. Cities and utilities in the state are taking the lead to increase renewable energy deployment. Columbia has set a goal to meet the city's energy needs with 100% renewable energy by 2036. Charleston has set a target to achieve net zero GHG emissions by 2050. In 2020, Duke Energy contracted, owned, or operated 8.8 GW of renewable energy and plans to double this amount by 2025. The utility also has a goal to reach net-zero carbon emissions by 2050. As part of Duke Energy's Carolinas Carbon Plan, the utility plans on more than tripling their current solar generating capacity in North and South Carolina as well as expanding wind resources. Dominion Energy has set a goal to achieve net zero GHG emissions by 2050.

To increase utility adoption of clean energy technologies, South Carolina's policymakers might consider the following:

1. **Accelerating and Amending Renewable Portfolio Standards –** States can revisit existing RPS policies to increase targets and/or accelerate target dates to continue to spur the development of renewable resources and save ratepayers money. Additionally, states might add one or more carve-outs to further incentivize the development of distributed generation and offshore resources. Embedding an RPS within broader clean electricity or emissions standard can allow technological flexibility.

2. **Emissions Standards** – Emissions targets can take a technology neutral approach that looks at the total emissions of the utility portfolio and drives emissions down with a combination of renewables, traditional fuels, efficiency, and technological advances. Emissions reductions can be achieved through 1) a carbon portfolio standard approach, or 2) a market-based approach. A portfolio emissions standard sets emissions reduction targets to be achieved over time. This can be implemented through the IRP process or by establishing a maximum allowable rate of emissions per unit. Under a market-based approach, a state or a group of states might set a certain emissions reduction target, for example, 50% below 2005 levels by 2030. This reduction is achieved by the distribution of annual emission allowances that decrease to the point that the standard is met in 2030. One of the advantages of a market-based program is that it is designed to reduce emissions in the most economically efficient manner possible. Such a standard can also address other concerns such as pollution, asthma risk, environmental justice, and water use.

3. **Clean Peak Standards (CPS) –** Clean Peak Standards aim to increase the share of clean energy resources used to meet peak demand and decrease energy bills over the long-term by reducing peak demand in the hours when energy costs are highest. These objectives can be met through different policy options, including planning and procurement that focuses on peak demand; a moratorium on the construction of new peaking units or a phase out of existing units; incentives – including carve-outs in states with RPSs – for clean energy resources delivered during peak times; and/or adopting a new clean peak standard that sets a target for clean energy deliveries during peak times.

ENERGY STORAGE

Energy storage offers a unique opportunity to manage supply and demand dynamically while also maximizing the value of grid resources. By deploying storage to strategic locations, utilities can more effectively manage their energy portfolios. First, storage allows utilities to manage intermittent demand – helping reduce peak demand requirements. Because the generation resources that provide peak power are the system's most expensive, reducing peak demand can save consumers money. Second, the responsiveness of energy storage can allow utilities to implement voltage regulation and other ancillary services, which are useful for improving system efficiency. Third, because storage technologies can both store and dispatch power, storage enables better integration of intermittent power generation resources like renewable energy to the grid.

On the customer side of the meter, the flexibility of battery storage combined with advanced metering infrastructure allows customers to control, for instance, how and when they use energy from the grid or from solar panels installed on their home or business. In most cases, this can provide greater cost savings than standalone solar systems. Energy storage can also help the commercial sector avoid costly demand charges. As utilities around the country consider implementing or extending demand charges to other sectors, energy storage will become more relevant as a customer cost-saving investment. Combined with time-varying rates or real-time pricing programs, state policy can further support customer choice and open a new market for energy services. Further, prices that better reflect the time-varying and location-dependent costs of producing and delivering electricity can lead to several economic and environmental gains.

Two major trends have enabled increased deployment of energy storage: declining costs and technological advances. State policies can help maximize the benefits of energy storage by establishing both a framework for easy integration of storage resources onto the grid and a marketplace that monetizes the benefits of energy storage for cost-effective investment.

South Carolina does not currently have an energy storage procurement target or goal. However, the state is primed to substantially increase adoption of energy storage technologies. The landmark legislation - the Energy Freedom Act – supports energy storage by removing regulatory barriers to grid access and by recognizing the values storage provides to the grid (discussed further below). Notable projects for energy storage in South Carolina include a microgrid planned for the Anderson County Civic Center, which will include a 5 MW battery connected to the grid and offer backup power at the state's largest hurricane evacuation center, and Duke Energy's plans to continue to increase pumped hydro power storage at its Bad Creek facility. Duke Energy's Carolinas Carbon Plan projects between 3,700 MW and 5,900 MW of new battery storage to support renewable energy projects in the Carolinas.

New federal funding through the IIJA provides a unique opportunity to fund energy storage projects. According to an analysis by the Energy Storage Association, the IIJA provides $505 million for grants to support energy storage demonstration projects, $6.15 billion for building out the U.S. battery supply chain, and $14.7 billion for grid resilience programs that include energy storage as a qualified technology.

In addition to evaluating energy storage's benefits to the grid, there are additional opportunities for developing supportive state policies. The recommendations here draw heavily from IREC's 2017 report, "Charging Ahead – An Energy Storage Guide for Policymakers."

1. Amend existing interconnection policies to ensure that storage can connect to the grid through a transparent and simple process. IREC has produced a series of interconnection protocols that states can adopt. The state could establish best practices for interconnecting storage in statute, or legislation could provide an instruction to the PSC to update existing policy.

2. Instruct the utilities commission to evaluate the value of energy storage in multiple strategic locations across the utility system and consider a requirement to deploy storage where it is cost-effective or identify the price point at which it will be cost-effective. Ensure that cost-effectiveness calculations include all the benefits storage can deliver to the system, including frequency regulation and avoided investments in new infrastructure. The Energy Freedom Act directs the PSC to open a docket to establish new avoided cost methodologies in making resource approval determinations, and geographic location is one factor to be considered in calculating the avoided cost for siting storage projects. In March 2021, three dockets[7] were filed which initiated the process for South Carolina's three major utilities.

3. Require the inclusion of energy storage as a critical piece of the energy system as both a demand and supply management resource. Some states have required that utilities evaluate the cost effectiveness of non-wires alternatives (NWAs) to large transmission and generation investments. Alternatively, states might want to require that utilities develop a distribution investment plan that identifies the locations on the distribution system where energy storage or other distributed resources would offer the greatest value. Because the Energy Freedom Act requires utilities to factor avoided costs into resource planning decisions, the legislation should have a positive impact on energy storage deployment. Greater storage penetration levels would reduce the

[7] See dockets: 2021-88-E, 2021-89-E, and 2021-90-E.

potential impact of electric service outages, and reduce overall costs to ratepayers, which could factor into avoided-cost methodologies.

4. Consider adding a mandatory energy storage procurement target or requirement for energy storage with a documented process for periodic review of progress towards that goal. Procurement targets can include provisions limiting the amount of utility owned storage to be procured, requiring that a certain percent of the storage procurement goal be targeted to low-income customers, and creating carve-outs for specific amounts of storage to be procured at the transmission, distribution, and customer levels. Procurement targets can jump-start market creation, spur fast learning, and ensure the development of a regulatory framework.

5. Finance and incentivize energy storage for customers and utilities. Incentives could enable customers to use storage to manage their electric load and store locally produced renewable energy. Incentives in the form of rebates, grants, and tax credits can provide a bridge to scalable deployment of storage. Incentives can be designed to decline as storage values become more readily monetized and/or as the cost of storage decreases. Policymakers could allow utilities that provide incentives to customers to recover the costs of installing smart meters. This would enable dynamic and time-varying energy management from multiple distributed battery systems. This could also signal to customers the value of leveraging storage and better align customer costs with system costs. Financing energy storage installations for commercial customers could help reduce their demand charges. Policymakers might want to start first with a policy that provides grants to pilot projects. Policy might also target solar system owners. Financial incentives should be designed to ensure that the state will meet other goals including emissions and peak demand reductions, and equitable access to clean energy.

   South Carolina included some incentives to spur energy storage deployment in the Energy Freedom Act of 2019 by allowing battery storage connected with on-site renewable systems to participate in net metering programs.

6. Clear data access policies that allow third parties to provide energy management services based on signals from the utility can greatly increase the value of efforts to monetize the value stream offered by energy storage. State policy should include measures to protect customer data, while also encouraging the use of this information to facilitate additional improvements to grid management and customer services. To address this, policymakers can develop legislation or rules that clarify who owns the energy data associated with customer energy usage; protect customer privacy; outline the process for allowing direct access to data by third parties; and promote access to the highest resolution of data possible.

THE BUILT ENVIRONMENT

In the U.S., buildings consume nearly 40% of total energy used.[8] Energy efficiency plays a prominent role in state energy and climate policies. It reduces energy demand and emissions and creates savings for utility customers. Coupled with beneficial electrification, which involves replacing direct fossil fuel use with electricity, there is great potential to reduce energy costs, reduce pollution, and provide more resilient, comfortable, and healthy buildings. Energy efficiency includes a multitude of measures to reduce the energy consumption of a building. These measures range from installing energy efficient appliances to full building renovations updating a building envelope.

Increasing levels of low carbon resources supplying the electric grid are reducing emissions associated with the electric sector. When policies are adopted to shift from energy uses based on fossil fuels (such as natural gas) for building heating, water heating, and appliances, to highly efficient electric alternatives, states can maximize achieving the dual objectives of energy efficiency and reduced emissions. This reduces overall energy usage, leading to emissions reductions, and in some cases, lower energy costs.

South Carolina currently adheres to the International Energy Conservation Code 2009 (IECC 2009) for new and renovated buildings. House Bill 3550, passed in 2009, removed energy codes from the normal adoption process, requiring updates to be adopted through statutory amendment. The 2016 South Carolina Energy Plan from the State Energy Office recommended looking into returning energy code decisions back to the state's Building Codes Council. Following extensive stakeholder involvement, the South Carolina Energy Efficiency Roadmap Report proposes a number of further recommendations including adopting IECC 2018 codes for commercial buildings.

[8] For additional information, see ACEEE Building Policies and Codes.

The IIJA provides $500 million for grants to fund energy efficiency and renewable energy upgrades in public schools, $3.5 billion for the Weatherization Assistance Program, and further funds the Energy Efficiency and Conservation Block Grant program by $550 million and the State Energy Program by $500 million.

Policymakers in South Carolina can consider a variety of policies to encourage energy efficiency and beneficial electrification:

Energy Efficiency Policies

1. **Building Codes –** The Department of Energy projects that, over time, improvements in building codes can have the greatest single impact in energy efficiency within the built environment. On average, commercial buildings waste 30% of energy used.[9] Because buildings will be around for generations, energy efficiency within the built environment is a matter of statewide and long-term importance. States can set requirements for energy systems, require statements of energy use, and set performance standards for energy use or emissions. Building codes can be required by state legislation or implemented by home rule, where local governments set more strict building codes than mandated by the state.

2. **Appliance Efficiency Standards** – Appliance efficiency standards set minimum requirements for efficiency in everything from washing machines to water heaters. Efficiency standards save consumers money on utility bills and reduce energy demand on the grid, most importantly reducing peak energy demand. Many states choose to adopt the federal appliance efficiency standards that were in effect on January 1, 2017[10]. These include, among other things, standards on metal halide lamp fixtures, residential furnaces and boilers, and external AC to DC power supplies.

3. **Energy Saving Performance Contracts (ESPCs)** – ESPCs are a financing mechanism for energy efficiency upgrades. ESPCs are often used within large institutions, such as college or government campuses, allowing them to meet their energy and environmental goals. An energy service company will pay the upfront cost of efficiency upgrades and execute the project, often guaranteeing the projected energy savings. The large institution will then pay back the service company with savings from their utility bills. This allows institutions to pay for their upgrades from their operating budget, instead of finding new financing, such as loans or bonds, for capital upgrades. Essentially, they pay their upgrade costs with their energy savings.

4. **Low-Income Energy Efficiency Programs –** While equity should be incorporated into all policy development, it is often necessary to ensure that specific programs are targeted towards historically underserved populations. Recent research suggests that weatherization can reduce energy use by 25-35%, allowing households to reduce their financial energy burden. The federal WAP program provides energy efficiency upgrades for income qualified homeowners. However, in many states there is difficulty in reaching individuals who may be eligible. Lawmakers can pass legislation requiring outreach and education to groups eligible for WAP.

   The South Carolina Office of Economic Opportunity oversees the state's LIHEAP program, assisting residents with energy bill payment, energy crises, and as well as weatherization and energy-related repairs.

5. **Energy Efficiency Resource Standards (EERS)** – EERS require utilities to demonstrate a reduction in energy demand from programs offered to their consumers. Because this means selling less electricity and reducing revenues, there is not always an incentive for the utility to make their consumers more productive or efficient users of electricity. If legislatures want to ensure a more productive and efficient energy distribution system that takes advantage of the latest technological innovations, they may want to require that a utility demonstrate a percent reduction in demand through efficiency or "demand side" programs. Legislators can also instruct their utility regulators to consider energy efficiency when approving rate cases, by allowing cost-recovery of energy efficiency improvements on a customer's utility bill.

[9] For more information, see the Office of Energy Efficiency & Renewable Energy's Commercial Buildings Integration (CBI) Program.

[10] Based upon research conducted by the Center for the New Energy Economy.

South Carolina currently does not have an EERS, thereby providing significant opportunity for policymakers in the state to take the lead in this area.

6. **Revenue Decoupling and Performance-Based Incentives –** Utilities earn revenue by selling electricity. As a result, there is no incentive for them to promote energy efficiency because it leads to a reduction in sales, and therefore a reduction in revenue. Revenue decoupling disconnects revenue from the amount of electricity sold. Rather than selling as much electricity as they can, they are allowed a set amount of revenue regardless of the amount of electricity sold. While this doesn't directly incentivize energy efficiency, it removes the inherent disincentive to promote energy efficiency.

   Incentive policies may be layered on top of a decoupling policy. For example, if a utility meets set energy reduction targets, performance-based incentives, as determined by a PUC board, provide monetary incentives for meeting those targets. This also ensures that customers benefit from the extra revenue from electrification by saving on their bills. South Carolina currently allows for recovery of lost revenues from efficiency improvements for utilities, as well as some performance incentives. The state has not yet authorized revenue decoupling. It is important to incorporate a regular review of decoupling and incentive policies to ensure they are still meeting their intended purpose.

Electrification Policies

1. **Strategically Targeting Beneficial Electrification** – Target areas of beneficial electrification in buildings can be home heating and hot water systems, systems that typically use gas as a power source. According to the Environment and Energy Study Institute, new electric heat pump technology can heat space and water at efficiencies of 200 to 300 percent, compared to 67 percent efficiency in typical Energy Star gas water heaters.[11] This allows savings on electricity bills, as well as decreased greenhouse gas emissions.

2. **Tools Advancing Electrification Policies** – Primarily, building codes and incentive programs are used to advance electrification policies. In many states, the primary jurisdiction for these codes are local governments, however some state legislatures have incorporated requirements for local jurisdictions. Incentive programs managed by cities, utilities, or states can be targeted at replacement of fossil fuel resources with high efficiency electric appliances including water heaters, furnaces, ovens, and ranges. Heat pump water heaters and space heating systems are being incentivized as high efficiency replacements for traditionally fossil-based equipment. In conjunction with utility regulatory policy, these technologies can serve as demand response management tools by utilities in exchange for compensation to the ratepaying home or business owner.

   As a note, cities across the country are implementing new building codes promoting beneficial electrification by limiting or banning the installation of natural gas in new construction. At the same time, some states are passing pre-emptive legislation to disallow municipalities from banning new gas hookups.[12] State legislatures can work to pass enabling legislation, allowing specific municipalities to make independent decisions on electrification building codes.

Programmatically, there will always be greatest benefit by combining measures – so incentives that bundle improvements will generate greater gains than individual measures. For example, a high efficiency heat pump will be much more effective and efficient when coupled with insulation. The entire system will increase in efficiency, rather than just the mechanical component.

ELECTRIFICATION OF THE TRANSPORTATION SECTOR

An estimated 58% of new car sales will be electric by 2040. Therefore, a key part of building a modernized grid involves designing infrastructure that will facilitate easy connection of electric vehicles (EVs) to the grid. One of the most important barriers to increased adoption of EVs is the consumer's awareness of the availability of EV charging stations. Ultimately, drivers want to be sure that their car will get them where they need to go. The good news is that

[11] For more information, see EESI's Beneficial Electrification.
[12] See, "Battle Brews over Banning Natural Gas to Homes." The Wall Street Journal, 1 June 2021, https://www.wsj.com/articles/battle-brews-over-banning-natural-gas-to-homes-11622334674.

both supportive policies for developing charging infrastructure and technological advancements have eased this "range anxiety."

A study prepared by M.J. Bradley and Associates in 2020 found that if EV adoption reaches the "high" scenario (1.2 million vehicles by 2030, 5.5 million by 2050), the state's utility customers would save $600 million through reduced electricity bills, cumulative gasoline use would be reduced by 15.4 billion gallons, and cumulative net GHG emissions would be reduced by 294 million metric tons. In total, the study found that "cumulative net benefits from greater [plug-in EV (PEV)] use in South Carolina could exceed $24 billion state-wide by 2050." Other studies in other states have found that greater market penetration of PEVs "can generate up to $570,000 in additional economic impact for every million dollars of direct savings, resulting in up to 25 additional jobs in the local economy for every 1,000 PEVs in the fleet" (M.J. Bradley and Associates 2020).

A few incentives for EVs and alternatively fueled vehicles are currently available in South Carolina. State facilities and educational institutions are eligible to use a revolving loan fund to finance alternative vehicle acquisitions in South Carolina. A battery manufacturing tax incentive for machinery and equipment used for renewable energy manufacturing facilities (including facilities that manufacture EVs) can be claimed to offset up to 20% of equipment costs. In September 2020, the PSC approved Duke Energy's Park & Plug program, which will enable the expansion of the necessary infrastructure for EVs in South Carolina. This includes the installation and operation of up to 60 Fast Chargers in 30 locations throughout the state. As of June 2021, through a second pilot program, Duke is offering a Plug-in Electric Vehicle Charging rebate to residential customers who participate in a managed charging program. The program requires the installation of a Level 2 charging station, providing access to charging data, and managing EV charging load to occur during off-peak times.[13] Enacted in May 2021, Senate Bill 0304 required South Carolina's PSC to open a docket in order to identify regulatory challenges and opportunities related to electrification of the transportation sector; a docket has yet to be filed. The bill also requires the Office of Regulatory Staff to complete a stakeholder process to further explore challenges and opportunities for the advancement of the transportation sector.

The American Council for an Energy-Efficient Economy (ACEEE) published a State Transportation Electrification Scorecard in 2021 that evaluates states' progress in electrifying transportation in six key policy areas and offers nationally applicable policy recommendations. South Carolina is unranked in the 2021 report, however, the report does provide an overview of the current state of the state's EV policies and infrastructure. The second annual Transportation Electrification in the Southeast report by the Southern Alliance for Clean Energy (SACE) outlines significant private sector investment in the EV industry in the region as well as rapid growth in consumer adoption. The year-end update for South Carolina identifies more than $800 billion in manufacturing investments and a 63% growth in EV sales in 2021 for the state. Major investments include a $76 million EV battery facility from Proterra and $118 million from Polestar for the production of its first EV manufactured outside of China.

The IIJA provides nearly $5 billion over the next five years to support the electrification of the transportation sector. In 2022, $615 million will be made available for the installation of charging stations along designated alternative fuel corridors. The Act also provides approximately $1.1 billion for grants to state and local governments to assist with the purchase or lease of low- or no-emission vehicles for transportation fleets. To be eligible, a state must have a Zero-Emission Fleet Transition Plan in place.

There are opportunities to expand the market for EVs in South Carolina:

1. **Charging Infrastructure Plan –** Locating charging infrastructure is different from locating conventional fueling stations. While some drivers will need to charge more quickly, others will refuel when they are parked for longer periods of time, for example when shopping at the mall or going to work. Charging infrastructure plans should attempt to pair the appropriate level of charging (level 2 or direct current fast charging) with a reasonable amount of time a person will be at that location. Legislation could direct a state agency to develop an infrastructure plan through a stakeholder process. South Carolina's existing registration fee for EVs could help fund these efforts.

[13] Managed charging helps utilities to shift loads to beneficial times for customers and the grid, see: https://www.duke-energy.com/energy-education/energy-savings-and-efficiency/electric-vehicles/ev-initiatives

2. **Parking Infrastructure Requirements –** In tandem with the development of a statewide plan, legislation could set requirements for parking lots and other infrastructure. Some states have adopted permitting standards for parking lots, requiring, for instance, that for every 100 parking spaces, there must be at least one EV charging space. Legislation could also incentivize utilities to develop make-ready locations. These locations supply power to the point where a utility or third-party developer might install an EV charging station. South Carolina's Statewide Building Energy Codes could also be updated to include requirements for EV charging infrastructure.

3. **EV and Charging Equipment Financing and Financial Incentives –** Providing financial incentives and innovative financing options can help spur greater market penetration of EVs. Sales, property, and income tax credits are some of the simplest methods for addressing the high up-front costs of EVs and EV charging equipment. While sales tax credits are typically applied at the time of purchase, property and income tax credits may do less to address upfront cost barriers, as the credit is not applied at the time of purchase.[14] States have adopted other financial incentives including low-interest loans, grants, vouchers, and rebates. A handful of states qualify EV charging equipment under their property assessed clean energy (PACE) programs. A simple solution is to increase and expand existing tax credits to incentivize commercial, publicly available charging stations.

NEWS

- June 29, 2022: New South Carolina Law Could Help Electric Customers Save Millions of Dollars Spent to Restore Power After Unprecedented Storm Damage
- June 6, 2022: The US South Prepares for The EV Transition
- May 31, 2022: South Carolina Regulator Nixes Duke Energy Bid to Reconsider Coal Plant Order
- May 11, 2022: Total, Duke are Winners of Latest U.S. Offshore Wind Auction
- April 4, 2022: Duke Energy Proposes 1.3 GW Solar Solicitation in the Carolinas

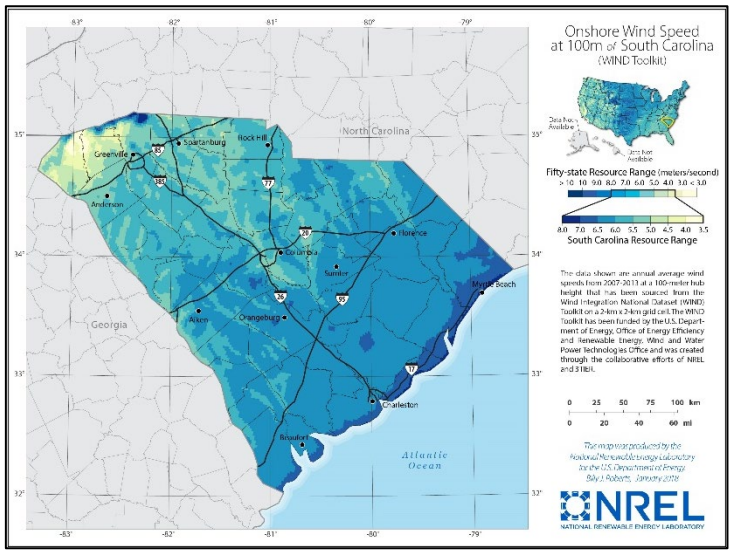
OTHER RESOURCES

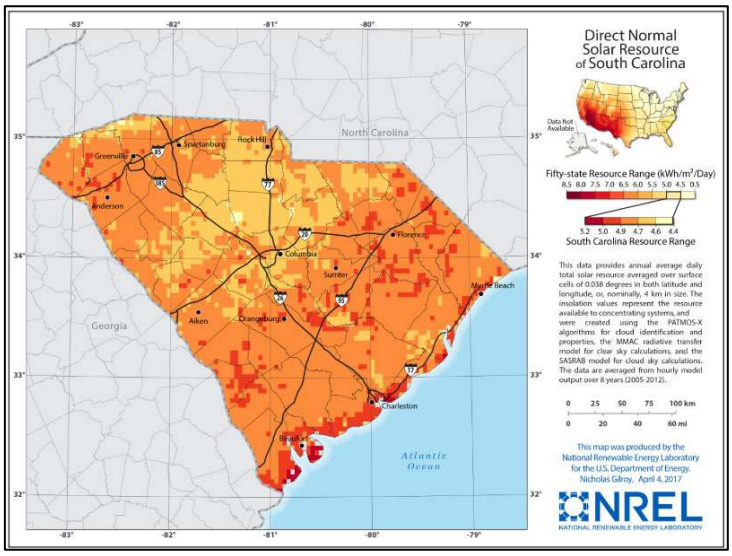
- South Carolina Office of Regulatory Staff, Energy Freedom Act: https://ors.sc.gov/consumers/electric-natural-gas/solar/south-carolina-energy-freedom-act
- Southern Alliance for Clean Energy: https://cleanenergy.org/
- Southeastern Wind Coalition: https://www.sewind.org/
- The American Council for an Energy-Efficient Economy State and Local Policy Database, South Carolina: https://database.aceee.org/state/south-carolina
- The Database of State Incentives for Renewables and Efficiency, South Carolina: https://programs.dsireusa.org/system/program?fromSir=0&state=SC
- U.S. Department of Energy's Alternative Fuels Data Center, South Carolina: https://afdc.energy.gov/laws/state_summary?state=SC
- U.S. Energy Information Administration, South Carolina: https://www.eia.gov/state/?sid=SC
- American Clean Power Association, South Carolina State Fact Sheet: https://cleanpower.org/wp-content/uploads/2022/06/South-Carolina_clean_energy_factsheet.pdf
- The Southern Alliance for Clean Energy Transportation Electrification in the Southeast, South Carolina Year-End Update: https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-South-Carolina.pdf
- SPOT for Clean Energy, South Carolina: https://spotforcleanenergy.org/state/south-carolina/

[14] A study by the Congressional Research Service suggests that tax credits are important tools for ensuring increased adoption of alternative-fueled vehicles.

SOUTH CAROLINA'S WIND AND SOLAR RESOURCES

WIND https://windexchange.energy.gov/states/sc
SOLAR https://www.nrel.gov/gis/solar.html





Our Resources

CNEE Homepage: https://cnee.colostate.edu/

The SPOT for Clean Energy: https://spotforcleanenergy.org/

The Advanced Energy Legislation (AEL) Tracker: https://www.aeltracker.org/

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