

# North Carolina Energy Efficiency Roadmap

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# North Carolina Energy Efficiency Roadmap

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## Executive Summary

Energy efficiency (EE) is widely considered a least cost option for meeting energy demand while reducing energy costs and carbon emissions. While EE has experienced slow and steady growth in North Carolina, much more can be done to maximize the full potential of this least cost resource. As such, leading EE and energy experts—including academic experts, consumer advocates, environmental nonprofits, commercial entities, state agencies, and utilities—participated in a series of meetings to determine where and how to deploy EE at a significantly greater rate. This report makes recommendations for increased and effective EE deployment in North Carolina.

Despite bipartisan support for the economic and environmental benefits of EE and an increasing focus by advocates, utilities, and big energy users, there are still barriers blocking the realization of EE’s potential. With a greater understanding of these barriers, there are multiple opportunities for increased EE in the state. This EE Roadmap report collects the expertise and ideas from over 100 EE stakeholders in the region and maps out the shared objectives and strategies that can help the state implement new solutions, remove barriers, and achieve its EE potential.

## Objectives of Roadmap

To capitalize on the EE opportunities in the state, the Nicholas Institute, in partnership with North Carolina's Department of Environmental Quality (NC DEQ), initiated a process to develop a comprehensive state EE Roadmap. This initiative, launched in August 2018, convened stakeholders from separate EE working group discussions to think collectively about this issue. Recognizing that considerable EE work was already being done within the state, the objective of the Roadmap is to build on the collective priorities and strengths of the state's energy stakeholders to identify and achieve a shared set of EE policy goals and inform the statewide Clean Energy Plan.<sup>1</sup>

The EE Roadmap strives to include diverse voices from across the state and identify a variety of paths forward to help all stakeholders seize the EE opportunities in the state. Some of the discussions generated substantial debate and disagreement among various parties that could be impacted by a new paradigm for EE. These discussions, particularly as they relate to statewide mandates, third-party administrators, utility incentives, and non-energy benefits, did not always garner consensus from all participants and are worthy of additional discussion from a broader group of EE stakeholders. Participation in this effort by any stakeholder should not necessarily be represented as an agreement with the final recommendations.

## The Energy Efficiency Roadmap Framework

In September 2018, the Nicholas Institute formed the EE Steering Committee, a group of EE leaders in the state with diverse organizational perspectives. The steering committee met regularly from September 2018 through July 2019 to provide critical guidance and input to the Nicholas Institute as progress on the EE Roadmap evolved. A final list of recommendations on specific EE-related areas has been provided to NC DEQ and is outlined in this final report.

Through a series of workshops and working groups, over 100 EE stakeholders from state, regional, and national organizations participated in the roadmap process. These included representatives from academia, consumer groups, environmental nonprofits, financial institutions, industrial associations, regulators, state agencies, utilities, and others. Each participant voluntarily selected a role; some led working groups, others provided subject matter expertise or research into solutions, and others observed or participated in an advisory role. Whenever possible, a diverse set of voices was sought to ensure that a balanced and thoughtful approach was taken for all recommendations. The final recommendations outlined in this report represent impactful and largely agreed upon ideas, but not all recommendations had consensus from all parties.

During the first EE stakeholder workshop in October 2018, the group established a set of shared objectives that would be the foundation for the evaluation of all recommendations.

### Shared Energy Efficiency Roadmap Objectives

*Objective 1: Align interests to create an EE-conducive climate*

*Objective 2: Increase access for hard to reach sectors*

*Objective 3: Develop a uniform standard for tracking/benchmarking EE costs and benefits*

Following the establishment of the three shared objectives, the workshop participants discussed approaches, methods, tools, and other ideas that could help to achieve each of the shared objectives. Over 100 different solutions were discussed, which were synthesized and condensed into 11 working group themes, aligned with each of the three objectives:

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<sup>1</sup> The North Carolina Clean Energy Plan stakeholder process was initiated by Governor Roy Cooper as part of Executive Order 80. It includes a broad set of stakeholder engagement focused on policy, regulatory, administrative and program recommendations to achieve EO80's climate goals. Additional information on the plan and the collaborative process can be found on NC DEQ's website: <https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-2>.

## Objective 1—Align Interests to Create an EE-Conductive Climate

- Theme 1: EE Education Campaign
- Theme 2: Workforce Training
- Theme 3: Building Code Improvement
- Theme 4: Centralized Administration and Cross-Collaboration
- Theme 5: EE Portfolio Standard or Target

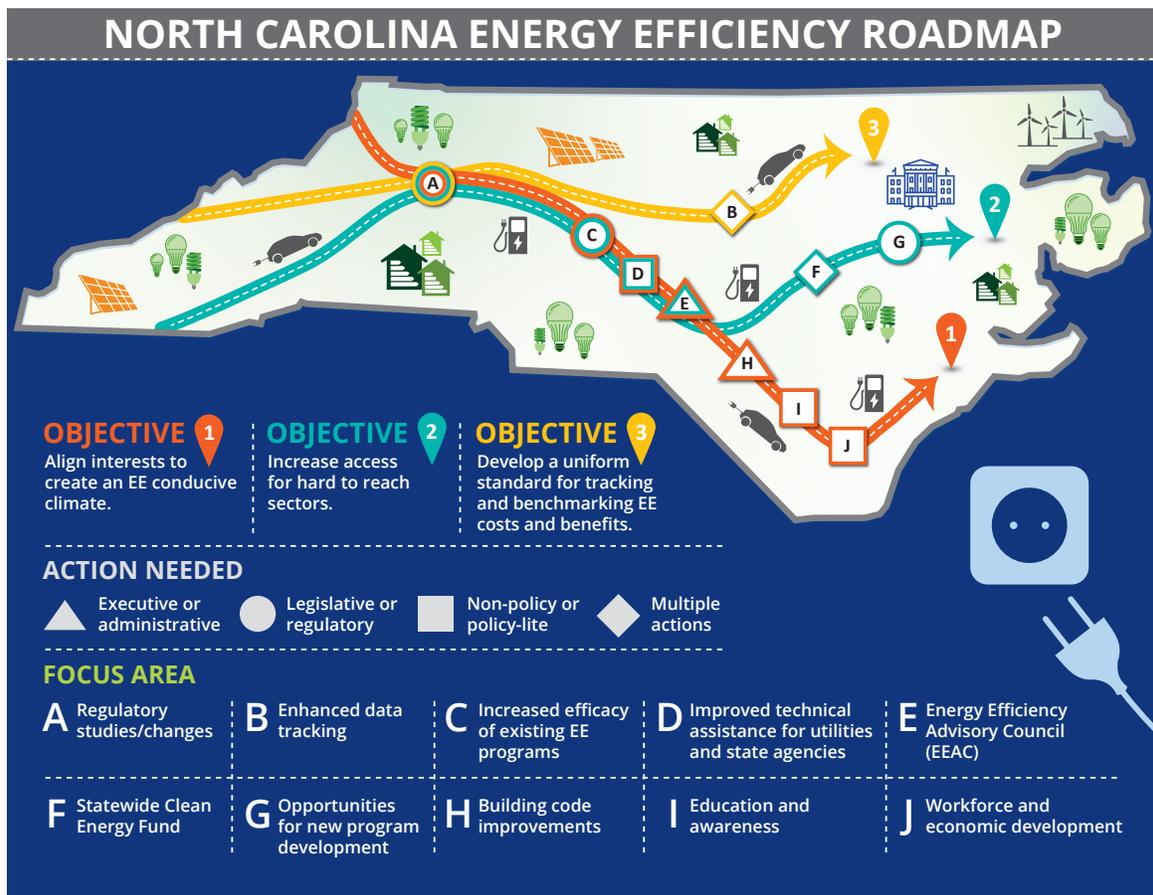
## Objective 2—Increase Access for Hard to Reach Sectors

- Theme 6: Address Energy Poverty
- Theme 7: Equitable EE Programs for All Sectors
- Theme 8: Equitable and Accessible EE Financing Programs

## Objective 3—Develop a Uniform Standard for Tracking/Benchmarking EE Costs and Benefits

- Theme 9: Cost/Benefit Analysis—EE Impacts on Grid and Societal Cost Inclusion
- Theme 10: Data Access and Analysis
- Theme 11: Standardized Tracking of EE

Over the course of ten months, the steering committee and working groups narrowed down a set of recommendations to 32 which were prioritized by their impact and feasibility. The result is a list of 10 EE focus areas for North Carolina. Additional detail on each of the recommendations can be found in Appendix A.



## Summary of Energy Efficiency Recommendations for North Carolina

Focus Area	Short-Term (1–3 years) Recommendation	Who should take the lead?	Longer Term (3+ years) Discussion
Energy Efficiency Advisory Council (EEAC)	Establish an EEAC to oversee the implementation of the EE Roadmap recommendations	Governor	
Enhanced Data Tracking	Collect data from existing sources and apply methodology to state buildings	Universities, NC State Agencies	Develop a data repository and enable voluntary reporting of certain metrics
	Enable “Download My Data” functionality for electric, natural gas, and water utilities	NCUC (IOU), Legislature (Munis/Co-ops)	Evaluate automatic Energy Data Transfer
	Develop a database of utility rates	NCUC (IOU), Legislature (Munis/Co-ops)	
Education and Awareness	Launch Energy Efficiency Everywhere (E3) campaign—educational materials for K–12 and community colleges	Academic Institutions	
	Develop sector-specific EE Toolkit from existing and new online resources	University or Nonprofit	
Workforce and Economic Development	Include EE jobs in the Dept. of Commerce’s workforce development assessment	Dept. of Commerce	
	Collaborate with ApprenticeshipNC to launch an EE Apprenticeship program	Nonprofit	
Building Code Improvements	Increase energy awareness and action on NC Building Code Council	Governor	Establish a defined pathway to net-zero energy-ready homes and buildings
Statewide Clean Energy Fund	Create NC Clean Energy Fund to include utility financing programs	Nonprofit	Add in fuel-neutral EE funding source to Clean Energy Fund
Regulatory (NCUC) Changes/Studies for Evaluating EE Programs	Commence a cost-effectiveness study to include evaluation of non-energy benefits	NCUC	
	Develop new NCUC evaluation criteria for evaluation of all energy programs to include equity and economic development criteria	NCUC	
Improved EE Program Efficacy	Establish minimum EE goals within existing REPS	Legislature	Develop a required/mandatory EERS target
	Allow flexible NC Agency Funding for EE projects (through NC OSBM)	Legislature	
Opportunities for New Program Development	Develop new programs (utility and nonutility) to address needs in underserved markets to include Hot Water Heat Pump (HWHP) rental program	NCUC, Utilities	Utilize DSM savings for low-income programs
	Increase funding for NC Housing Trust Fund to improve energy efficient affordable housing options in the state	Legislature	

Focus Area	Short-Term (1–3 years) Recommendation	Who should take the lead?	Longer Term (3+ years) Discussion
Improved Technical Assistance for Utilities and State Agencies	Develop a third-party “EE Technical Assistance” administrator to assist municipal utilities, co-ops, and state agencies with EE program development and administration	Nonprofits, Utilities	
	Improve project management coordination for weatherization, urgent repair with improved measurement, and verification of programs	Nonprofits, Universities, Utilities	

By continuing to work together on the EE focus areas and recommendations outlined in this roadmap, North Carolinians will be well on the way to meeting the clean energy goals outlined in EO80 as well as increasing grid resiliency and improving the health and economic well-being of all North Carolina energy consumers.

## INTRODUCTION

Energy efficiency (EE) is widely considered a least cost option for meeting energy demand, while reducing energy costs and carbon emissions. While EE has experienced slow and steady growth in North Carolina, much more can be done to maximize the full potential of this least cost resource. As such, leading EE and energy experts—including academic experts, consumer advocates, environmental nonprofits, commercial entities, state agencies, and utilities—have built upon this momentum and supported efforts to educate consumers, create new utility programs, and make EE more accessible to all energy users in order to deploy EE at a significantly greater rate.

Total retail electricity sales to North Carolina consumers in 2017 was just over 131,000 Gigawatt hours (GWh). Although the state has realized increasing annual incremental EE savings—exceeding 1,220 GWh in 2017—annual incremental EE savings from utility programs as a percentage of retail sales is still under 1.0 percent as shown in Tables 1 and 2.<sup>2,3</sup> Each incremental investment in energy efficiency accrues multiple benefits to consumers, including lower energy bills, increased grid reliability and the deferral or elimination of expensive new generation, transmission and distribution infrastructure investments—costs that would otherwise be borne by ratepayers.

**Table 1: Annual Incremental EE Savings (MWh) in North Carolina (reported by utilities)**

Sector	2013	2014	2015	2016	2017
Residential	537,665	504,950	570,912	654,803	706,701
Commercial	233,866	346,861	389,382	484,776	512,942
Industrial	2,185	2,144	751	1,146	235
<b>TOTAL</b>	<b>773,738</b>	<b>853,955</b>	<b>961,045</b>	<b>1,140,725</b>	<b>1,219,878</b>

Source: EIA, Form EIA-861, Annual Electric Power Industry Report

However, even with an increasing focus by advocates, utilities, and big energy users, EE remains underutilized. As part of the EE Roadmap process, stakeholders identified specific barriers that are perceived to present the largest challenge to increased adoption of EE in the state. A complete list of barriers—both real and perceived—identified by the stakeholders can be found in Appendix B. Regardless of the perception (real or not), they hinder further development of EE. Resolving both of these types of barriers is a goal of the report. These barriers can be broadly categorized into four groups, with examples of each:

### End-User Barriers

- Lack of reliable information about EE opportunities (particularly in rural and agricultural communities)
- EE is often confused with renewable energy
- Longer payback period for some EE investments as the opportunities for shorter payback investments for “low hanging fruit” (like lighting) have already been realized
- Lack of inclusive financing options

### Building Sector Barriers

- NC building code cycle is six years for residential homes, twice as long as best practice in other states, and the state’s energy conservation code is falling behind national standards

<sup>2</sup> North Carolina State Electricity Data, Energy Information Administration, Form EIA-861, “Annual Electric Power Industry Report” for the years 2013–2017. <https://www.eia.gov/electricity/data/eia861/>.

<sup>3</sup> Annual incremental energy efficiency is defined as “The annual changes in energy use (measured in megawatt hours) and peak load (measured in kilowatts) caused by new participants in existing DSM (Demand-Side Management) programs and all participants in new DSM programs during a given year. Reported Incremental Effects are annualized to indicate the program effects that would have occurred had these participants been initiated into the program on January 1 of the given year. Incremental effects are not simply the Annual Effects of a given year minus the Annual Effects of the prior year, since these net effects would fail to account for program attrition, equipment degradation, building demolition, and participant dropouts. Please note that Incremental Effects are not a monthly disaggregate of the Annual Effects but are the total year’s effects of only the new participants and programs for that year.” US Energy Information Administration Glossary, accessed 7/3/19. <https://www.eia.gov/tools/glossary/index.php?id=1>.

- Lack of energy managers/EE champions in commercial and small business
- Quantitative analysis (energy audit) of EE opportunities can be expensive

### State Regulatory and Policy Barriers

- Federal weatherization funding is limited
- Lack of efficiency mandate for all utilities
- Industrial and large commercial customers are allowed to opt out of utility programs

### Utility Barriers

- Perception that the cost per kilowatt hour (kWh) may increase with additional EE utility investment
- Absent incentives or mandates, the current cost-of-service utility business model is not aligned with EE; investments in EE undercut revenue to the utility in the short term and deferred or avoided generation, transmission, or distribution investments—while good for ratepayers—limit opportunities for profits to shareholders in the long term.
- Lower avoided costs and advancement of codes/standards create barriers to utility programs under traditional cost-effectiveness tests
- Failure to recognize all energy and non-energy benefits of efficiency in cost-effectiveness tests

Yet even with a greater understanding of these real and perceived barriers, there are still multiple opportunities to increase energy efficiency in the state. EE potential studies estimate that the cumulative, cost-effective energy efficiency economic potential in the state ranges from 18,663 GWh by 2041 (Duke Energy)<sup>4</sup> to 30,907 GWh by 2035 (EPRI)<sup>5</sup>. While this indicates a large opportunity for EE, as investment in EE increases and energy reductions from short-payback EE projects like lighting are achieved, continued cost-effective investment in EE projects will require new solutions and ideas as well as the systematic removal of existing barriers. This report collects the expertise and ideas from over 100 EE stakeholders in the region and maps out the shared objectives and strategies that can help the state find these new solutions, remove barriers and achieve its EE potential.

## BACKGROUND

For the past 20 years, North Carolina has been a climate leader in the Southeast, passing the [Clean Smokestacks Act](#) (NC Senate Bill 1078) in 2002 and the [Renewable Energy and Energy Efficiency Portfolio Standard](#) (NC Senate Bill 3) in 2007. In October 2018, Governor Roy Cooper signed Executive Order 80 (EO80) with a goal to further address climate change. The order commits the state to achieve, by 2025, a reduction in greenhouse gases (GHG) to 40 percent below 2005 levels; and reductions in energy consumption in state-owned buildings by at least 40 percent from fiscal year 2002–2003 levels. EE has a large role to play in the realization of these policies, not only in the reduction in energy used and the accompanying GHG reductions, but also in other non-climate benefits, including retaining industrial competitiveness, cutting consumer electric bills, avoiding the construction of new generation, transmission, and distribution infrastructure, and creating a new market for jobs and technologies.

### Definition of Energy Efficiency

EE can be defined in many ways.<sup>6</sup> For the purposes of this report, and the entire EE Roadmap process, it has been defined as follows:

<sup>4</sup> Nexant, Inc., “Duke Energy North Carolina DSM Market Potential Study,” December 19, 2016. This study includes EE potential estimates for DEC and DEP electric customers only.

<sup>5</sup> Electric Power Research Institute, “State Level Electric Energy Efficiency Potential Estimates, Technical Update,” May 2017.

<sup>6</sup> Energy efficiency is currently defined by North Carolina General Statute § 62-133.8(a)(4): “‘Energy efficiency measure’ means an equipment, physical, or program change implemented after January 1, 2007, that results in less energy used to perform the same function. ‘Energy efficiency measure’ includes, but is not limited to, energy produced from a combined heat and power system that uses nonrenewable energy resources. ‘Energy efficiency measure’ does not include demand-side management.”

- Reducing the energy used by equipment and/or processes while maintaining or improving the user’s level of comfort and end-use functionality at a lower customer cost.
- Reduction in the rate of energy used may be achieved by substituting more advanced technology or by reorganizing the process to reduce waste heat, waste cooling, or energy.

Given this definition, demand response is considered a form of energy efficiency. On the other hand, conservation as a result of a user reaction to a price increase is not considered energy efficiency.

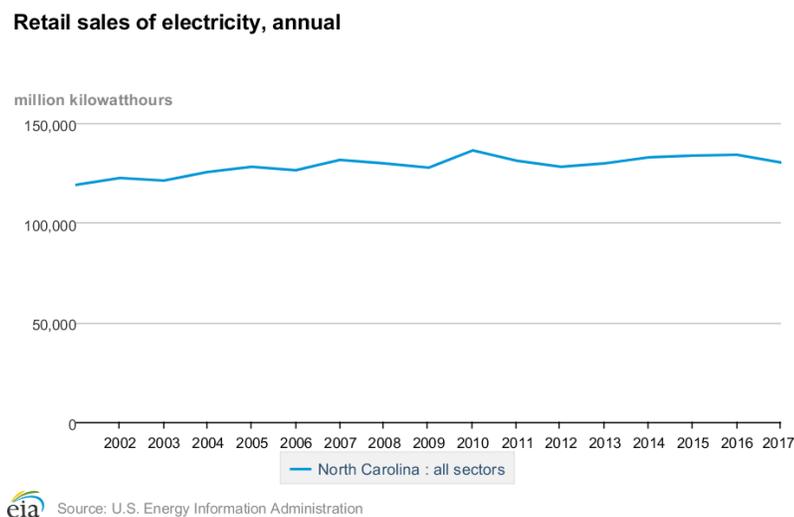
Although it can reflect a more efficient use of energy, electrification is not part of this EE Roadmap Process. With that being said, it is an important opportunity that warrants future discussion.

### Current Electricity Landscape in North Carolina

Retail sales to North Carolina electricity consumers in 2017 was just over 131,000 GWh—its lowest level in the last four years—distributed between residential (43 percent), commercial (36 percent), and industrial (21 percent) customers.<sup>7</sup> Despite an increasing state population, the overall trend since 2010 suggests electricity demand is flattening as shown in Figure 1 below. Improved building codes, appliance standards and end-user EE investment—including industrial reductions to load—have contributed to this trend.

As the population in North Carolina is expected to increase another nearly 14 percent by 2030, the demand for electricity will also increase.<sup>8</sup> EE measures implemented in industrial facilities as well as nonutility investment in existing and new buildings will play a vital role in keeping the demand curve flat in the coming decades and helping the state achieve the goals of EO80.

**Figure 1: Annual Retail Sales of Electricity in NC (2010–2017)**



Utility incentives and rebates—primarily from NC’s three investor-owned utilities—have helped to encourage EE investment, as shown in the table below. While North Carolina is a leader in the Southeast, annual incremental EE savings from utility programs as a percentage of retail sales (as reported by the U.S. Energy Information Administration) in 2017 was only 0.91 percent—much lower than states in the Northeast and West which approach 2 percent and higher. That said, the reported numbers likely understate the amount of EE actually occurring in the state since they do not include EE investment from industrial and commercial customers that have opted out of utility programs and are making investments on their own.<sup>9</sup> In addition, the EIA reporting requirements for smaller electric utilities (100 MWh of annual

<sup>7</sup> North Carolina State Electricity Data, Energy Information Administration, Form EIA-861, “Annual Electric Power Industry Report” for 2017. <https://www.eia.gov/electricity/data/eia861/>.

<sup>8</sup> North Carolina Office of Budget and Management, County/State Population Projections between 2020 and 2030. Accessed 8/16/18. <https://www.osbm.nc.gov/demog/county-projections>.

<sup>9</sup> In North Carolina, large commercial and industrial customers are allowed to opt-out of utility DSM and EE programs, choosing instead to make

retail sales or lower) do not require reporting of energy efficiency, further understating the amount of EE actually achieved in the state.

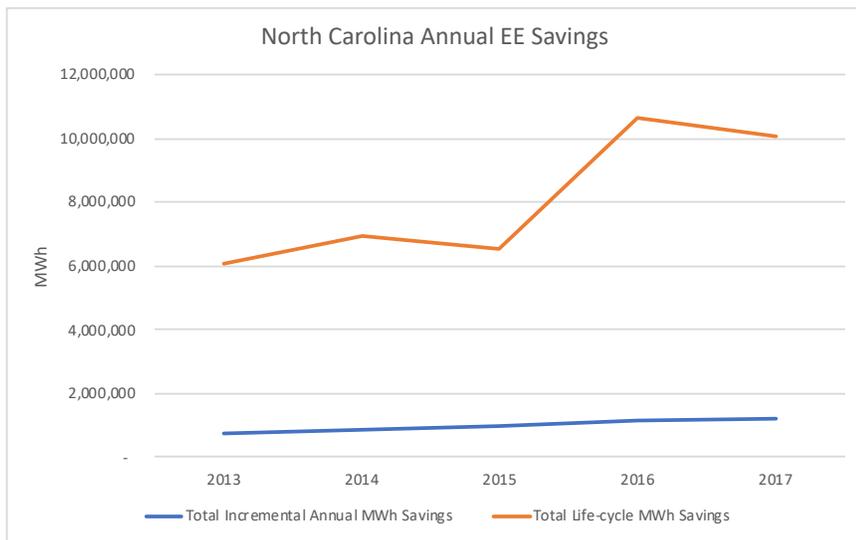
**Table 2: A Snapshot of NC Electricity Sector in 2017**

2017 Electricity Landscape	Investor Owned Utilities	Municipal (Public) Utilities	Electric Cooperatives	Total
<b>Number of Entities</b>	3	72	32	107
<b>2017 Retail Customers</b>	3,485,584	606,232	1,087,231	5,179,052
<b>Percentage of Customers</b>	67%	12%	21%	
<b>2017 Retail Sales (GWh)</b>	97,484	15,770	18,159	131,421
<b>Percentage of Retail Sales</b>	74%	12%	14%	
<b>2017 Annual EE Savings (GWh)</b>	1,168	4	47	1,220
<b>EE Savings as % of PY Sales</b>	1.17%	0.03%	0.25%	0.91%

Source: Energy Information Administration, Form EIA-861

However, savings from EE aren't always measured on an annual incremental basis. Savings from EE projects can last for the lifetime of a measure, generally from three to ten years. Therefore, to fully understand the energy-reducing benefits of EE, an analysis of the cumulative MWh savings over the life of an EE investment is also warranted. As Figure 2 below demonstrates, the cumulative life-cycle savings from EE (orange line) has been increasing since 2013, dropping slightly in 2017, likely due to the roll-off of shorter life EE improvements. For comparison, it is charted against the incremental annual EE savings (blue line) which has been gradually increasing.

**Figure 2: Incremental Annual Versus Life-Cycle MWh Savings from EE**



Source: Energy Information Administration, Form EIA-861

### **Existing North Carolina Energy Efficiency Policies and Laws**

North Carolina has a number of policies, laws, and funding sources already in place that have helped to drive EE within the state, policies that can be built upon to realize the state's EE potential.

investments at their own expense. In 2018, the number of opted out customers in Duke Energy's territories represented over half of eligible sales.

## Renewable Energy and Energy Efficiency Portfolio Standard

In 2007, the North Carolina legislature established the state’s Renewable Energy and Energy Efficiency Portfolio Standard (REPS) in Senate Bill 3. REPS requires each utility in the state to generate an increasing percentage of its energy mix from renewable sources over time. A portion of this percentage can be met with energy efficiency.<sup>10</sup>

*Investor-owned utilities: 12.5% renewable energy (as % of retail sales) by 2021. EE measures can be used to meet up to 25% of the requirement.<sup>11</sup> After 2021, up to 40% of the standard may be met through EE.*

*Electric cooperatives, municipal utilities: 10% renewable energy by 2018 with no limitation on EE.*

The North Carolina Utilities Commission (NCUC) tracks the cumulative level of Energy Efficiency Credits (EECs) generated to date in the NC Renewable Energy Tracking System (NC-RETS), less any EECs used for compliance with the REPS target and adjustments for Evaluation, Measurement, and Verification (EM&V) or other adjustments.<sup>12</sup> The NCUC has ordered that “EECs should be earned ... for a duration equal to the life of the approved program or measure as established by the EM&V process.”<sup>13</sup> This approach is similar to the way that EIA tracks the life-cycle savings for EE measures.

Each utility can bank the EECs generated annually and use them as needed for compliance. Based on NC-RETS tracking, all electric utilities are using EE measures for a portion of their REPS requirements as follows for reporting year 2017. See Appendix B for additional detail on each utility’s NC-RETS reporting since 2008.

**Table 3: Energy Efficiency Credits Used for REPS Compliance, 2017**

Reporting Year—2017	Max EECs Allowed as % of REPS Goal	EECs Used for Compliance as % of REPS Goal	EECs Used for Compliance as % of Prior Year Sales
Duke Energy Carolinas	25%	25%	1.5%
Duke Energy Progress	25%	25%	1.5%
Dominion	25%	7.0%	0.42%
Electric Co-ops	100%	9.4%	0.56%
Municipal Utilities	100%	0.0%	0.0%

Source: NC-RETS

The NC-RETS report shows that Duke Energy Carolinas and Duke Energy Progress are currently generating more EECs than can be claimed for complying with REPS and are banking EECs for future compliance. This pattern of fully utilizing EECs for REPS compliance and banking excess EECs is expected to continue even when the percentage of EECs allowed to meet the REPS requirement increases to 40 percent of requirement (or 5 percent of prior year retail sales) in 2021.

Dominion is purchasing out-of-state RECs to meet most of its REPS requirements and has been generating very limited EECs (in total inventory, only about 1.2 percent of prior year retail sales in 2017). Co-ops are generating EECs with a current inventory of about 9.7 percent of total prior year retail sales. Only a handful of municipal utilities are currently generating EECs and the current EEC inventory is about 0.45 percent of prior year retail sales. The tracking and verification of EECs has proven too costly for many of the municipal and co-op utilities.

<sup>10</sup> Additional information on North Carolina’s Renewable Energy and Energy Efficiency Portfolio Standard (REPS) can be found in § 62-133.8. [https://www.ncleg.net/enactedlegislation/statutes/html/bysection/chapter\\_62/gs\\_62-133.8.html](https://www.ncleg.net/enactedlegislation/statutes/html/bysection/chapter_62/gs_62-133.8.html).

<sup>11</sup> “Energy efficiency measure” in REPS is defined as an equipment, physical, or program change implemented after January 1, 2007, that results in less energy used to perform the same function. “Energy efficiency measure” includes, but is not limited to, energy produced from a combined heat and power system that uses nonrenewable energy resources. “Energy efficiency measure” does not include demand-side management. N.C. Gen. Stat. § 62-133.8(a)(4).

<sup>12</sup> An Energy Efficiency Credit (EEC) is equivalent to 1 MWh of energy savings.

<sup>13</sup> See, NCUC’s January 17, 2017 order in DEP’s 2015 REPS docket No. E-2, Sub 1109. <https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=234c0951-fd81-4040-b19f-721334d6c083>.

## Other North Carolina Initiatives

In 2010, the North Carolina legislature passed [HB 1292](#), allowing the University of North Carolina (UNC) system to carry forward any energy savings it realized from EE investments into future fiscal years, and requiring 60 percent of those savings to be used for additional conservation measures. By contrast, NC state agencies have minimal access to EE funding through traditional appropriated means; additionally, if EE measures are implemented, the Office of State Budget and Management (OSBM) will typically reduce future utility appropriations to reflect energy savings.

NC Building Performance Association (NCBPA) has been leading an effort to advance [HB 330](#), the “Efficient Government Buildings & Savings Act,” for the 2019 legislative session to increase the requirement for state and public university buildings to reduce the energy consumption per gross square foot from 30 percent reduction in 2015 to 40 percent reduction by 2025 based on energy consumption for the 2002–2003 fiscal year.

**Roanoke Electric Cooperative** has an on-bill tariff program for whole-house, behind the meter EE investments including LED lighting, insulation, duct sealing, heat pumps, and other energy efficiency improvements. The upfront capital is provided by the co-op and then paid for over time through a voluntary tariff, offset by energy savings on the customer’s bill.

The **NC Housing Trust Fund** (NC HTF) was created by the General Assembly in 1987 and is administered by the North Carolina Housing Finance Agency. It is North Carolina’s most flexible resource for the state’s growing and complex affordable housing need. The NC HTF leverages private funding to support homeownership, rental, supportive housing, new construction, rehabilitation, and emergency repairs. Regulations controlling rents ensure that rental units remain affordable and strict building requirements ensure properties are energy-efficient.

The **North Carolina Weatherization Assistance Program** (WAP) is administered by the NC State Energy Office and is designed to help low-income citizens save energy and reduce expenses through the installation of energy conservation materials and the implementation of energy efficiency measures in their homes. Priority is placed on providing assistance to the elderly, individuals with disabilities and families with children. A household’s income must be under 150 percent of poverty to be eligible to participate in the program; however, over 80 percent of the families served in North Carolina have annual incomes below \$15,000. The North Carolina WAP is implemented in all counties in the State through 29 subgrantees.

Between 2015 and 2017, Duke Energy worked with the North Carolina Community Action Association (NCCAA) and Lockheed Martin to administer the **Helping Home Fund**, a program helping low-income customers improve their health and safety and manage their energy costs. Initial funding was provided through a utility settlement agreement, with Duke Energy Carolinas and Duke Energy Progress providing a total of \$20 million to support appliance replacement, health and safety measures, weatherization, and heating/cooling replacement and repair in participating homes. In 2017, an additional \$2.5 million in funding was provided as part of the merger between Duke Energy and Piedmont Natural Gas.

The **Southeast Energy Innovation Collaborative** is a joint effort between E4 Carolinas, North Carolina Department of Commerce (NC DOC), Office of Science, Technology, & Innovation and over 50 senior-level professionals from the private-, public-, and research energy sector that is developing policy recommendations for increasing innovation within the energy industry across the Southeast United States. The Collaborative’s first task began in late 2017 with a survey of hundreds of senior-level energy sector officials. The survey found the region has the potential to become the national leader in energy-sector innovative activities, but the region lacks a cohesive plan for doing so.<sup>14</sup> To act on these findings, the Collaborative held two summits to uncover recommendations for expanding innovative activity and developing greater energy sector leadership. The Collaborative will publish these recommendations in the fall of 2019.

All of these current initiatives and policies can be used as a starting point for capitalizing on North Carolina’s EE potential as is outlined in the recommendations that follow.

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<sup>14</sup> Hardin, J., D. Doctor, and D. Kaiser. 2017. Carolinas’ Energy Economy Survey: Findings & Recommendations. Raleigh, North Carolina: the North Carolina Department of Commerce. Available for download at: [https://files.nc.gov/nccommerce/documents/files/Carolinas\\_Energy\\_Economy\\_Survey.pdf](https://files.nc.gov/nccommerce/documents/files/Carolinas_Energy_Economy_Survey.pdf).

## NORTH CAROLINA ENERGY EFFICIENCY ROADMAP FRAMEWORK

To capitalize on the energy efficiency opportunities in the state, the Nicholas Institute, in partnership with NC DEQ, initiated a process to develop a comprehensive state EE Roadmap. This initiative, launched in August 2018, convened stakeholders from separate EE working group discussions to think collectively about EE opportunities. Recognizing that considerable EE work was already being done within the state, the objective of the Roadmap was to build on the collective priorities and strengths of the state's energy stakeholders to identify and achieve a shared set of EE policy goals and inform the statewide Clean Energy Plan.

The EE Roadmap strives to include diverse voices from across the state and identify a variety of paths forward to help all stakeholders seize the EE opportunities in the state. Some of the discussions generated substantial debate and disagreement among various parties that could be impacted by a new paradigm for EE. These discussions, particularly as they relate to statewide mandates, third party administrators, utility incentives and non-energy benefits, did not always garner consensus from all participants and are worthy of additional discussion from a broader group of EE stakeholders. Participation in this effort by any stakeholder should not necessarily be represented as an agreement with the final recommendations.

### *Project Team and Participants*

In September 2018, the Nicholas Institute formed the EE Steering Committee, a group of EE leaders in the state with diverse organizational perspectives. The steering committee met once monthly from September 2018 through July 2019 to provide critical guidance and input to the Institute as progress on the EE Roadmap evolved. Over 100 EE stakeholders from state, regional, and national organizations participated in the roadmap process. These included representatives from academia, consumer groups, environmental nonprofits, financial institutions, industrial associations, regulators, state agencies, utilities, and others. Each participant voluntarily selected a role; some led working groups, others provided subject matter expertise or research into solutions, and others observed or participated in an advisory role. Whenever possible, a diverse set of voices was sought to ensure that a balanced and thoughtful approach was taken for all recommendations. A final list of recommendations on specific EE-related areas has been provided to NC DEQ and is outlined in this final report.

The NC DEQ provided meeting space and high-level guidance to assure that the project met guidelines for inclusion in the State Clean Energy Plan.

### *Existing Energy Efficiency Working Groups*

Following the creation of the EE Steering Committee, the team began gathering information on EE collaborations and working groups that were currently underway in the state. It was the intention of the Roadmap process to include all existing working group participants in the discussion with an eye toward combining and streamlining working groups as needed.

**Table 4: North Carolina's EE Working Groups (2018)**

<b>Name of Working Group</b>	<b>Focus Area</b>
DEC/DEP Quarterly EE Collaborative	Discussion of Duke Energy's DSM/EE programs
DEQ Quarterly Residential EE Meetings	Discussion of state and utility residential DSM/EE programs (all electric utilities)
Low-Income EE Collaborative	Coordination of utility and state low-income weatherization programs and databases
Multifamily EE Collaborative	Strategy for increasing EE in multifamily units
Energy Innovation Task Force (Blue Horizons)	Coordination of DSM/EE programs in Asheville/Buncombe County

Name of Working Group	Focus Area
NC On-Bill Working Group	Education and technical assistance for using on-bill financing to enable EE improvements
Mobile Home Working Group	Develop programs that combine energy efficiency and disaster resilience to upgrade mobile homes

The team also performed a literature review of EE plans in various stages of maturity and different levels of complexity in neighboring states and states generally viewed as on the cutting edge of EE policy and programming (see Appendix B). The analysis describes the approaches taken by 10 such states—Arkansas, California, Connecticut, Maryland, Massachusetts, Minnesota, Pennsylvania, South Carolina, Tennessee, and Virginia—toward the development of statewide EE plans. These states reflect a wide range of outcomes, from plans with aggressive five- and ten-year targets, to those oriented exclusively to addressing the EE of state-owned facilities and fleets. The selection of these states was influenced in part by a preference for North Carolina’s closest neighbors and other eastern states but includes states in the Midwest and Western regions with a reputation for setting progressive EE targets.

While each state varied in its stated goals and objectives, some common characteristics from these states’ experiences emerge as potential winning strategies for North Carolina:

- Near-term objectives are set to be achievable under the constraints of current state regulation, while longer-term goals are more ambitious, and in some cases, may require changes to state statute to achieve.
- High level buy-in and support for the EE strategy development process can ease the collaborative process.
- Setting EE strategies alone is insufficient. Goals need to be clearly defined and tied to measurable metrics. This should be accompanied by a robust plan for monitoring and evaluation.
- EE strategies require secure, long-term funding streams. To the extent possible, planning for or creating insulated funding mechanisms is desirable.
- Clear roles of responsibility and oversight, committees and processes must be defined for monitoring, evaluation, and decision-making.

The best practices from the current NC working groups and the neighboring states were used to inform the NC EE Roadmap process.

### ***The Energy Efficiency Roadmap Timeline***

The first stakeholder meeting was held on October 26, 2018 in Durham, North Carolina. The meeting included all 12 of the steering committee members, as well as 30 other EE stakeholders representing a wide variety of organizations from across the state (see Appendix B for a complete list of participants). The day-long meeting had the following objectives:

- Foster a community of energy efficiency stakeholders in North Carolina
- Create a shared understanding of the energy efficiency landscape
- Establish consensus on a set of shared goals and objectives
- Collectively work to implement these goals

Throughout the day, the participants worked together to understand the current EE landscape in North Carolina and review the challenges and opportunities of increased EE in NC (see Appendix B for a complete list of challenges and opportunities). Through a series of facilitated break-out groups, the participants agreed to a set of three shared objectives that would guide the collaborative work of the EE Roadmap in the following months.

## Shared Energy Efficiency Roadmap Objectives

*Objective 1: Align interests to create an EE-conducive climate*

*Objective 2: Increase access for hard to reach sectors*

*Objective 3: Develop a uniform standard for tracking/benchmarking EE costs and benefits*

### The Five Pillars of the Energy Efficiency Roadmap

A primary objective of the EE Roadmap was to coordinate a comprehensive investigation into EE opportunities for the state. This includes multiple energy sources, all types of utilities and all sectors, with a particular focus on areas that are underserved by the state’s existing EE programs and services. To ensure a comprehensive review of potential solutions, the Roadmap followed a “five-pillar” approach to developing recommendations in order to ensure that the recommendations coming out of the process were holistic and addressed each of the EE roadmap objectives through a variety of potential solutions. The five pillars outlined below—benefit analysis, regulatory reform, education/outreach, financing models, and grid integration—form the framework of the EE Roadmap, with equity as an overarching consideration for all pillars.<sup>15</sup> Through a series of stakeholder workshops and working groups, NI used the five-pillar framework to identify a set of recommendations in support of the shared set of policy goals and objectives.

**Figure 3: The NC EE Roadmap “Five-Pillar” Framework**

EQUITY				
BENEFIT ANALYSIS	REGULATORY REFORM	EDUCATION / OUTREACH	FINANCING MODELS	GRID INTEGRATION
<ul style="list-style-type: none"> <li>• Economic Development</li> <li>• Work Force Development</li> <li>• Health</li> <li>• Environmental</li> <li>• Consumer Savings</li> <li>• Industrial Savings</li> <li>• Technology Innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Business Model</li> <li>• Rate Structure</li> <li>• Cost-effectiveness</li> <li>• Energy Code</li> <li>• Appliance Standards</li> </ul>	<ul style="list-style-type: none"> <li>• Regulator</li> <li>• Legislator</li> <li>• Rate-payers</li> <li>• Homeowners</li> <li>• Renters</li> <li>• Commercial building owners</li> <li>• Property managers</li> <li>• Realtors</li> <li>• Industrial Facilities</li> <li>• Universities</li> </ul>	<ul style="list-style-type: none"> <li>• Utility</li> <li>• State</li> <li>• Private</li> <li>• On-Bill</li> <li>• PACE</li> <li>• Green Bank</li> </ul>	<ul style="list-style-type: none"> <li>• Demand Side Management</li> <li>• EE as a Resource</li> <li>• EE Plus Storage</li> <li>• Distributed Energy Resources</li> <li>• Distributed Grid Technology</li> </ul>

Following the establishment of the three shared objectives, the workshop participants broke into three sector groups (residential, business, and institutional) and used the five-pillar framework to focus on approaches, methods, tools, and other ideas that could help to achieve each of the shared objectives. Over 100 different solutions were discussed, which were synthesized and condensed into 11 working group themes, aligned with each of the three objectives:

#### *Objective 1—Align interests to create an EE-conducive climate*

- Theme 1: EE Education Campaign

<sup>15</sup> In all of the NC EE Roadmap stakeholder work, equity was defined as follows: “Energy equity involves addressing the disproportionate distribution of climate change burdens and climate impact vulnerabilities through a just distribution of the benefits of climate protection.”

- Theme 2: Workforce Training
- Theme 3: Building Code Improvement
- Theme 4: Centralized Administration and Cross-Collaboration
- Theme 5: EE Portfolio Standard or Target

**Objective 2—Increase access for hard to reach sectors**

- Theme 6: Address Energy Poverty
- Theme 7: Equitable EE Programs for all Sectors
- Theme 8: Equitable and Accessible EE Financing Programs

**Objective 3—Develop a uniform standard for tracking/benchmarking EE costs and benefits**

- Theme 9: Cost/Benefit Analysis—EE impacts on Grid and Societal Cost Inclusion
- Theme 10: Data Access and Analysis
- Theme 11: Standardized tracking of EE

Between November 2018 and February 2019, EE stakeholders were invited to join one or more theme working groups to participate in a more in-depth look into existing barriers and potential solutions, research the feasibility of solutions, and participate in informative focus group calls with subject matter experts (see Appendix B for detailed discussion from these focus groups). All of this research was used to create a set of feasible recommendations for consideration in the EE Roadmap.

**Figure 4: North Carolina EE Roadmap Timeline**



In March 2019, the team leads from the 11 thematic working groups were asked to prioritize their team’s set of feasible recommendations using a standardized set of solution evaluation criteria. The objective was to develop a standardized process for prioritizing solutions that offer the greatest potential with respect to energy efficiency. The evaluation criteria asked each working group to consider the implementation requirements, timing, costs and benefits, market transformation potential and existence of current programs for each of their recommendations. The results would be used to prioritize the final recommendations. For a full set of evaluation criteria, please see Appendix B.

Based on the results from these solution evaluations, in April 2019 each working group selected their top 2–3 recommendations, which were presented at a second EE workshop held in May 2019. In this workshop, the EE stakeholders worked together to further refine and prioritize a set of recommendations which constitute this EE Roadmap.

## PRIORITIZATION OF ENERGY EFFICIENCY RECOMMENDATIONS

On May 23, 2019, a group of 45 participants—including EE steering committee members, working group team members and subject matter experts—attended the second EE Workshop. The objectives of this day-long workshop included:

- Reviewing the 2–3 recommendations presented by each thematic working group
- Providing feedback to clarify and refine the recommendations
- Ranking the recommendations based on their relative feasibility and impact
- Generating insights and data to inform the final set of recommendations for the final NC EE Roadmap report

Each of the EE recommendations are included in Appendix A and are summarized below.

### *List of Energy Efficiency Recommendations for North Carolina*

#### **RECOMMENDATION 1: Increase Energy Efficiency Education and Career Awareness in K–12 and Community Colleges (Themes 1 and 2)**

Launch the Energy Efficiency Everywhere (E3) project, to curate and disseminate EE curricula to K–12 public school systems and county-based community colleges; launch a professional development training program for educators in North Carolina; create a statewide EE certification certificate; and establish an online sharing platform for energy efficiency related activities and lessons for teachers to use in their classroom.

#### **RECOMMENDATION 2: Deploy Public Education Energy Managers in K–12 and Community Colleges (Theme 1)**

Build on the existing Utility Savings Initiative structure to create a statewide energy manager program, providing technical support and training to K–12 school districts and community colleges lacking in-house energy management.

#### **RECOMMENDATION 3: Create Online Energy Efficiency Toolkits for All Sectors (Theme 1)**

Curate and produce a series of EE “toolkits.” Each would contain sector-specific EE education and outreach material, scripts, presentations, and activities. These toolkits would reside on one portal website with links to other materials as appropriate.

#### **RECOMMENDATION 4: Create Energy Efficiency Apprenticeship Programs (Theme 2)**

In partnership with [ApprenticeshipNC](#), create an EE apprenticeship program to include apprenticeships and pre-apprenticeships for NC workers with industry partners and organizations, and “career awareness” programs in K–12 settings.

#### **RECOMMENDATION 5: Perform a Public Education Workforce Data and Economic Impact Study (Theme 2)**

Perform a workforce economic impact study that captures critical data needed to invest public and private resources in K–12 and higher education curriculum development and career awareness related to North Carolina’s EE industry.

#### **RECOMMENDATION 6: Raise Energy Efficiency Awareness on North Carolina Building Code Council (Theme 3)**

Improve the North Carolina Building Code Council (NCBCC)’s support of energy efficiency by adding an Energy seat to the Council’s makeup, increasing the EE education of all existing members and establishing new actionable goals that prioritize EE in North Carolina’s current and future building codes.

#### **RECOMMENDATION 7: Establish a Pathway to Net-Zero Energy-Ready New Buildings (Theme 3)**

Establish a defined pathway to net-zero energy ready new buildings by 2042; ensure all new buildings receive an inspection, verification, or rating that ensures functional energy code compliance; improve enforcement of building codes at existing buildings; and revisit the building codes on a more frequent basis (with possible automatic review and adoption of model language).

#### **RECOMMENDATION 8: Improve North Carolina legislative Process for Building and Energy Codes (Theme 3)**

Through statutory language, provide the NCBCC with a formal review and recommendation opportunity when the legislature proposes building and energy code changes.

#### **RECOMMENDATION 9: Establish an Energy Efficiency Advisory Council (Theme 4)**

Establish an Energy Efficiency Advisory Council (EEAC) comprised of representatives from utilities, state agencies, higher education, industry, advocates, and other EE experts. The EEAC would share information and best practices between stakeholders, to increase EE measures for residential and commercial programs across the state and oversee implementation of the EE recommendations included in the state's Clean Energy Plan.

#### **RECOMMENDATION 10: Create Project Management Coordination System for Delivery of Energy Efficiency, Urgent Repair, and Weatherization Programs (Theme 4)**

North Carolina energy efficiency, urgent repair, and weatherization programs are administered separately by multiple agencies, creating significant inefficiencies, and falling short of their goals. Coordinate communication between the participating agencies and build an effective and efficient energy services delivery mechanism to relieve or eliminate energy burden and improve housing conditions.

#### **RECOMMENDATION 11: Create a Standardized Measurement and Evaluation Process for Evaluating Energy Efficiency, Urgent Repair, and Weatherization Programs (Theme 6)**

Create a unified, standardized waiver for applicant/homeowners that allows energy consumption data to be shared with all relevant state agencies. The waiver would enable agencies to market programs in more targeted fashion, measure the efficacy of certain interventions, identify need for follow-up or continued support, and in the aggregate, understand which programs are most effective at reducing energy burden for beneficiaries.

#### **RECOMMENDATION 12: Create an Energy Efficiency "Technical Assistance" Entity (Theme 4)**

Establish an EE Technical Assistance Administrator, a distinct entity responsible for assisting NC municipal utilities, electric cooperatives and state agencies with developing EE customer programs, negotiating contracts and using EE to comply with NC's Renewable Energy and Energy Efficiency Portfolio Standard (REPS).

#### **RECOMMENDATION 13: Match Energy Efficiency Opportunities to Unique Sector Needs (Theme 7)**

Develop EE rebates, incentives, and other program offerings to better address underserved and energy-burdened sectors with a priority focus on low-income, multifamily, and mobile homes as well as the agricultural sector. Other target sectors might include houses of worship, military populations, rural customers, small businesses, and some industrial customers.

#### **RECOMMENDATION 14: Evaluate the Inclusion of New Criteria to EE Program Approval Process at North Carolina Utility Commission (Theme 7)**

Evaluate the inclusion of new review criteria to address equity, accessibility, and inclusiveness (among all applicable social, economic, demographic or geographic groups), in new EE program reviews by the NC Public Utilities Commission and the EE program filing and approval process.

#### **RECOMMENDATION 15: Utilize Utility Demand-Side Management Savings for Low-Income Energy Efficiency Programs (Theme 7)**

Utilize savings from demand response and load-control utility programs to fund EE improvements to reduce peak demand and overall energy consumption at low-income single and multifamily residences that are identified through meter data as having disproportionately high contribution to peak.

#### **RECOMMENDATION 16: Develop a Heat Pump Water Heater Rental Program as a DSM/EE Program (Theme 6)**

Deploy "smart" equipped Heat Pump Water Heaters (HPWH) as an EE and DSM tool targeted to low- to moderate-income communities (LMI) through a utility-sponsored equipment rental program. By shifting loads off peak through thermal storage, additional utility cost savings and/or funding for LMI programs could be realized.

#### **RECOMMENDATION 17: Increase Funding to the North Carolina Housing Trust Fund (Theme 6)**

The NC HTF has a long history of creating high-quality multi- and single-family affordable housing opportunities for low-income communities. Provide additional investment to meet the challenges of EE in low-income communities while also creating jobs and new economic opportunities.

#### **RECOMMENDATION 18: Create a North Carolina–Based Clean Energy Fund (Theme 8)**

Create a NC-based Clean Energy Fund to issue loans, provide credit enhancements, and invest in clean energy and EE projects, to the benefit of North Carolina businesses, congregations, nonprofits, and consumers. Following examples in Colorado and Nevada, an independent nonprofit organization could administer the program.

#### **RECOMMENDATION 19: Support Expanded Access to Creative Utility Financing Programs (Themes 7 and 8)**

Improve the effectiveness and accessibility of creative EE financing programs—including on-bill tariffs or the use of third-party providers—across multiple sectors. Encourage utilities with clarifying authority, performance data, and loss protection.

#### **RECOMMENDATION 20: Allow Flexible North Carolina Agency Funding for Energy Efficiency Projects (Theme 8)**

Allow NC agencies flexibility in how to fund EE projects including the ability to carry an EE reserve fund; allow for annual Office of State Budget and Management (OSBM) increases that reflect known utility rate increase and utilize utility savings realized by NC agencies to remain available to the agency for additional EE projects.

#### **RECOMMENDATION 21: Standardize Energy Efficiency Metrics and Reporting Practices in State Buildings (Theme 9)**

Standardize what and how energy information is reported, including factors beyond energy consumption and measures implemented, to determine life-cycle cost and the contribution of projects towards the EO80 goal of 40 percent reduction in energy use in state-owned buildings.

#### **RECOMMENDATION 22: Establish a Fuel-Neutral Statewide Energy Efficiency Fund to Address Energy Burden and Equity Concerns (Theme 9)**

Implement a fuel source-neutral rider for all carbon-based energy to incentivize energy savings in previously unreachable populations. A statewide nonutility/energy provider collects the rider for all carbon-based fuels, assessed per a standardized metric (e.g., MMBtu, tons CO<sub>2</sub>e). Energy burden would be based on total carbon-fueled energy consumption, not a specific fuel or energy provider, resulting in a more equitable system than the current rider.

#### **RECOMMENDATION 23: Include Valuation of Non-Energy Benefits in Energy Efficiency Investments (Theme 9)**

Develop methodology to calculate benefits to public health (via air and water quality), economic development, environmental health (GHG emission reduction, air and water quality), and increased property value and reduced tenant turnover for EE investments at the utility scale and at the building level. This methodology should be developed prior to the cost-effectiveness testing analysis (Recommendation 24, below).

#### **RECOMMENDATION 24: Commence a NCUC Study on Cost-Effectiveness Testing (Theme 5)**

The NC Utilities Commission should select a consultant to analyze opportunities to improve EE program participation using current or new cost-effectiveness testing regulations and protocols, including the National Standard Practice Manual (NSPM).

#### **RECOMMENDATION 25: Institute a Mandatory Energy Efficiency Resource Standard (Theme 5)**

Separate from North Carolina's current Renewable Energy Portfolio Standard (REPS) framework, develop a mandatory Energy Efficiency Resource Standard (EERS) for all utilities that will support the most cost-effective way to achieve efficiency goals outlined in EO80.

#### **RECOMMENDATION 26: Establish Minimum Energy Efficiency Goals within Current REPS Program (Theme 5)**

As an alternative to recommendation 25, incorporate a 25 percent minimum, up to 40 percent maximum, EE contribution to the REPS goal beginning in 2021, subject to cost-effectiveness screens. Apply this to IOUs only.

#### **RECOMMENDATION 27: Provide “Download My Data” Functionality for All Utility Data (Theme 10)**

Enable all customer classes to download 24 months of utility data using a standardized XML format (Green Button “Download My Data” or similar standard). Provide data access through existing metering infrastructure rather than require significant investments in new meters just for the purpose of accessing incremental water and natural gas usage.

#### **RECOMMENDATION 28: Establish Database of Rates for All North Carolina Utilities (Theme 10)**

Require all electric, water, and natural gas utilities in the state to publish all of their rate schedules (and updates) in a standardized machine-readable XML format, accessible to all ratepayers.

### RECOMMENDATION 29: Continue to Evaluate Automatic Energy Data Transfer (Theme 10)

Continue to work with all utilities on ways they can provide automatic transfers of data to third parties when customers have authorized access to their data.

### RECOMMENDATION 30: Collect Existing Data on Energy Efficiency Metrics (Theme 11)

Identify the basic information needed to tell an “energy efficiency” story for North Carolina and search existing public and private reporting mechanisms to find that information. Collect information on all types of energy into one place for one-stop shop analysis.

### RECOMMENDATION 31: Establish an Online Data Repository for Energy Efficiency Metrics (Theme 11)

Establish a transparent and straightforward repository of energy use, energy savings, and types of EE measures implemented. Gather the information collected in Recommendations 21 and 30, and present in an online repository that enables users to download aggregated energy use and savings data.

### RECOMMENDATION 32: Expand the Energy Savings Data Repository to Include Voluntary Reporting (Theme 11)

After launching the energy savings data repository (Recommendation 31) and demonstrating its utility in tracking energy use, energy intensity, and energy savings progress in the state of North Carolina, expand the repository by encouraging new entities to begin reporting their energy use, energy savings, and types of EE interventions.

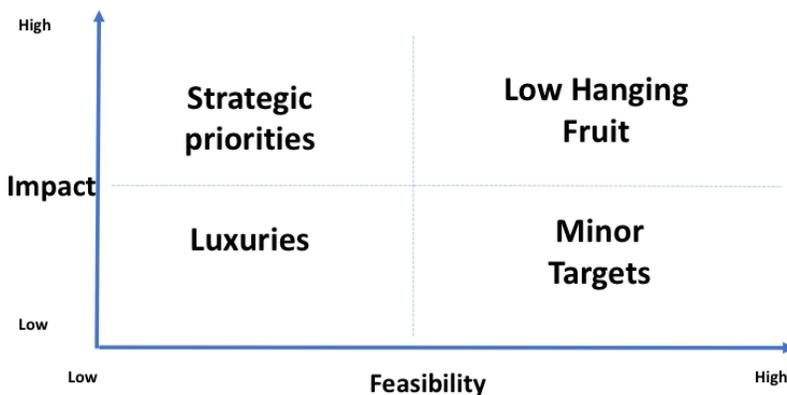
## Feasibility/Impact Matrix

Following presentations on the 32 recommendations from the theme team leads, the workshop participants broke into six subgroups to prioritize the recommendations using a feasibility/impact matrix. The groups discussed, dissected, deliberated, and eventually agreed to a ranking of each recommendation comparing its relative feasibility (Low to High) and impact (Low to High) according to the matrix in Figure 5, below.

The resulting landscape of recommendations represents each group’s analysis of each recommendation’s feasibility and impact relative to the other recommendations. These were then broken into quadrants to help group the recommendations and identify trends:

- *Low hanging fruit*—the highest impact recommendations with the highest feasibility.
- *Strategic priorities*—high impact recommendations that may be more difficult to implement or require other actions (including other recommendations) to occur. In addition, these may require larger investments or a longer timeframe to achieve results.
- *Minor targets*—easy to realize recommendations that may not have the highest impact but may still be important for other reasons and may be needed to accomplish the strategic priorities.
- *Luxuries*—recommendations with high cost or difficult to achieve, with likely little return.

Figure 5: Feasibility/Impact Matrix for EE Recommendations



After the workshop, the quadrant results from each of the six tables were reviewed for consistency and trends (see Appendix B for a summary). While not all tables reached the same consensus for the exercise, the results guided the formulation and organization of the final recommendations for this report and formed the basis of the EE Roadmap recommendations outlined in the next section.

## **THE NORTH CAROLINA ENERGY EFFICIENCY ROADMAP**

The following summarizes the final roadmap towards a more impactful EE strategy for North Carolina. It should be noted that even with a set of shared goals, the diverse viewpoints represented in the EE roadmap process created healthy debate as the ideas and strategies were refined. Each recommendation may or may not represent consensus from all of the participants that were involved in the development of the recommendations. In addition, some of the participants acted only in an advisory and/or learning mode and were not able to accept or reject recommendations outside of a more formal arena. The ongoing discussions in and of themselves were valuable parts of the process and all parties should feel free to continue to air their views in the other arenas where EE matters are discussed and decided as the roadmap is implemented.

In addition, although some of the recommendations might not have been considered “high impact/high feasibility” by participants in the second workshop, they are necessary prerequisites for the implementation of more highly impactful/feasible recommendations. Therefore, recommendations relating to oversight of the EE Roadmap implementation and the collection of data are included as pathways for North Carolina’s roadmap. These recommendations have been identified as prerequisites or scaffolding for more impactful/feasible partners wherever possible. Where applicable, original recommendations have been combined with others to improve synergies and coordination across themes. Finally, it is important to note that these recommendations are not the only solutions to consider when advancing EE in North Carolina. Other potential solutions that were discussed within the working groups are included in Appendix B and should continue to be evaluated as potential projects in the future. Other parties may have additional ideas and suggestions that can augment these recommendations or offer new solutions. All of these ideas are welcomed and encouraged.

### ***The Final Energy Efficiency Recommendations***

The recommendations below span sectors and themes, but they also differ in how they can be implemented. Some require little, or no, legislative intervention, while others would require legislative action or administrative rulemaking to be successful. The remaining set of recommendations will require some form of legislative, regulatory, or executive action. It is important to note how intertwined many of the recommendations are, as depicted in Figure 6. These dependences are indicated by the lines between recommendations.

Figure 6: Summary of Final EE Recommendations by Focus Area



**Summary of Energy Efficiency Recommendation Focus Areas**

Based on the connections and interdependencies between the recommendations, the Steering Committee grouped them together in 10 focus areas. Within each focus area, short-term recommendations are listed that will help North Carolina achieve its shared goals within a one- to three-year time frame. In some cases, discussion topics are listed as potential recommendations for the longer term (3+ years). These are topics that did not receive enough group consensus to move forward in the short term but warrant additional discussion as they have the potential to be highly impactful if implemented in some form.

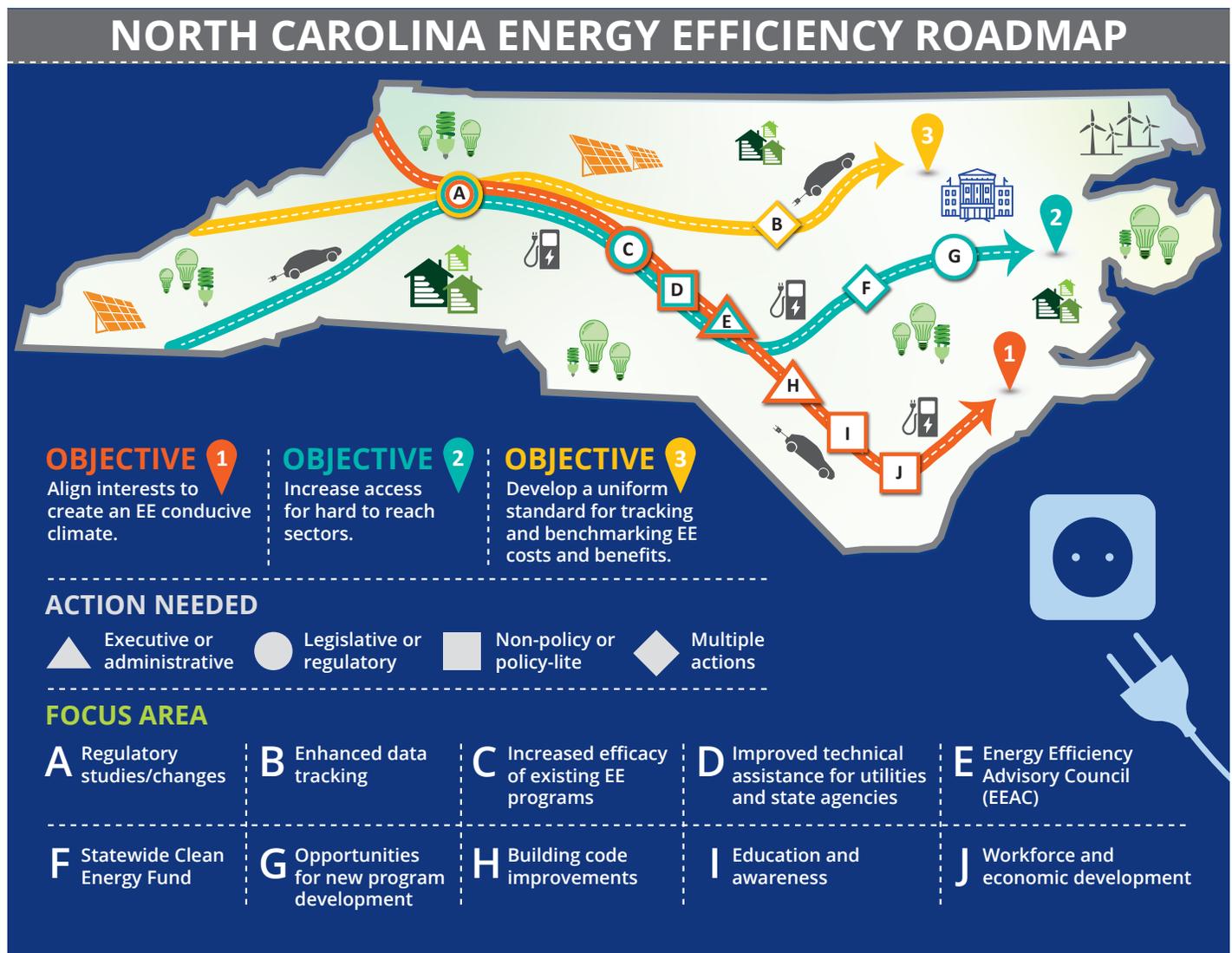
Table 5: North Carolina EE Focus Areas and Recommendations

Focus Area	Short-Term (1–3 years) Recommendation	Who should take the lead?	Longer Term (3+ years) Discussion
Energy Efficiency Advisory Council (EEAC)	Establish an EEAC to oversee the implementation of the EE Roadmap recommendations (Rec 9)	Governor	

Focus Area	Short-Term (1–3 years) Recommendation	Who should take the lead?	Longer Term (3+ years) Discussion
Enhanced Data Tracking	Collect data from existing sources (Rec 30) and apply methodology to state buildings (Rec 21)	Universities, NC State Agencies	Develop a data repository (Rec 31) and enable voluntary reporting of certain metrics (Rec 32)
	Enable “download my data” functionality for electric, natural gas and water utilities (Rec 27)	NCUC (IOU), Legislature (Munis/Co-ops)	Evaluate automatic Energy Data Transfer (Rec 29)
	Develop a database of utility rates (Rec 28)	NCUC (IOU), Legislature (Munis/Co-ops)	
Education and Awareness	Launch Energy Efficiency Everywhere (E3) campaign—educational materials for K–12 and community colleges (Rec 1)	Academic Institutions	
	Develop sector-specific EE Toolkit from existing and new online resources (Rec 3)	University or Nonprofit	
Workforce and Economic Development	Include EE jobs in the Dept. of Commerce’s workforce development assessment (Rec 5)	Dept. of Commerce	
	Collaborate with ApprenticeshipNC to launch an EE Apprenticeship program (Rec 4)	Nonprofit	
Building Code Improvements	Increase energy awareness and action on NC Building Code Council (Rec 6)	Governor	Establish a defined pathway to net-zero energy-ready homes and buildings (Rec 7)
Statewide Clean Energy Fund	Create NC Clean Energy Fund (Rec 18) to include utility financing programs (Rec 19)	Nonprofit	Add in fuel-neutral EE funding source to Clean Energy Fund (Rec 22)
Regulatory (NCUC) changes/ studies for evaluating EE programs	Commence a cost-effectiveness study (Rec 24) to include evaluation of non-energy benefits (Rec 23)	NCUC	
	Develop new NCUC evaluation criteria for evaluation of all energy programs to include equity and economic development criteria (Rec 14)	NCUC	
Improved EE program efficacy	Establish minimum EE goals within existing REPS (Rec 26)	Legislature	Develop a required/mandatory EERS target (Rec 25)
	Allow flexible NC Agency Funding for EE projects (through NC OSBM) (Rec 20)	Legislature	
Opportunities for new program development	Develop new programs (utility and nonutility) to address needs in underserved markets (Rec 13) to include Hot Water Heat Pump (HWHP) rental program (Rec 16)	NCUC, Utilities	Utilize DSM savings for low-income programs (Rec 15)
	Increase funding for NC Housing Trust Fund to improve energy efficient affordable housing options in the state (Rec 17)	Legislature	

Focus Area	Short-Term (1–3 years) Recommendation	Who should take the lead?	Longer Term (3+ years) Discussion
Improved technical assistance for utilities and state agencies	Develop a third party “EE Technical Assistance” administrator to assist municipal utilities, co-ops and state agencies with EE program development and administration (Rec 12)	Nonprofits, Utilities	
	Improve project management coordination for weatherization, urgent repair (Rec 10) with improved measurement and verification of programs (Rec 11)	Nonprofits, Universities, Utilities	

### The Energy Efficiency Roadmap



## CONCLUSIONS AND NEXT STEPS

The NC EE Roadmap is not a starting point, nor is it a destination. It is a framework for mapping out the potential pathways towards greater investment in EE in order to maximize its full potential as a least cost resource. The recommendations set out in this report represent the work of over 100 EE stakeholders throughout the state and should be used to inform legislative, regulatory, and programmatic change. As we continue to work together to achieve our shared objectives, additional discussions should occur around new ideas that can augment these recommendations or offer new solutions. It is important that the state continue to innovate and encourage ideas from all stakeholders as we all work together to help the state achieve its economic and environmental goals.

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## **RECOMMENDATION 1: Increase Energy Efficiency Education and Career Awareness in K–12 Schools and Community Colleges**

### **Current State of Play in NC**

The North Carolina public school curricula for K–12 does not include an energy efficiency component. Nor do schools provide “career awareness” programming for students to learn about careers in energy efficiency. Teachers are left to learn about these issues on their own, should they want to bring energy efficiency into the classroom.

Several North Carolina institutions offer energy-focused trainings and certificate programs, including UNC Chapel Hill’s Institute for the Environment and North Carolina’s Office of Environmental Education (training here earns state teachers Environmental Education Certification credit). The NC Dept of Environmental Quality (DEQ) and the U.S. Department of Energy (DOE) also offer a rich selection of energy-related materials and activities. In addition, broader science and technology curricula and training opportunities have been created in science-based centers<sup>16</sup> and community colleges<sup>17</sup>. However, these opportunities are too scattered and various for most teachers to look through and evaluate on their own.

### **Summary of Recommendation**

The primary goal of the Energy Efficiency Everywhere (E3) project is to support the implementation of EE curriculum programs within the existing educational systems of North Carolina to include K–12 public school systems and county-based community colleges. E3 would foster excitement about energy efficiency, educate students on the electricity consumption and generation in our state, encourage specific actions by individuals and communities to reduce energy usage, and raise public awareness to the benefits of pursuing EE skilled trade careers. The project would launch a professional development training program for teachers as well as other educators in North Carolina, create a statewide EE certification certificate, and establish an online sharing platform for energy efficiency related activities and lessons for teachers to use in their classroom.

### **Background**

Electricity generation and usage impacts us all. Although every student in North Carolina is directly impacted by our electricity generation and consumption, many students do not understand the basics of how our electricity is produced, the real environmental costs, and what actions can be taken at home and at school to reduce electricity consumption. Students and young adults are often well versed in everyday technology but unaware of the technologies that produce the electricity that their devices depend upon. An understanding of North Carolina’s energy landscape and how consumers influence future decisions will help our students become more environmentally and scientifically literate and thus better prepare them for the careers and jobs of the future. The best way to bring this and similar topics into the classroom is to equip and train teachers through professional development workshops to ensure they are able and willing to teach our students these important topics.

The “train-the-trainer” workshop method could be used for K–12 schools to enable selected teachers to become “E3 Certified” and bring content back to their teams, schools, and school districts. The main tasks for a community college program would be identifying key energy efficiency career opportunities in the EE workplace, partnering with employers and education institutions to develop EE career paths and degree curriculum programs, and following through with public awareness campaigns to connect students and other participants to these opportunities.

### **Specific Actions for Implementation and Key Participants**

A university or nonprofit group may be the best host organization option in partnership with the NC Department of Commerce (DOC) and DEQ’s Office of Environmental Education. To be effective, there would need to be communication, collaboration and participation among key representatives and stakeholders including:

- NC Community College Systems Office (NCCCSO)
- NC Department of Public Instruction (DPI)

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<sup>16</sup> The North Carolina Museum of Natural Sciences created the Educators of Excellence Institutes to support continued learning for educators: <https://naturalsciences.org/learn/educators-of-excellence-institutes>.

<sup>17</sup> For example, Wake Technical Community College currently offers a Building Automation Certificate Program: <https://www.waketech.edu/programs-courses/credit/credit-programs/air-conditioning-heating-refrigeration-technology/degrees-1>.

- NC DEQ
- NC Community Colleges
- NC K–12 County School Systems
- National Energy Education Development Project (NEED)
- NC’s EE industry organizations and corporate leaders
- Accreditation organizations that oversee curriculum programs in K–12 & Community Colleges
- School groups, science educators, state education public information officers, science-based centers and museums, superintendent offices, and universities that are already involved in energy education, nonprofits that support this type of work and others.

A paradigm shift must occur in public perception of skilled trades employment. The stereotypical “blue-collar” job stigma must be dismantled and transformed to higher level of respect that accurately represents the viable, skilled career pathways that are in need within many trades sectors in the North Carolina workforce in order for EE workforce development and degree programs to be effective. This would require NC DOC, NC DPI, and NCCCSO to establish statewide and local outreach marketing to students and their parents (in forms such as advertising, social media, websites, etc.), and training the K–12 school systems’ career development coordinators and guidance counselors, on the benefits of EE skilled trade career pathways available to students.

#### *K–12 Program Development*

Within the K–12 school system, an Energy Efficiency curriculum must be developed and approved by the Southern Regional Education Board (SREB). Once developed, K–12 schools must take appropriate steps to get any curriculum approved by the NC DPI for inclusion in the classroom. If E3 becomes a state DPI-managed program, there is a need for additional staffing, funding, resources etc. Career and Technical Education (CTE) with an EE focus is another college-focused pathway with a focus on developing technical and soft employability skills. Career pathways need to be based on the emerging labor markets identified by regional business and education leaders. This would be a new creation for K–12’s in North Carolina, but similar programs exist in Florida and other states.<sup>18</sup>

#### *Community College Program Development*

Community colleges are restricted to work only with industries and business that exist within their respective counties. Creating new EE academic programs may be challenging and time consuming, because each community college follows the NCCCSO governance and requirements which can take between one year (minimum) to three years, from concept to completion, to establish a new two-year degree program at a community college. The Curriculum Procedures Reference Manual must be properly followed, and a Curriculum Program Application is to be filed with the NCCCSO.<sup>19</sup> Creating a new specialized track within an existing curriculum program, juxtaposed starting a completely new curriculum, typically fast-tracks the aforementioned review and approval process.

#### *Alignment with Other Recommendations/Objectives and Prerequisites*

This solution would primarily achieve Objective 1 by enabling and encouraging teachers to pick EE topics for their classrooms while creating EE educational pathways to build a robust and capable EE workforce. This will drive an EE conducive climate in NC, while also providing secondary achievement for Objective 2. By providing greater access to effective EE educational career programs, hard to reach sectors could benefit from skilled training and employment opportunities.

Ideally, E3 and the EE Apprenticeship program (Recommendation 4) would be implemented simultaneously along with an awareness campaign so education institutions have a career pathway available for students who learn about various energy efficiency opportunities. No legislative, regulatory or executive branch approval is needed.

<sup>18</sup> One example is a partnership between Miami Dade Schools and Siemens: <http://miamilaker.com/Education/TabId/101/ArtMID/570/ArticleID/5571/Miami-Dade-Schools-Siemens-launch-unique-Hi-Tech-Building-Automation-lab-.aspx>.

<sup>19</sup> Additional information on NC Community Colleges’ Curriculum Procedures Manual can be found here: <https://www.ncccommunitycolleges.edu/academic-programs/curriculum-procedures-reference-manual-cprm>.

## **RECOMMENDATION 2: Deploy Public Education Energy Managers in K–12 and Community Colleges**

### **Current State of Play in NC**

Some larger public school districts and community colleges in North Carolina have developed in-house energy management programs; however, most do not have the personnel or programs in place to evaluate and reduce energy use. Meanwhile, the North Carolina Department of Environmental Quality runs the Utility Savings Initiative (DEQ-USI) to help 14 state agencies and the UNC system track and reduce energy and water use. Currently, however, the USI is not authorized or funded to work with the K–12 public school districts in North Carolina, or the community college system.

### **Summary of Recommendation**

Public school and community college facilities are significant public building stocks in North Carolina, yet state action on energy efficiency has historically focused on state agencies and the public university system, leaving a technical and practical gap at the K–12 and community college levels. Though some larger entities have developed in-house energy management, all K–12 districts and community colleges would benefit from additional support and centralized training. Developing and deploying a statewide energy manager program (via an expanded version of the existing DEQ-USI structure) would parlay well with recent legislative interest in the operational and capital needs of K–12 districts and community colleges.

### **Background**

Presently, County Commissions across the state are the ultimate funders and organizers of operational and capital expenditures for facilities within both the K–12 and community college systems. This means many systems within distressed Tier 1 and Tier 2 economic areas are routinely operating with a scarcity of funding. Although the state has had limited on-going involvement in operational and capital decisions by either Local Education Agencies (LEAs) or community colleges, there has been recent evidence via NC House Bill 241 and corresponding discussions in the Senate about increasing state allotments or appropriations for capital expenses.<sup>20</sup> If the state were to simultaneously embark on a Public Education Energy Manager Deployment, those potential new state capital funds could more efficiently be put into cost- and energy-savings projects identified by a state-trained and state-deployed energy manager.

The State of Kentucky has one of the best examples of a successful state-run K–12 energy manager program. Initially funded through a State Energy Program grant via the American Recovery and Reinvestment Act (ARRA), the Kentucky School Energy Managers Project (SEMP) hired 49 energy managers to serve 144 of the 173 school districts across the state. Once the grant period concluded, the state turned to the utility sector to provide continuation funding for the program through 2018. During its 8-year run, the program is reported to have saved districts over \$225-million in total utility avoided costs.<sup>21</sup>

### **Specific Actions for Implementation and Key Participants**

With some programmatic tweaks, the DEQ-USI could easily align with this recommendation. Although DEQ-USI has focused more on training and assisting energy professionals who are employed directly by the program participants, hiring the K–12 and community college energy managers as centralized state employees would allow the state to be more directive in achieving specific goals, especially if those goals are tied to any increase in state funding or bond disbursements for the capital needs of public education systems. Centralized staffing would also allow for some energy managers to be assigned to multiple, smaller districts without any lengthy cost-share agreements.

Although NC DPI historically has had little authoritative influence over the capital decisions made by LEAs, DPI would likely be a partnering agency to assist with integrating the deployment of energy managers as well as standardizing data acquisition and on-going reporting from LEAs. It would be expected that DEQ-USI and DPI officials would be instrumental in together crafting a detailed plan to implement this recommendation. Likewise, community college leaders can be involved early.

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<sup>20</sup> North Carolina House Bill 241, “Education Bond Act of 2019” would provide up to \$1.9 billion in funds from a general obligation bond issuance, for capital outlay projects at public school, community college and UNC facilities, to include repairs and renovations. As filed on March 4, 2019. <https://www.ncleg.gov/Sessions/2019/Bills/House/PDF/H241v3.pdf>.

<sup>21</sup> Kentucky School Boards Association, School Energy Manager Project, accessed 6/12/19. <https://www.ksba.org/SEMP.aspx>.

## Alignment with Other Recommendations/Objectives and Prerequisites

This recommendation would at least partially address all three shared objectives:

- (1) Objective 1: “Align interests to create an EE-conducive climate.” This would install energy professionals in direct project- and campaign-oriented EE work as well as provide additional support to other EE education and awareness recommendations.
- (2) Objective 2: “Increase access for hard to reach sectors.” This would touch all 100 counties in the state in sectors that have not universally benefited from concerted, centralized EE endeavors.
- (3) Objective 3: “Develop a uniform standard for tracking/benchmarking EE costs and benefits.” This would allow energy data and reporting standardization to be made across all 100 counties, all 114 local education agencies (LEAs) who presently (and rather chaotically) report semi-annually to the Department of Public Instruction, and all 58 community colleges spread from every corner of the state.

Securing funding is perhaps the most significant prerequisite to initiating this recommendation. Establishing a programmatic mandate for the recommendation through authorizing legislation or orders, especially due to the sheer breadth of the recommendation, might be necessary as well. A well-staffed team could plan the program and recruit participants within a year of receiving a funded mandate.

## **RECOMMENDATION 3: Create Online Energy Efficiency Toolkits for All Sectors**

### Current State of Play in NC

A wealth of energy efficiency resources and educational materials exists online; for instance, EE resources are found on websites hosted by the U.S. Department of Energy, the nonprofit [National Energy Foundation](#), and NC DEQ. Similarly, local nonprofits ([homeenergync.org](#)) and universities ([NC State Extension](#)) offer resources to specific sectors including renters, small businesses, and farmers. However, the information can be hard to navigate and may not be targeted to particular sectors.

### Summary of Recommendation

Instead of an overload of redundant or irrelevant information, energy efficiency “toolkits” can be developed which are relevant to an energy user’s situation and provide actionable steps to reduce energy consumption. Each toolkit would contain sector-specific energy efficiency education and outreach material, scripts, presentations, and activities. These toolkits would all reside on one website with links to other materials as appropriate.

### Background

Even with these extensive resources, if an energy consumer was looking for ways to save energy in their home or business, there are barriers to overcome: limited to no access to the internet, financial barriers, language barriers, and information overload. To combat apathy and frustration, information about energy efficiency and conservation should be easy to understand, relevant to the individual, and accessible to all.

### Specific Actions for Implementation and Key Participants

The first part of implementation should be focused on gathering information from available resources. Once the existing information has been catalogued, the development of sector-specific toolkits can occur. This should be done in partnership with subject matter experts and community organizations from each relevant sector to ensure applicability and interest. Once the toolkits have been developed, they can be distributed:

- **Online**, through a statewide, centrally run website. This might include NC DEQ or a university center like NC Clean Energy Technology Center (NCCETC). The kits will be organized by sector, and organizations wanting to use the information for community outreach will be able to download the information and provide in-person access to those without internet access.
- **In-person**, to be shared in hard copy with community organizations that provide outreach to communities. These organizations can use the provided information to inform their communities of energy saving actions/ tips, programs and rebates. Kits can also be provided to nontraditional, but trusted, communication channels like social workers, health insurers, and faith-based organizations.

### Alignment with Other Recommendations/Objectives and Prerequisites

This recommendation achieves Objectives 1 and 2 through improved organization of resources that makes EE information more accessible to all. When information is relevant and includes achievable steps to reduce consumption, energy consumers can become more aware of their energy use and develop energy saving behaviors. Funding for the start-up and ongoing administration of the toolkits needs to be acquired and a lead organization needs to be assigned. No legislative or regulatory action is required.

### **RECOMMENDATION 4: Create Energy Efficiency Apprenticeship Programs**

#### Current State of Play in NC

North Carolina is home to a successful state apprenticeship program. ApprenticeshipNC is an economic development-focused organization housed within the NC Community Colleges System. The U.S. Department of Labor has described ApprenticeshipNC as an agency that works “to ensure NC has an innovative, relevant, effective, and efficient workforce development system that develops adaptable, work ready, skilled talent to meet the current and future needs of workers and businesses to achieve and sustain economic prosperity.” However, currently, ApprenticeshipNC does not focus on energy efficiency as a career path.

#### Summary of Recommendation

Create an energy efficiency apprenticeship program to include apprenticeships and pre-apprenticeships<sup>22</sup> for North Carolina workers through collaboration with [ApprenticeshipNC](#), industry partners and organizations, and learning institutions from K–12 to higher education.

#### Background

Apprenticeships and pre-apprenticeships provide opportunities for experiential learning through paid “on the job” training with real companies in the industry. Allowing for both apprenticeships and pre-apprenticeships would ensure that anyone could participate in the program regardless of education level or background.

This type of program would also be extremely beneficial to employers. In the highly competitive job market, many firms and companies have difficulty finding employees with the necessary skills or desired level of company-specific knowledge. Through apprenticeships, employers can reduce operational costs by establishing a streamlined channel to bring on new workers and advance existing workers, building employee loyalty and reducing attrition, and fostering new leaders.

Apprenticeship NC already works in collaboration with the NC Community Colleges System, the NC Department of Commerce, and the US Department of Labor’s Bureau of Apprenticeship and Training and currently recognizes building trades and energy industries as part of their apprenticeship programs. This partnership could easily expand to include various energy efficiency trades. In order for this to happen, specific energy efficiency careers would need to be identified and reputable companies would need to be contacted and asked to participate in the program.

#### Specific Actions for Implementation and Key Participants

The lead implementing organization would be ApprenticeshipNC, however there would need to be coordination and participation among several stakeholders, including:

- Technical and community colleges
- Traditional colleges and universities
- Energy efficiency industry employers
- K–12 institutions
- NC Department of Commerce/NCWorks
- Workforce Development Boards

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<sup>22</sup> Apprenticeship requires participants to participate in both classroom and on-the-job training. Pre-apprenticeship gives its participants the option of choosing one or both and offers shorter training programs than full apprenticeships. Source: ApprenticeshipNC.

- NC Business Committee for Education Navigator Tool
- Training institutions
- Credentialing organizations such as Building Performance Institute (BPI)

The following would need to take place for the successful implantation of an energy efficiency apprenticeship or pre-apprenticeship program:

- (1) E3 (Recommendation #1) for increased energy efficiency education and career awareness would need to occur to raise awareness about the opportunities for energy efficiency careers and provide students and others a way to access information and explore potential career pathways after graduation. This would provide visibility for the industry and hopefully pique students' interest in energy efficiency and get them thinking about a potential career in the field.
- (2) Apprenticeship Program Planning—While Recommendation 1 is being implemented, preparation for the development of an energy efficiency apprenticeship program can begin. This would include:
  - Identifying key energy efficiency careers, which could be done in conjunction with the NC Department of Commerce's Workforce Assessments through Executive Order 80 to determine which specific sectors have the most need for skilled energy efficiency workers
  - Identifying employers and education institutions to participate in an apprenticeship program
  - Designing an energy efficiency-specific apprenticeship program and model based on industry needs, workforce needs, and required or beneficial certifications and credentials
  - Certifying the apprenticeship through ApprenticeshipNC

Once all of these things are established, they follow along the progression provided in the ApprenticeshipNC “Pathway to Apprenticeship” starting with career awareness in middle school, followed by career exploration and pre-apprenticeships in high school, and ending with career preparation and apprenticeships after high school.<sup>23</sup>

#### Alignment with Other Recommendations/Objectives and Prerequisites

This solution would primarily achieve *Objective 1: Align interests to create an EE-conducive climate* and *Objective 2: Increase access for hard to reach sectors* by bringing together a diverse group of stakeholders across North Carolina and by providing a pathway for students to explore a career in energy efficiency through paid, on-the-job training with industry employers which, in turn, addresses the need for skilled, qualified workers in the industry. It also strongly aligns with the NC DOC's EO80 work on Workforce Assessments since developing apprenticeship programs would require working alongside industry partners who would benefit from such a program. This would help “evaluate the current and projected workforce demand, assess the skills and education required and recommend actions to help North Carolinians develop such skills and education.”<sup>24</sup>

Theoretically, this type of program could include all sectors within the energy efficiency industry throughout NC. ApprenticeshipNC accepts employer partners on an ongoing basis, so identifying energy efficiency careers and placements could begin right away. The longer-term prospects for this program would be dependent on the demand for certain jobs and what is being taught through K–12 and higher education programs. This recommendations partners well with Recommendation 1—increasing EE education and awareness in K–12 and community colleges. No legislative or regulatory action is required.

<sup>23</sup> Additional information on the “Pathway to Apprenticeship” can be found here: <https://www.apprenticeshipnc.com/partners/k-12-educators>

<sup>24</sup> North Carolina Executive Order No. 80, October 29, 2018.

## **RECOMMENDATION 5: Perform a Public Education Workforce Data and Economic Impact Study**

### **Current State of Play in NC**

Existing state and national studies range widely and unreliably on the number of EE jobs in the state. Estimates range widely on a number of key metrics:

- Companies: NCSEA: 1,310 (2018 Census), NCBPA: 1,500 (2018 Report)
- Jobs: NCSEA: 23,891 (2018 Census), NASEO/EFI: 86,559 (2019 Report), NCBPA: 47,829 (2018 Report)
- Annual Revenue: \$6.3B (2018 Census), NCBPA: \$15B (2018 Report)

As of July 2019, the NC DOC and the organization E4Carolinas are working on a NC workforce assessment as part of a forthcoming Energy Innovations report (final due out in July 2019). Energy efficiency will be included in this report. In addition, the NC DOC is creating a methodology for estimating the number of clean energy companies and professionals in the state. However, the DOC's methodology as currently contemplated will not break out energy efficiency from the rest of the industry.

### **Summary of Recommendation**

Perform a workforce economic impact study that captures critical data needed to invest public and private resources in K–12 and higher education curriculum development and career awareness related to North Carolina's energy efficiency industry. At present, North Carolina lacks a standard methodology and reporting mechanism for quantifying the number of energy efficiency companies and workers. Because of a lack of visibility into the number of energy efficiency companies and workers, much-needed initiatives such as community college curriculum development, funding prioritization for career awareness and many other initiatives that would be beneficial for the industry and the state are unable to be quantified, thus preventing them from moving forward. The working group recommends:

- That the Department of Commerce develop a state-supported methodology for quantifying energy efficiency companies and professionals, within its economic analysis of the clean energy industry;
- That a follow-up economic impact study is performed by an institution or agency to establish a baseline that can be used to quantify the workforce impacts of energy efficiency market, regulatory, policy, and other efforts going forward; and that
- The economic impact study is used in other energy efficiency market and workforce development initiatives to quantify the expected, and eventual actual, impact of market, regulatory, and other activities on the state's workforce and economy.

### **Background**

As part of EO80, the Department of Commerce is establishing a methodology for quantifying an accepted range of "clean energy" and "clean transportation" companies and professionals in the state. As noted, this endeavor will not break out EE or estimate the economic impact of the EE workforce—at its current status or with growth related to the Clean Energy Plan's activities. An accurate baseline or methodology for EE workforce is needed to measure the Clean Energy Plan's workforce opportunity or actual impact.

### **Specific Actions for Implementation and Key Participants**

Staff from the NC DOC could lead the first portion of this initiative regarding the methodology for energy efficiency companies and professionals. NASEO and the Energy Futures Initiative currently perform the national reports. It is possible that a national organization, foundation, or other entity would be interested in funding this ongoing research. Organizations like NRDC, E4TheFuture, and others fund these initiatives. A separate organization (TBD) will need to lead the remaining work efforts regarding the economic impact analysis.

### **Alignment with Other Recommendations/Objectives and Prerequisites**

The baseline data on the number and location of energy efficiency companies, professionals, and therefore impacts and needs will assist all working groups in forming better solutions and enable more targeted and beneficial solutions. Better data on our industry's workforce will also provide the specific data points needed to create resources and programs that assist hard-to-reach sectors and parts of North Carolina's economy. Ideally, this recommendation would be one of the first

implemented. The study would establish a baseline of current workforce and economic data that would be used to measure costs and impacts of other projects planned and could help to quantify the workforce and economic impacts of all recommendations. Without a baseline established for this data, it will be impossible to accurately measure their impacts on workforce and economic development.

## **RECOMMENDATION 6: Raise Energy Efficiency Awareness on North Carolina Building Code Council**

### **Current State of Play in NC**

The North Carolina Building Code Council was established to oversee the state's building codes, which include energy code. In addition, the state legislature may update building codes at any time. The Building Code Council is comprised of seventeen members, each representing a different area of expertise or constituent group as detailed in the [state law](#). Currently energy efficiency is not represented on the Building Code Council.

### **Summary of Recommendation**

Improve the North Carolina Building Code Council (NCBCC)'s support of energy efficiency by adding an Energy seat to the Council's makeup, increasing the energy efficiency education of all existing members and establishing new actionable goals that prioritize energy efficiency in North Carolina's current and future building codes.

### **Background**

The NCBCC has regulatory control over the sources—buildings—of more than 50 percent of North Carolina's energy consumption. This control is authorized by law and enacted by setting and managing the minimum energy code standards and voluntary measures for all new and existing residential, commercial and industrial buildings. For the past several years, the 17-member council, whose positions are established via the Legislature and appointed by the Governor, have supported weak increases in energy efficiency minimum code requirements and approved roll-backs of moderate, yet cost-effective, energy code increases. This action has led to North Carolina's energy codes becoming less stringent when compared to other Southeastern states, national and international standards.

Energy codes play a major role in how a state acts on energy efficiency and, because North Carolina is a [Dillon Rule](#) state, local jurisdictions are limited in how they can implement increased stringency (above state code) in local codes to support their own climate change and energy goals. To improve local and state support for energy efficiency, establishing greater support, understanding and action of the NCBCC is a fundamental starting point.

The NCBCC currently lacks understanding and support for the positive role that responsible, cost-effective increases to minimum energy efficiency requirements can have in North Carolina's building code. Prudent, cost-effective energy code improvements could save up to \$10 billion (NCBPA, 2018) in direct avoided energy costs over the next ten years, offer significant environmental and health impacts to the state, and provide strong economic impacts through improved housing and property affordability, local economic development improvement and workforce development.

Florida is one of the few Southeastern states that has an energy efficiency, clean energy, or green building seat on its code council. The Florida Building Commission includes a representative of the "green building industry" as well as from the Florida Office of Energy.

### **Specific Actions for Implementation and Key Participants**

Although more than 50 percent of the state's energy usage is regulated through building codes, the 17-member NCBCC lacks an Energy industry representative. Adding an Energy seat to the NCBCC is a direct step to include energy's role in the code development and management process. Ensuring that this new position is a member of both supercommittees is a critical step to further ensuring that energy efficiency and clean energy (renewable energy, energy storage, and electric vehicles) are properly represented on the NCBCC. Both of these steps require legislative action and approval by the Governor.

A barrier to adding an Energy seat is that the 17-member council, whose positions are established in statute by the legislature and subsequently appointed by the governor, needs to remain an odd number for voting purposes (Statute, 2019). Replacing an existing seat is not desirable and adding one seat would make the NCBCC an even number. To address this issue, a second new seat in addition to the Energy seat is recommended. For this second seat, a recommendation is to

create a position for an industry professional representing existing commercial buildings, specifically through building envelope and mechanical commissioning.

Moreover, the governor's office could provide direction for the NCBCC to further support energy efficiency and clean energy. The governor's office would lead the implementation of this recommendation by meeting with NCBCC members, NCDOT, and related stakeholders to direct the prioritization of energy efficiency in North Carolina's building code regulatory environment. The North Carolina General Assembly (NCGA) would be responsible for enabling the legislative changes, in cooperation with the governor's office and with support from energy code advocate organizations.

In addition to the governor's office, NCDOT, and legislators in the NCGA, additional stakeholders include EE and clean energy advocates, and trade associations and nonprofits representing energy efficiency, clean energy, and other stakeholders that are impacted by building code.

#### **Alignment with Other Recommendations/Objectives and Prerequisites**

The addition of an Energy seat (and possibly a second seat) would require legislative action. Such action was pursued in April of 2019 and nearly achieved. If legislation were successful, the governor usually make new appointments each July. Establishing EE goals for the Council through the governor's office would not require legislative action.

### ***RECOMMENDATION 7: Establish a Pathway to Net-Zero Energy-Ready New Buildings***

#### **Current State of Play in NC**

Executive Order 80 sets a target of reduced energy consumption for state-owned buildings (40 percent from 2002–2003 levels by 2025) but is silent as to the rest of the building stock. North Carolina just began its latest 2018 North Carolina Energy Conservation Code cycle in January of 2019. The new commercial energy code will be in place for the next three years and the new residential energy code for six years. North Carolina's new energy codes most closely follow the 2012 International Energy Conservation Code. Generally speaking, the new energy codes are between 1–2 percent more energy efficient than the prior 2012 North Carolina Energy Conservation Code.

#### **Summary of Recommendation**

Establish a defined pathway to net-zero energy ready new buildings and more energy efficient existing buildings in North Carolina by 2042. Key elements of this pathway include: (1) requiring that all new buildings receive an inspection, verification or rating by a qualified code official or approved third party that ensures functional energy code compliance to the current state code; (2) ensuring that all code stakeholders—Code Council members, code officials and other state employees that play a role in code—understand and act on increasing the energy efficiency of North Carolina's codes; (3) revisit the building codes on a more frequent basis (possibly reducing the update cycle from its current six-year term for residential buildings to a three-year term), including resources to better align with national and international standards—possibly including automatic review and/or adoption of model language.

Ensuring that all new buildings—whether single family, multifamily, commercial, or otherwise—receive an inspection, verification, or rating is a starting point to establishing state-mandated benchmarking, reporting, and visibility related to the energy efficiency of buildings in the state.

#### **Background**

North Carolina's buildings account for more than 50 percent of the state's energy usage. Establishing a goal of net-zero energy ready new buildings by 2042 creates a framework and momentum for improving the energy efficiency minimum requirements of North Carolina's new construction codes. Doing so would simplify utility load management and would provide improved resiliency, preparation, and recovery during natural disasters. This goal would help North Carolina return to a position of national leadership relative to energy codes.

Prioritizing the energy efficiency of existing buildings through energy code is a small first step in prioritizing energy savings and consumption in existing buildings, which comprise roughly 99 percent of the state's building stock. Because existing buildings do not have to comply with the current energy code unless a major renovation is performed or the project is permitted, it is important to establish a pathway to improved energy efficiency through code requirements. In particular, as established by recent legislation, additions to existing commercial buildings do not have to comply with the current energy code.

Currently, energy code enforcement commonly receives a lower priority when compared to other parts of code. Existing code officials and future code officials should be provided with increased training and incentives to properly inspect and verify buildings for energy efficiency and energy code. Energy inspections should have a professional development track like other trades for plumbing, electrical, and HVAC.

California, Washington, Vermont, and New York as well as cities such as Boulder, the District of Columbia, and Scottsdale (Institute, 2019) have established net zero-energy ready targets for new buildings. North Carolina's building code is set at a state-level with little opportunity for local jurisdictions to affect their own clean energy and environmental goals, making it difficult to emulate actions taken by cities in other states. However, at the state level, North Carolina could invest more heavily in research and infrastructure to support building energy efficiency goals.

States such as Maryland auto-adopt the most recent International Energy Conservation Code (IECC), in order to incorporate the newest building technologies and methods into their codes. North Carolina might consider automatic code updates or shorter code cycles to ensure a closer alignment to national and international standards.

### Specific Actions for Implementation and Key Participants

To assist in market transformation for performance-based code compliance, significant education, quality assurance, and feedback channels will be required for both builders and inspectors/raters/verifiers. Under current code, prescriptive backstop requirements prevent homes from using only short-lived efficiency improvements or renewables to meet the ERI path for code compliance. This backstop will need to be updated as code continues to be changed. As our buildings move closer toward net zero—that is, the more we improve energy efficiency—the more we will need to prioritize durable, reliable energy conservation technologies. Buy-in from electricity providers, especially, necessitates a “conservation before generation” strategy, which minimizes the magnitude of demand fluctuations.

The governor, by executive order, or the North Carolina General Assembly could establish a net zero-energy ready goal. Complementary improvements to existing home and building energy efficiency codes will require advocates to petition the NCBCB for approval, or the legislature to pass legislation that overrides the NCBCB process. Similarly, adjusting the building code cycle and improving alignment with national and international standards can be proposed at the NCBCB, but ultimately lies with the legislature.

Implementation of the construction, design, and other costs to meet the net zero-energy ready goal needs to be evaluated carefully. Improving energy code enforcement education and resources will be led by NCDOT. Many third-party energy consultants and contractors already operate in the state but would have to be brought in to the regulatory process via a trade association or regulatory entity. All of these items will have impacts on designers, builders, developers, owners, managers, and occupants of North Carolina buildings, due to increased compliance with new and existing code. All stakeholder groups residing in or working in buildings will require cost/benefit consideration.

### Alignment with Other Recommendations/Objectives and Prerequisites

The net zero-energy ready target is an effective option for achieving the first goal of the governor's EO80, as buildings represent the largest energy consumption sector of North Carolina's economy. Establishing the necessary infrastructure via reporting, benchmarking, code enforcement, workforce development, and more will support EO80's goals in the short- and long-term. Measuring the energy efficiency potential of existing buildings is challenging and will require substantial data to identify financial and other resources needed to do so. Examples of reporting requirements or existing home energy efficiency include the state of [Massachusetts](#) and the city of [Portland, Oregon](#).

Legislative action could be required, particularly if these recommendations were not taken up by the NCBCB through the code development process. Third-party energy code enforcement would require approval from the North Carolina Code Officials Qualifications Board. Transitioning North Carolina's construction and built environment to one founded in net zero-energy ready buildings with proper energy code enforcement should be coordinated with the workforce development efforts currently underway.

## **RECOMMENDATION 8: Improve North Carolina Legislative Process for Building and Energy Codes**

### Summary of Recommendation

Improve the stringency and oversight regarding statutory rules and regulations including a thorough review of the legislative process involved in setting building and energy codes that focuses on improving the stringency and oversight of legislation that impacts energy usage, health, and life safety without consultation from the NCBCC and stakeholders that actively participate in the code setting process. This would ensure that North Carolina legislature makes building and energy code changes with review or analysis provided by the North Carolina Building Code Council, particularly related to impacts on energy efficiency, health, and life safety. The legislature's ability to impact code can have positive or negative impacts on the state's ability to meet its energy efficiency and clean energy targets, and potentially return to a position of national leadership in energy codes.

This recommendation enables revisions to the statutory language provide the NCBCC with a formal review and recommendation opportunity through its existing regulatory procedures or new ones. Doing so will provide a formal opportunity for code regulators, expert witnesses and stakeholder testimony on potential issues related to energy, health, and life safety.

### Background

In the standard code development process, citizens, businesses, or special interest groups propose code changes to the NCBCC which then follows a several-month-long process to analyze and vet the changes. This process helps ensure that issues such as energy efficiency, health, and safety, are reviewed by the 17-member council appointed as experts in the building code field. However, North Carolina's legislature is able to unilaterally override the NCBCC on its own accord or at the request of special interest groups, which can positively or negatively impact all areas of code, including energy efficiency. Because North Carolina is a Dillon Rule state, this override ability allows a legislator from one jurisdiction to impact code changes in all other jurisdictions across the state.

Potential solutions to this issue include:

- Enabling a 90-day energy, health, and life safety review process that would allow the NCBCC to review and make recommendations to legislation impacting building code.
- Limiting the ability of legislation that has a wide reach to be enabled without further analysis into the impact of doing so, which would need to include the NCBCC.

A review process may not be able to stop all negative impacts to energy efficiency but could prevent significant negative impacts.

### Specific Actions for Implementation and Key Participants

The North Carolina General Assembly would be the lead implementing organization. The North Carolina Department of Insurance (NCDOI), which oversees code officials and supports the NCBCC, should be consulted regarding the process whereby financial and other reviews would be performed. The NCBCC should be involved in this process as well. Other stakeholders that routinely participate in the code development process—local government organizations, nonprofits, energy code advocates—can be involved to provide examples of cases that should be addressed going forward.

### Alignment with Other Recommendations/Objectives and Prerequisites

Legislative action is needed to define the new rules that would regulate the legislature's ability to override and change code.

## **RECOMMENDATION 9: Establish an Energy Efficiency Advisory Council**

### Current State of Play in NC

No Energy Efficiency Advisory Council currently exists in North Carolina. The Energy Policy Council (EPC) is an independent body of experts appointed by the Governor and NC General Assembly and staffed by the NC DEQ. The EPC advises the governor and General Assembly on domestic energy production and environmental protection and has a standing energy efficiency subcommittee which meets quarterly but doesn't specifically track and advise on EE opportunities outside of legislative opportunities. In addition, as part of EO80, Governor Cooper established a cabinet-

level Climate Change Interagency Council. This Council has no subcommittees and has not otherwise focused on energy efficiency.

### Summary of Recommendation

Establish an Energy Efficiency Advisory Council (EEAC) comprised of representatives from utilities, state agencies, higher education, industry, advocates, and other EE experts. The EEAC would be responsible for sharing information and best practices between stakeholders in order to increase statewide EE measures for residential and commercial programs across the state in support of the governor's Executive Order 80. In the near-to-medium term, the EEAC would oversee the implementation of the recommendations selected for inclusion into the state's Clean Energy Plan and help to monitor and report on the progress of the EE recommendations. Long-term, the council would be responsible for tracking broad EE efficacy in North Carolina and undertake studies and analyses that can inform future EE recommendations. The EEAC would sit within NC's executive branch—pending support from the Governor—and would provide advisory support to agencies involved in implementing EE programming.

### Background

Today, there is no established body that is diverse and inclusive of all the many EE interests in North Carolina that could oversee and guarantee the implementation of the NC Clean Power Plan EE recommendations. The EEAC would fill this gap and track implementation of the approved recommendations as well as the emissions reductions, economic development benefits, and other metrics from EE measures. With a diverse make-up, the EEAC would ensure that balanced, consensus-driven recommendations are made, and that new EE policies are implemented as quickly and effectively as possible. The EEAC would help establish better communication between the EE stakeholders, and improve the sharing of best practices to boost adoption of energy efficiency measures within the state.

Virginia and Massachusetts have implemented similar EE Advisory Councils. In Virginia, the EE Committee under Governor McCauley was charged with setting metrics, monitoring Virginia's progress towards an EE goal, and developing further recommendations to help Virginia accomplish its EE goals. The Committee consists of stakeholders from state and local government, utilities, academia, and the energy services sector, including EE advocates and practitioners. Technical and administrative support to the committee is provided by the VA Department of Mines, Minerals and Energy (VA DMME).

Similar to VA's EE Committee, the NC EEAC could be created within the Executive Branch of NC's government, with a statewide purview for broadening EE programming.

- The EEAC would target the residential and commercial sectors, but occasionally, could provide oversight to and recommendations for industrial EE initiatives.
- The EEAC could also serve as a supporting role for the current DEQ Energy Policy Council (EPC) EE Committee members.

### Specific Actions for Implementation and Key Participants

The governor's office is most well suited as the organizing agency, either as part of the Climate Change Interagency Council or as a separate entity. Once established, it makes sense for someone from the NC DEQ to chair the Council.

Council members will have several responsibilities: participate regularly in Council meetings; contribute their knowledge and expertise to the best of their abilities; participate in Council processes and discussions, including any committee processes set up by the Council; and vote, according to their best judgment, in such a way as to enable the State to achieve stated EE goals. The EEAC could be designed to have voting and nonvoting members to make the body more agile.

The following stakeholders should be represented on the EEAC:

- Ratepayer advocate
- Industrial/manufacturing
- Commercial businesses
- Low-income advocates
- Workforce development
- Residential customers
- Energy efficiency experts
- Environmental nonprofits
- Electric utilities (munis, co-ops, and IOUs)
- Other utilities (natural gas, propane)
- Energy efficiency businesses
- Local government
- Higher education
- State government—DEQ, DOC

#### Alignment with Other Recommendations/Objectives and Prerequisites

This recommendation aligns very closely with the EO80 Goals and Plans. The EEAC will be both a catalyst and an accountability check for the implementation of all the EE recommendations. As such, the EEAC will ensure that significant emissions reductions are accomplished via the successful implementation of EE program improvements and other recommendations that result from the EE Roadmap initiative. The EEAC is not a pre-requisite for any other recommendations, but it is a highly preferable precursor to ensure that other EE recommendations are implemented in a timely manner, that any barriers to implementation are mediated and solved quickly, and to serve as an accountability check for the implementation process for each of the recommendations.

No legislative action is required to start the EEAC. However, legislative action may be necessary if additional funds are needed, beyond the budgets of the agencies funding it or if additional recommendations for the state require it.

### ***RECOMMENDATION 10: Project Management Coordination System for Delivery of Energy Efficiency, Urgent Repair, and Weatherization Programs***

#### Current State of Play in NC

In North Carolina, energy efficiency, urgent repair, and weatherization programs are delivered and administered separately by multiple agencies. More localized attempts have been made to better coordinate services, including pilot programs in Asheville, the Town of Enfield, and Chatham and Orange Counties. Lessons learned from these pilots could contribute to the design of a statewide program.

#### Summary of Recommendation

The separation of services and lack of coordination between energy efficiency, urgent repair, and weatherization programs in North Carolina creates significant inefficiencies, often leaving funds underutilized because they are not effectively leveraged, hampering the deployment of energy efficiency, and leaving North Carolinians living in poverty without services that they desperately need. This recommendation seeks to coordinate communication between the participating agencies and build an effective and efficient energy services delivery mechanism, to relieve or eliminate energy burden and improve housing conditions.

#### Background

Energy burden is the percentage of a household's annual income that is spent on energy bills. The U.S. HHS classifies an energy burden of 6 percent or higher as "unaffordable,"<sup>25</sup> while other sources define high energy burden as a utility bill of 10 percent or more of a household's annual income.<sup>26</sup> Today, there are 1.4 million people in North Carolina living with unaffordable energy bills.<sup>27</sup> While services exist to assist these households with the weatherization and urgent repairs they

<sup>25</sup> Applied Public Policy Research Institute for Study and Evaluation. (July 2005). LIHEAP Energy Burden Evaluation Study—Final Report. [https://www.acf.hhs.gov/sites/default/files/ocs/comm\\_liheap\\_energyburdenstudy\\_appraise.pdf](https://www.acf.hhs.gov/sites/default/files/ocs/comm_liheap_energyburdenstudy_appraise.pdf)

<sup>26</sup> Fisher, Sheehan, & Colton. 2019. Home Energy Affordability Gap. [www.homeenergyaffordabilitygap.com/](http://www.homeenergyaffordabilitygap.com/).

<sup>27</sup> Office of Energy Efficiency and Renewable Energy. 2017. Low-Income Energy Affordability Data (LEAD) Tool—OpenEi DOE Open Data (K. Layman, Ed.). <https://openei.org/doe-opendata/dataset/celica-data>

need, the programs are generally delivered and administered by different state and local agencies, causing inefficiencies in how the combined programs are administered.

A coordinated service delivery mechanism could take the form of a secure, online database that is accessible to service providers, contractors, utilities, and relevant state agencies. The database would give approved parties the ability to manage waitlists, track housing data concerning applicant and applicant residents, coordinate the provision of services for applicants, provide alerts when prerequisite actions have been taken, log notes or comments, notify administrators when the beneficiary is ready for follow-up action, and have the beneficiary auto-assigned to a service queue. The database would be strictly for case management of beneficiary interventions. It would be private and secure, accessible only to the service providers pertinent to EE, urgent repair, and weatherization services.

This mechanism could also streamline the process for income program qualification and verification through the use of a “Uniform Application” shared by all service providers. The “uniform application” would collect all relevant applicant information in one form, streamlining the application process from the applicant’s perspective.

#### Specific Actions for Implementation and Key Participants

The lead implementing organization would likely be NC DEQ. Utilities, contractors, and other relevant state agencies should be involved in designing the mechanism so that it meets the needs of all stakeholders. The following core components are essential to building an effective delivery mechanism:

- **Unified Application Process:** A unified application process should be utilized by all participating agencies and partner organizations. By utilizing a unified application, applicants would be able to apply to all programs simultaneously without having to fill out multiple applications. could also include a waiver that authorizes the relevant utility to share the applicant’s energy consumption data with DEQ for program measurement and verification purposes (see Recommendation 11).
- **Unified Waiver and Data Sharing:** A unified applicant waiver and data sharing agreement enabling all partnering organizations to share applicant information (including pre- and post-utility data) and coordinate activities together.
- **Streamlined Income Verification:** Creation of a rapid income verification process.
- **Centralized Assessment:** A comprehensive, centralized assessment ensures that client needs drive the routing of the application, instead of the program goals or design of any particular agency. This approach also saves clients many days of lost work time from multiple home visits. Instead, photos of the home and work completed will be accessible to all partners on a shared database.
- **Shared Database:** A secure, shared database will be accessible to all program agencies and partners to enable the sharing of application and program data including photos of the applicant’s home, notes from the auditors, and shared project management tools. The database will also allow for long-term data preservation for future home assessments.
- **Shared Evaluation:** Ongoing evaluation of the effectiveness of the process in meeting client needs and the needs of the agencies through post-assessments and partner check-ins.

#### Alignment with Other Recommendations/Objectives and Prerequisites

Legislative or regulatory action may be required to allow data sharing between agencies. This recommendation should be done in partnership with Recommendation 11 (Measurement and Evaluation Tool for Energy Efficiency, Urgent Repair, and Weatherization Programs).

### ***RECOMMENDATION 11: Create a Standardized Measurement and Verification Process for Evaluating Energy Efficiency, Urgent Repair, and Weatherization Programs***

#### Current State of Play in NC

In North Carolina, energy efficiency, urgent repair, and weatherization programs are delivered and administered separately by multiple agencies. More localized attempts have been made to better coordinate services, including pilot

programs in Asheville, the Town of Enfield, and Chatham and Orange Counties. Lessons learned from these pilots could contribute to the design of a statewide program.

### Summary of Recommendation

This recommendation involves creating a single standardized waiver for all participating state agencies. Applicants/homeowners would sign this waiver at the time of application thereby allowing his/her utility consumption de-personalized data to be shared with relevant state agencies. The data will allow multiple years of pre-intervention and multiple years of post-intervention data to be released to the agencies. The data will only be available to the state agencies and will allow them to measure the efficacy of certain interventions, track the cases that need follow-up or continued support, and identify which programs are most effective at reducing energy burden for beneficiaries.

### Background

Reflecting the siloed work of energy efficiency, urgent repair, and weatherization programs, no standardized method exists in North Carolina for evaluating program performance. To establish a method, access to energy usage data is necessary. Today, utility consumption data of these program recipients is currently limited to consumer use only. A unified waiver can provide data from a broad set of programs including Duke Energy's Helping Home Fund, the Weatherization Assistance Program, Equipment Replacement Program (through LIHEAP), Crisis Intervention Program (CIP), and Urgent Repair Programs. Evaluation, measurement, and verification (EM&V) can be done on these data to measure program efficacy and incentivize increased utility funding and third-party investment.

### Specific Actions for Implementation and Key Participants

DEQ and/or DHHS could implement this proposal by working with service providers and utilities. Duke Energy's EE Collaborative as well as a Low-Income EE Collaborative has been discussing this issue and could provide an important venue during implementation. The most difficult aspect of implementation is setting up the database sharing tools and securing the shared data agreements and ensuring the quality of input and tracked data.

### Alignment with Other Recommendations/Objectives and Prerequisites

No legislative regulatory action is required. This recommendation should be done in partnership with Recommendation 10 (Project management coordination for EE, Urgent Repair, and Weatherization).

## **RECOMMENDATION 12: Create an Energy Efficiency "Technical Assistance" Entity**

### Current State of Play in NC

Municipal electric utilities and electric membership co-operatives provide electricity and services to their 1.7 million customers across 93 counties. While many of these utilities offer EE programs—including, for instance, the North Carolina Electric Membership Corporation (NCEMC), EnergyUnited, and Halifax EMC—others do not. Among the utilities that do offer their own EE programs, there are varying degrees of efficacy and impact. A program, GreenCo Solutions, was established in 2008 by the NC Electric Cooperatives to aggregate energy efficiency and renewable energy programs for compliance with REPS.<sup>28</sup> NCEMS still offers this service to its co-ops for REPS compliance and could be an option for administering the expanded EE technical assistance services outlined below.

### Summary of Recommendation

This recommendation establishes an "EE Technical Assistance" Entity. This distinct entity would assist NC municipal utilities, electric cooperatives and state agencies with developing EE customer programs, negotiating contracts and using EE to comply with NC's Renewable Energy and Energy Efficiency Portfolio Standard (REPS). Assistance is provided on a voluntary, à la carte, basis, and could offer the following services:

- Assistance with EE program evaluation and design;
- Development of marketing programs;
- Assistance with the development of customer financing options, including access to a loss reserve fund (see Recommendations 18 and 19);

<sup>28</sup> See "NC Electric Cooperatives Launch New Company: GreenCo Solutions, Inc.," May 12, 2008. <https://www.ncelectriccooperatives.com/who-we-are/spotlight/nc-electric-cooperatives-launch-new-company-greenco-solutions-inc/>.

- Assistance with grant and loan applications;
- Aggregated EM&V services;
- REC compliance services;
- State agency coordination with community action committees (CACs);
- Coordination of energy audits;
- Standardized forms and intake processes management;
- Supporting EE program cost-effectiveness decision-making;
- Other EE program technical assistance as necessary.

### Background

Smaller utilities often lack funding resources, staff capacity, marketing material, subject matter expertise, project management, program evaluation, and data analytics necessary to launch, manage, and scale a customer EE program. In addition, the measurement and verification of EE for compliance with REPS is often costly to a small cooperative or municipal utility. Aggregating the EM&V for programs could reduce this cost and enable more EE compliance with REPS.

On a voluntary, à la carte basis, an EE Technical Assistance entity could provide technical assistance and support services along the EE program continuum as needed, from design and marketing, to cost-effective EM&V of EE savings. This entity would provide necessary assistance that would enable these small utilities to begin offering, or expand current, EE programs to their customers as well as reduce the cost of EM&V and increase each utility's ability to use EE Certificates (EECs) to comply with NC REPS.

### Specific Actions for Implementation and Key Participants

The lead implementation organization would be the EE Technical Assistance Entity. Some initial support to identify and hire the right organizational leader for this entity may be necessary, possibly with oversight from the Energy Efficiency Advisory Council (Recommendation 9).

### Alignment with Other Recommendations/Objectives and Prerequisites

No legislative action is required to start the EE Technical Assistance Entity. However, legislative action could be useful to establishing the entity and could also be useful in allocating initial or continuous funds to this organization. Implementation may be easier if funding is raised through private sources such as foundations, rather than through legislative appropriation.

The EE Technical Assistance Entity is not a prerequisite for any other recommendations, but it is invaluable if the state would like to see EE programs offered statewide to customers in rural or municipal service areas or if a voluntary or mandatory EE portfolio standard or target is established for all utilities in the state (Recommendations 25 and 26).

## **RECOMMENDATION 13: Match Energy Efficiency Opportunities to Unique Sector Needs**

### Current State of Play in NC

There are many existing EE programs in North Carolina, and yet some sectors—including agricultural and multifamily housing—are underserved by these programs. Some existing dynamic incentive programs, such as Duke Energy Design Assistance program, cannot serve multifamily developments due to metering eligibility requirements. Other programs have payback schedules that do not match a sector's situation, or application periods that do not align with complementary funding sources.

### Summary of Recommendation

EE rebates, incentives, and other program offerings need to better address underserved and disproportionately energy-burdened sectors with a priority focus on low-income, multifamily, and mobile homes as well as the agricultural sector. Other sectors and populations need similar aligned programs to better serve houses of worship, military populations, rural customers, small businesses, and some industrial customers. These focused programs (utility and nonutility) need

to be low cost and should seek to better leverage partnerships with existing programs and funders serving these targeted communities.

### Background

The intent of this recommendation is to advance more robust EE programs and opportunities to better address and serve priority sectors that may not only be underserved markets but, most importantly, address sectors with a disproportion energy burden (especially residential low income). Some existing utility EE programs could be tailored to be a “better fit” to address the target markets of agriculture, multifamily, mobile homes, military populations, and houses of worship, and others including small businesses and some industrial customers that are unable to take advantage of utility-offered programs due to the high cost of opting-in to the EE Rider.

For example, many low-income North Carolinians (up to 30 percent of utility customers in some counties) reside in mobile homes, especially in rural areas. Mobile homes have disproportionately high energy usage due to poor envelope insulation and electric heating, estimated as two to three times as energy intensive as site-built homes. Mobile homes typically use the most energy during peak demand periods in summer and winter contributing to the need for bringing peaker plants online. Financing/assistance programs usually have lower lending limits for mobile homes and challenges for investing in improvements for structures with short remaining life spans. A mobile home EE program could consider ways to expand the breadth of both regulated and nonregulated programs to address energy-related health and safety needs as part of the EE program offering.

As another example, the agriculture sector is not only historically underserved by energy efficiency programs, but they bear a disproportionate share of climate change burdens and climate impact vulnerabilities as their livelihoods are directly dependent on climate and weather. Extreme weather events and a shift in the average temperature per season impacts both crop and livestock farms.

Fifty percent of low-income populations in North Carolina reside in multifamily residences. However, many developers may not be taking full advantage of existing EE incentive programs in this sector. Opportunities exist to better align multifamily utility EE incentives with new NC Housing Finance Agency projects and their refinancing cycles, and to seek out complementary funding such as US Department of Agriculture (USDA), state weatherization and other nonregulated sources.

Other unique opportunities exist for targeted sectors including Heat Pump Water Heater programs for low-income households (see Recommendation 16) and Strategic Energy Management programs for small industrials.

### Specific Actions for Implementation and Key Participants

While utilities will play a major role, the NCUC or other statewide oversight may be required to reach new sectors. The state/utilities will need to include subject matter experts with specific expertise in serving certain underserved populations. Time will be needed to structure the procurement of these services and determine the most efficient way to roll out the outreach. Stakeholders would involve utilities, multifamily developers, NC Housing Finance Agency, State Energy Office–Weatherization, USDA, Community Action Agencies and related nonprofits, nonregulated funding partners, consultants, and others.

The Duke Energy EE Collaborative regularly meets to discuss new program ideas and could be used to discuss the needs of the underserved markets. Similarly, DEQ holds quarterly residential EE meetings with representation from NC IOUs, co-ops, and municipal utilities.

### Alignment with Other Recommendations/Objectives and Prerequisites

To truly impact underserved communities, customers of rural electric cooperatives will need equitable participation with their counterparts in IOU territory. Legislative action may be needed to require greater participation/funding strategies from RECs or broader value propositions which include peak demand reduction benefits and utilize value weight/pricing for other externalities in program economic justifications. See Recommendation 12 (EE Technical Assistance Entity to assist electric cooperatives and municipal utilities) and Recommendation 25 (mandatory EE Resource Standard).

## ***RECOMMENDATION 14: Evaluate the Inclusion of New Criteria for Energy Efficiency Program Approval Process at North Carolina Utilities Commission***

### **Current State of Play in NC**

Currently the NCUC utilizes a number of cost-effectiveness tests in the approval process of DSM and EE programs offered by IOUs. These tests can include Participant Cost Test, Utility Cost Test, Ratepayer Impact Measure Test, and Total Resource Cost tests. Some individual EE program proposed by IOUs may not pass the above cost-effectiveness tests, but the NCUC can approve these programs as part of a portfolio of programs that does meet cost-effectiveness test in the aggregate. Today, Duke Energy has designated about 10 percent of its EE program portfolio to targeted low-income sectors. These special low-income EE programs include equity criteria, however all programs and sectors will benefit by adding equity criteria to new program filings.

### **Summary of Recommendation**

Evaluate the inclusion of new program filing review criteria, which addresses equity, accessibility and inclusiveness (among all applicable social, economic, demographic, or geographic groups), as part of new EE program reviews by the NCUC and the energy-efficiency program filing and approval process.

### **Background**

Including additional EE program evaluation criteria would ensure that customer equity, accessibility and inclusiveness is considered when a new EE/DSM program is filed/approved with the NCUC. By including climate equity criteria in the EE Program filing process, new programs can be better designed to address these issues for the particular sector focus of the new program.

### **Specific Actions for Implementation and Key Participants**

The NCUC would be the lead implementing organization. This recommendation requires much more research, evaluation, and consideration on the necessity of new review criteria and the potential outcomes and consequences of implementing these criteria for EE or perhaps other NCUC filings. This would be a statewide initiative overseen by the NCUC for IOUs, the results of which could have application to other EE program considerations in cooperative, municipal, and nonelectric energy suppliers. The development of criteria should involve a diverse set of stakeholders. These new review criteria would be applied to new EE programs in all sectors, residential, commercial, and industrial.

### **Alignment with Other Recommendations/Objectives and Prerequisites**

The recommendation is viewed as an expansion of existing policy and processes. Legislative action is not required. This recommendation could possibly be rolled up into the cost-effectiveness discussion (Recommendation 24).

## ***RECOMMENDATION 15: Utilize Demand Side Management Utility Savings for Low-Income Energy Efficiency Programs***

### **Current State of Play in NC**

In 2014, the North Carolina legislature directed electric power suppliers to [implement programs for demand-side management and energy efficiency](#). Electric Membership Corporations and municipalities can rely on the efforts of the IOUs that they purchase power from, to meet their obligation under this law. These programs have not focused on low-income residences.

### **Summary of Recommendation**

Utilize demand response and load-control utility savings to fund EE improvements to reduce peak demand and overall energy consumption at low-income single and multifamily residences that are identified through meter data as having disproportionately high contribution to peak. This approach creates an alternative source of funding from utilities to address low-income access to EE improvements. The approach can be applied statewide with best applications to rural cooperatives and municipal providers.

### **Background**

For many EMCs and municipal utilities, charges for coincident peak demand represent a significant portion of their wholesale power cost. Utilizing low-income EE programs to reduce the energy use intensity of older construction and mobile homes offers an opportunity to save significantly on demand charges. Few, if any, programs currently use EE

improvements to low-income housing as a DSM strategy. Using EE retrofit projects for low-income residents as a DSM tool would require a significant number of completed projects to reduce peak demand. However, the demand reduction would be semi-permanent and not require any control signal or communication to a device in the home like a thermostat or load switch. A smart thermostat could be added as part of any retrofit project to augment the demand reduction impact. EE measures in these sectors would increase the resiliency and economic security of these residents.

#### Specific Actions for Implementation and Key Participants

Much of the program cost and support would access existing DSM/EE and load control utility budgets but could also leverage the work and support of other energy project service providers, such as weatherization programs assisting the low-income sector. Additional utility staff could be required to oversee project design, delivery, and completion schedules and ensure quality of work, also for contractor management and performing M&V. Ongoing program administration and M&V costs would be borne by the utility using EE as a DSM tool. Costs can be offset by satisfying EE REPS requirements. Utilities would need to pilot program first to understand how much impact EE improvements would have as DSM tool before allocating significant budget to projects.

#### Alignment with Other Recommendations/Objectives and Prerequisites

Legislative action is not required for implementation. If IOUs engage this strategy, Public Utility Commission approval will be required.

### **RECOMMENDATION 16: Develop a Heat Pump Water Heater Rental Program**

#### Summary of Recommendation

Deploy “smart” equipped Heat Pump Water Heaters (HPWH) as an EE and DSM tool targeted in low- to moderate-income communities (LMI) through the use of a utility-sponsored equipment rental program. The reduction in the upfront cost of the equipment would dramatically increase the adoption of HPWH in LMI communities helping each household significantly reduce energy use for heating water resulting in savings to the resident. In addition, by using HPWH as deployable DSM to shift loads off peak through thermal storage, additional utility cost savings and/or funding for LMI programs could be realized. See Recommendation 15 for how these savings could be used.

#### Background

Water heating consumes approximately 12 percent of residential energy use (ACEEE). Other jurisdictions and utilities have started to utilize HPWH to lower energy use and shift demand through thermal storage to off peak periods. Some utilities (such as [NB Power](#) in Canada) have developed equipment rental programs, enabling LMI communities to gain access to the more advanced technology with no upfront cost. To reduce costs, utilities can take advantage of bulk purchasing. During the rental period, HPWH are maintained by the utility creating additional income streams while reducing loads to off peak.

#### Specific Actions for Implementation and Key Participants

Advocates for low income communities could work with utility providers to design and implement a program. HPWH rental programs could be instituted immediately in rural electric cooperatives territories that already have deployed smart meters. For IOUs, the program would need to be approved by the NC Utilities Commission.

#### Alignment with Other Recommendations/Objectives and Prerequisites

No legislative action is required. Depending on program design and participants, utility commission may have to be involved. This recommendation should be included as part of Recommendation 13—new programs to address needs of underserved markets.

### **RECOMMENDATION 17: Increase Funding to North Carolina Housing Trust Fund**

#### Current State of Play in NC

The NC HTF was created by the General Assembly in 1987 and is administered by the North Carolina Housing Finance Agency. It is North Carolina’s most flexible resource for the state’s growing and complex affordable housing need. The HTF leverages private funding to support homeownership, rental, supportive housing, new construction, rehabilitation, and emergency repairs. Regulations controlling rents ensure that rental units remain affordable and strict building requirements ensure properties are energy-efficient.

## Summary of Recommendation

The NC HTF is the most effective vehicle to create affordable housing that is energy-efficient for North Carolina's low income and energy burdened communities, and those living in inefficient manufactured homes. It has a long history of creating high-quality multi- and single-family affordable housing opportunities for low-income communities across all of North Carolina. By investing in the HTF, the state can meet many of the challenges of energy efficiency in low-income communities while also creating jobs and new opportunities that healthy housing provides.

## Background

In North Carolina, there is a tremendous lack of affordable, safe, energy efficient housing leaving thousands of people living in sub-standard housing conditions. Yet with limited dollars, the HTF has worked to improve the situation. Through 2017, the HTF has created over 34,000 housing units and supported 22,000 jobs across North Carolina.<sup>29</sup> For every \$1 million that the Housing Trust Fund spends:

- 108 households are assisted;
- \$5,169,000 in affordable housing real estate value is generated;
- 110 jobs are supported; and
- \$455,000 in state and local revenue is generated.

## Specific Actions for Implementation and Key Participants

This recommendation can be implemented through investments from private or public sources but will most likely require legislative action.

## Alignment with Other Recommendations/Objectives and Prerequisites

This recommendation should be done in coordination with the development of new programs to meet the needs of underserved markets (Recommendation 13).

## **RECOMMENDATION 18: Create a North Carolina–Based Clean Energy Fund**

### Current State of Play in NC

North Carolina and its lending institutions have made efforts over the years to align financing with market demand to increase access to energy efficiency and/or clean energy for the private sector as well as low- and moderate-income consumers. Nevertheless, funding and favorable financing terms remain an obstacle to further uptake, particularly in hard to reach sectors.

## Summary of Recommendation

A NC-based Clean Energy Fund should be established to issue loans, provide credit enhancements, and invest in projects to promote energy efficiency, energy conservation, and a reduction in energy consumption to the benefit of North Carolina businesses, congregations, nonprofits, and consumers. Following examples of states like Colorado and Nevada, an independent nonprofit organization could be created to administer the program. Alternatively, enabling legislation could establish a public purpose “Green Bank” which could be administered by a third-party administrator or government agency.

## Background

In other states, a dedicated Clean Energy Fund or Green Bank has been successful in filling gaps in the EE and clean energy market, particularly those sectors that are hard to reach.

In 2017, the Nevada General Assembly directed the Governor's Office of Energy to establish an independent, nonprofit corporation as the Nevada Clean Energy Fund, to support qualified clean energy projects. In 2018, the Colorado Governor's office announced the creation of the Colorado Clean Energy Fund, a nonprofit organization leveraging private investment in clean energy projects like community solar and energy efficiency, including a focus on the low-income and multifamily sectors. While both Clean Energy Funds were created as private nonprofits, their funding models draw on the success of public Green Bank institutions in other states such as NY Green Bank and Connecticut Green Bank.

<sup>29</sup> North Carolina Housing Trust Fund web site, accessed 8/4/19. <https://nchousing.org/policy-advocacy/north-carolina-housing-trust-fund/>.

Initial seed funding of a NC Clean Energy Fund could come from a variety of different sources including public funds and private foundations. In addition, public capital can be leveraged via a loan loss reserve or other credit enhancement to attract private capital or the capital of CDFI's, private foundations and other public purpose lenders in NC, reducing risk to private lenders and inducing participation in the energy efficiency marketplace. Ongoing capitalization for existing Clean Energy Funds and Green Banks has come from interest earned from a founding allocation, regional cap and trade programs, public benefit charges, and savings from peak load demand realized through the use of energy efficiency/demand-side management (Recommendation 15).<sup>30</sup>

### Specific Actions for Implementation and Key Participants

While the Clean Energy Fund can be established by the Governor's office or the state legislature, it is best implemented by a third-party nonprofit organization. This organization can be staffed with one or two full-time employees but would also require an advisory board to provide technical and financial guidance. If established as a nonprofit organization, implementation of the Fund would be easier and feasible over a shorter timeline than if legislative action is needed.

### Alignment with Other Recommendations/Objectives and Prerequisites

There are two possible paths: one requires establishing a nonprofit fund and providing adequate start-up funding; the second requires enabling legislation and appropriations from state budgets to create a public fund. The team recommends following the nonprofit path first. Regulatory approval is not needed unless funding is provided based on rates or targeted investor-utility programs like voluntary round-up the bill.

A North Carolina Clean Energy Fund would fill gaps in residential and commercial EE and clean energy lending in NC, relying on Recommendation 13 to assess the financing need.

## **RECOMMENDATION 19: Support Expanded Access to Creative Utility Financing Programs**

*Note: While the intent of this recommendation is to be highly flexible, adaptive, and not prescriptive, some aspects of this recommendation did not have support of every team member. On-bill financing did not have support of IOU representatives due to debt burden that would be carried by the IOU, utilities are not set up to be banks or lending institutions, the administrative set up would be costly, and partial payment issues. "Pay as you save" models were not supported by our team's EMC representative due to the perceived risk potential for underperformance.*

### State of Play in NC

Roanoke Electric Cooperative has an on-bill tariff program where LED lighting, insulation, duct sealing, heat pumps, and other energy efficiency improvements are provided by the EMC and then paid for over time through energy savings on the customer's bill. As of January 2019, the "Upgrade to Save" program had invested \$2.9 million in up-front costs for EE upgrades in coop member homes and businesses. Similar "Pay As You Save" (PAYS) programs in East Kentucky and Arkansas have improved EE implementation rates in low- to moderate-income sectors. To increase the use of these on-bill programs, utilities need clarifying authority, performance data, and loss protection to develop robust programs for rate payers, constituents, and members.

### Summary of Recommendation

Improve the effectiveness and accessibility of creative EE financing programs to serve multiple sectors. Enact state policies which promote and support PAYS, or reasonable repayment EE programs financed through on-bill tariffs or third-party partners.

### Background

Ease of project identification, delivery, and financing are major barriers to EE project adoption, especially in areas and sectors served by electric membership cooperatives and municipal electric suppliers that have fewer rebates and incentives for EE programs. Utilization rates of EE programs are lower when financing and repayment programs are complicated or handled through nonintegrated third-party providers. If North Carolina and its communities want to significantly advance EE project implementation with an equity focus, they should encourage novel project financing and delivery

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<sup>30</sup> For additional detail on the design of a green bank, please see the Nicholas Institute primer, "[Beyond Financing: A Guide to Green Bank Design in the Southeast.](#)"

models to be explored, piloted, and implemented across all electric utility providers and nonelectric energy providers in North Carolina.

As Tariff On-Bill/PAYS models do not require qualifying for debt, this type of program shows the greatest potential to be made widely available in the residential and commercial sectors. Roanoke Electric Cooperative's pioneer program could be expanded across other utilities if other utilities were assured of their authority to offer similar programs, offered research on the performance of Roanoke's and others PAYS programs, connected to experienced third-party service providers, and provided some loss protection to create an additional incentive for the development of such a program.

#### **Specific Actions for Implementation and Key Participants**

Such novel finance programs would be led by the serving utility in partnership with direct install contractors and other financial partner stakeholders. To implement PAYS broadly, a lead entity could be commissioned to build a network of utility professionals, EE practitioners, researcher university staff, third-party on-bill administrators, and equitable access advocates, to share implementation research and best practices, and to document basic implementation steps and risk mitigation strategies for municipal, cooperative, and investor-owned utilities. Utilities may require additional on-bill financing administration staff or close partnership with third-party contactors/financing agencies including, perhaps, a statewide entity like an EE Technical Assistance Entity (Recommendation 12).

A state Clean Energy Fund or Green Bank (Recommendation 18) could complement this recommendation, offering start-up funding or a loss reserve for utility on-bill programs.

#### **Alignment with Other Recommendations/Objectives and Prerequisites**

Legislative action is not needed to advance these finance offerings. However, if the legislature wanted to incentivize the development of programs, establishing a startup loss reserve and/or a revolving loan fund could greatly speed the expansion of programs across multiple utilities. The legislature could also clarify utility authority to develop programs.

### ***RECOMMENDATION 20: Allow Flexible North Carolina Agency Funding for Energy Efficiency Projects***

#### **Current State of Play in NC**

In 2010, the North Carolina legislature passed [HB 1292](#), allowing the UNC system to carry forward any energy savings it realized from EE investments into future fiscal years, and requiring 60 percent of those savings to be used for additional conservation measures. By contrast, NC state agencies have minimal access to EE funding through traditional appropriated means; additionally, if EE measures are implemented, the Office of State Budget and Management (OSBM) will typically reduce future utility appropriations to reflect energy savings. This can disincentivize an agency from seeking EE measures.

Meanwhile and perhaps as a result, funding sources for state agency energy efficiency projects are available but underutilized; for instance, the well-established Energy Savings Performance Contracting (ESPC) process. These types of financing mechanisms could be used more aggressively as they are not counted against the state's borrowing limits.

#### **Summary of Recommendation**

EO80 sets a goal for North Carolina state-owned buildings to reduce energy consumption per sq. ft by at least 40 percent from 2002–2003 levels by 2025. The two most significant barriers to achieving this goal are EE project funding and EE project management. This recommendation focuses on these barriers and recommends several potential solutions:

- (1) Allow NC Agencies to carry an EE reserve fund
- (2) Allow for annual OSBM increases that reflect known utility rate increases
- (3) Allow utility savings realized by NC agencies to remain available to the agency for additional EE projects similar to legislation for the UNC system<sup>31</sup>
- (4) Provide funding for agencies to hire project management staff for energy efficiency project implementation

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<sup>31</sup> A bill was filed in the NC House on April 16, 2019, that would enable state agencies to retain energy savings realized from EE and water improvements. HB-828. <https://www.ncleg.gov/BillLookUp/2019/H828>.

- (5) Allow agencies to use utility opt-out savings to hire EE PM staff and to fund EE projects
- (6) Develop better and more widespread use of the ESPC process, P3, Design-Build-Own-Operate (DBO), and energy-as-a-service contracts.

### Background

North Carolina agencies consume over \$100M in utilities annually. Much of this energy, over 50 percent in many cases, is wasted and could be conserved if appropriate and widespread EE measures were implemented. Some agencies operate their facilities 24/7 even when there are no occupants in the facilities up to 70 percent of the time.

Additional potential funding sources exist including ESPC, utility rebates, utility opt-out privileges, P3, DBOOM projects, energy-as-a-service contracts, and energy related grants. These types of financing mechanisms are not counted against the State's borrowing limits as they are either guaranteed and backed by NC Treasury–approved investment-grade financial instruments or the assets are owned by a private entity. Where private financing is required, state mandated approvals are required including OSBM, Treasury, and NC Council of State.

Barriers to more effective EE implementation include:

- (1) Lack of EE project funding sources and alternatives
- (2) Negative EE incentives including agency utility budget reductions when EE measures are implemented and utility expenses decrease
- (3) Lack of agency project management staff to manage and implement EE projects
- (4) Lack of a state Clean Energy Fund/Green Bank to fund smaller (<\$1M) EE projects
- (5) Uncertainty over the longevity of agency facilities. Old and crumbling facilities and infrastructure with significant maintenance issues are causing some agencies to defer EE investments. Many underutilized and/or nonutilized agency facilities remain open and are consuming significant energy and other resources.
- (6) Lack of agency understanding or uncertainty related to the ESPC process and/or previous ESPC outcomes where the ESPC project was mismanaged by the Agency and/or the Energy Services Company (ESCO).
- (7) Lack of other NC approved or advocated alternative EE financing mechanisms

### Specific Actions for Implementation and Key Participants

NCDEQ, OSBM, Treasury, legislators, agencies, governor's office, and other stakeholders and authorities would lead these initiatives. Funding requirements for any required legislation would be minimal. Most agency EE projects that are implemented would save NC significant dollars in the medium and long term and even some in the short term, depending on the cost/savings of the implemented EE measure(s).

### Alignment with Other Recommendations/Objectives and Prerequisites

- (1) Allow NC agencies to carry an EE reserve fund—Legislative action likely required.
- (2) Allow for annual OSBM increases that reflect known utility rate increases—Legislative action likely not required and handled by OSBM.
- (3) Allow utility savings realized by NC agencies to remain available to the agency for additional EE projects similar to legislation enabled by H1292-2010 for the UNC system—Legislative action likely required possibly similar to HB:1292-2010.
- (4) Provide funding for agencies to hire PM staff for energy efficiency project execution—Legislative action likely not required and likely handled by OSBM.
- (5) Allow agencies to use utility opt out savings to hire EE PM staff and to fund EE projects—Legislative action possibly required.

- (6) Better and more widespread use of the ESPC process—Legislative action would not be required to accelerate the use of ESPC’s as legislation already exists. ESPC operates presently under a \$500M cap that may need to be raised in the future if the program experiences significantly increased activity.
- (7) Establish a Green Bank in NC for small <\$1M projects—Legislative action might be required but could also be done through a third party. See Recommendation 18.

Typical EE project savings for state agencies are in the 25–30 percent savings range. NC Museum of Art experienced 60 percent utility savings over the 12-year term (financing recently 100 percent paid). Average electricity savings are in the 50–55 percent range.

## **RECOMMENDATION 21: Standardize Energy Efficiency Metrics and Reporting Practices in State Buildings**

### Current State of Play in NC

EO80 sets a goal for state-owned buildings to reduce energy use per sq. ft by 40 percent from 2002–2003 levels by 2025 (Goal 3). In March 2019, [HB 330](#) passed the North Carolina House. If enacted, it would require compliance with Goal 3, and annual progress reports.

### Summary of Recommendation

Standardize what and how energy information is reported, including factors beyond energy consumption and current measures implemented, to determine life-cycle cost and the benefit of energy efficiency projects in light of EO80 Goal 3. Potentially include these costs and benefits with the online data repository (Recommendation 31).

### Background

One of the many challenges in tracking the energy and non-energy benefits associated with energy efficiency projects is the variance between what is tracked, how it is tracked, and what is reported, which has also been cited by other formal working groups including the Southeast Energy Innovation Collaborative.<sup>32</sup> Currently in North Carolina there is no centralized tracking database and no universally recognized standard for the public or private sector to follow. Instead, there are numerous reporting platforms, requiring different inputs, and reporting results in incompatible formats. Coordinated standards development requires state initiation, if not ongoing leadership.

A standardization pilot for state-owned building data will support EO80 Goal 3 directly, while allowing local governments and private entities to adopt these standards on a voluntary basis. This program’s scope could expand to all interested energy consumers after initial testing, because scaling should have little-to-no additional cost if the reporting/database/analysis is automated. To measure the correlation between EE and economic development, a proposed standard should consider the collection of additional information including but not limited to:

- (1) Changes in consumer energy cost
- (2) Changes to revenues received by individuals and businesses
- (3) Revenue recovery payments
- (4) Incentive payments to participants (or program implementers if applicable)
- (5) Changes to gross state product
- (6) Number of Full Time Equivalent employees
- (7) Characteristics of the Labor Force (degrees, urban vs. rural, income levels, etc.)

### Specific Actions for Implementation and Key Participants

Establishing a stakeholder working group to develop a uniform tracking and reporting framework (e.g., what information is reported) could begin immediately, likely without budgetary adjustment. However, more research and stakeholder engagement will be required to finalize a universal reporting standard and database, ideally with funding in the next

<sup>32</sup> Doctor, D., D. Kaiser, and J. Hardin. 2019. *The Pathway to Southeast Energy Innovation Leadership: Policy Recommendations from the Southeast Energy Innovation Collaborative*. Raleigh, North Carolina: The North Carolina Department of Commerce.

fiscal year. It may be cost-effective to expand the existing UNC system reporting platform. If that platform is insufficient, a *de novo* system will increase both funding needs and the expected implementation horizon. A significant reduction in state-owned building energy cost could offset what otherwise would necessitate taxpayer funding once the program is in place. The implementing/oversight agency—most likely NC DEQ—would need additional staff to manage UNC system expansion or a new program.

Though state-owned building managers will pilot this program, it is essential to have private industry stakeholders participate in initial development. NC DEQ is the default facilitator for coordinating Public Staff/NCUC, utilities, energy managers (public and private), and the Department of Commerce to develop the reporting standard(s). Both the ease and speed of the implementation is dependent upon the staff capacity and budget at NC DEQ (or whichever organization leads). After initial standardization and reporting system modification/development, state building operators will need to set the example through participation, hopefully building interest with other, voluntary participants.

#### Alignment with Other Recommendations/Objectives and Prerequisites

Standardized reporting should be introduced as a requirement for state-owned buildings and encouraged for other public and private buildings. Due to the voluntary nature of this program, legislative action requiring compliance with Goal 3 would support implementation and improve the program. Prior to pursuing a universal standardized tracking protocol—that is, before private stakeholders are included—state agencies (NC DEQ, Commerce, NCUC Public Staff, DOI) should be given the opportunity to communicate recommendations for included reporting items. Tracking should be coordinated with the data repository developed under Recommendation 31. This recommendation is also consistent with Recommendation 4.1 from the Southeast Energy Innovation Collaborative.<sup>33</sup>

### **RECOMMENDATION 22: Establish Fuel-Neutral Statewide Energy Efficiency Fund to Address Energy Burden and Equity Concerns**

*Note: The team did not reach a collective consensus on this recommendation.*

#### Current State of Play in NC

As noted in Recommendation 15, in 2014, the North Carolina General Assembly directed electric power suppliers to **implement programs for demand-side management and energy efficiency**. Electric Membership Corporations and municipalities can rely on the efforts of the IOUs that they purchase power from, to meet their obligation under this law. In addition, the legislature authorized a bill rider to cover “all reasonable and prudent costs” related to demand-side management and energy efficiency. Industrial customers are able to opt out of the program, meaning that they neither have to pay the rider nor are able to access the programs funded through the rider.

#### Summary of Recommendation

Implement a fuel source-neutral rider for all carbon-based energy. A statewide nonutility/energy provider would collect the rider for all carbon-based fuels, assessed per a standardized metric (e.g., MMBtu, tons CO<sub>2</sub>e). Energy burden would be based on total carbon-fueled energy consumption, not a specific fuel or energy provider, resulting in a more equitable system than the current rider. This could be used as a source of funding for a Clean Energy Fund (Recommendation 18).

#### Background

This recommendation would broaden the existing IOU DSM/EE rider to include all fuels and all utilities, giving an opportunity for more customers and utilities to participate in efficiency innovation. By allowing energy burden to be determined by total energy consumption, not electricity only, all energy customers, including low income rate-payers, could share the opportunity for savings. An energy efficiency fund, possibly a part of a larger state clean energy fund (see Recommendation 18), also presents the opportunity to develop programs that are applicable statewide and not specific to a limited utility territory.

#### Specific Actions for Implementation and Key Participants

The Department of Commerce, in partnership with NC DEQ, NCUC, and in-scope energy providers, would lead this collaborative effort. A third party could manage collection and distribution of funds, if the Department of Commerce lacks the capacity or statutory authority.

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<sup>33</sup> See previous reference.

### Alignment with Other Recommendations/Objectives and Prerequisites

Stakeholder recruitment and initial discussion can begin immediately, in partnership with discussions around a state Clean Energy Fund (Recommendation 18). Legislative action may be required to empower the Utilities Commission to provide additional scope and flexibility to energy providers.

## **RECOMMENDATION 23: Include Valuation of Non-Energy Benefits in Energy Efficiency Investments**

### Current State of Play in NC

A regulated utility must secure approval from the North Carolina Utilities Commission to pass on the costs of a demand-side management or energy efficiency program. North Carolina regulators use the “total resource cost” (TRC) test as the primary test for evaluating these programs. This test considers whether total costs of energy will decrease in the utility’s service territory as a result of the program.

### Summary of Recommendation

Develop methodology to calculate benefits to public health (via air and water quality), economic development, environmental health (GHG emission reduction, air, and water quality), and increased property value and reduced tenant turnover for energy efficiency investments at the utility scale and at the building level. This methodology should be developed prior to the cost-effectiveness testing analysis (Recommendation 24).

### Background

While EE evaluation in North Carolina today is limited to an analysis of direct energy cost savings (primarily from reduced electricity use), reductions in energy use have additional co-benefits in healthcare and property values. Other states, for instance, have valued carbon reduction. Recognizing and standardizing the valuation of non-energy benefits can improve societal good. All stakeholders could benefit from this more realistic valuation.

### Specific Actions for Implementation and Key Participants

This recommendation only recognizes the need; it does not propose a solution. A working group should be developed to include a diverse group of stakeholders to work toward consensus valuation standards and procedures for the state. The organizational lead for this effort could be housed at NC DEQ, a special appointment from the governor’s office, or at the NCUC. Utilities, regulators, and stakeholders from healthcare, real estate, efficiency advocates, and public interest representatives will be required. Although this is not an easy task, it provides the opportunity to limit wasted resources and properly value energy savings could transform the efficiency business sector, generating economic development as well as avoided (currently externalized) cost.

### Alignment with Other Recommendations/Objectives and Prerequisites

Support from the NCGA is required to empower the NCUC to consider proper evaluation of non-energy benefits. The NCUC and the Public Staff will need to participate in evaluation of avoided cost, while the Commission will ultimately be required to consider how utility compensation integrates with non-energy cost savings. This analysis should be done prior to the cost-effectiveness study outlined in Recommendation 24.

## **RECOMMENDATION 24: Commence a NCUC Study on Cost-Effectiveness Testing**

### Current State of Play in NC

As noted in Recommendation 23, regulated utility must secure approval from the North Carolina Utilities Commission to pass on the costs of a demand-side management or energy efficiency program. North Carolina regulators use the “total resource cost” (TRC) test as the primary test for evaluating these programs. This test considers whether total costs of energy will decrease in the utility’s service territory as a result of the program.

### Summary of Recommendation

The NCUC should select a consultant to analyze opportunities to improve EE program participation using current or new cost-effectiveness testing regulations and protocols, in support of the Governor’s EO80 and the Clean Energy Plan. The study could follow the template of past studies assessing the renewable energy portfolio standard (La Capra, 2006) and energy storage (NC State, 2018). For instance, a report might evaluate the National Standard Practice Manual (NSPM) as a tool for assessing cost-effectiveness of energy efficiency resources to help solidify the policy goals and targets set forth by the General Assembly.

## Background

Currently, there is a lack of participation and engagement within energy efficiency programs across all sectors. In the commercial and industrial sectors, for instance, the utility-based programs do not incentivize participation among customers due to the high cost of opting-in to those programs. In other cases, the utilities are unable to offer programs to certain sectors (i.e., residential) due to their inability to surpass the cost-effectiveness hurdle. Therefore, many customers are often unable to take advantage of the benefits that EE measures can offer. By advocating for a broader analysis of cost-effectiveness conducted by a third party, we can begin to quantify and qualify all of the benefits of energy efficiency utility programs, proving the viability of policy-driven goals.

Updates to North Carolina's current cost-effectiveness testing rules and protocols may incorporate additional benefits that support improved equity of efficiency programs. A program such as the National Standard Practice Manual would help identify the following gaps:

- (1) Recognize that energy efficiency is a valued resource.
- (2) Account for applicable policy goals.
- (3) Account for all relevant costs & benefits, even if hard-to-quantify impacts.
- (4) Ensure symmetry across all relevant costs/benefits.
- (5) Conduct a forward-looking, long-term analysis to capture incremental impacts of EE.
- (6) Ensure transparency in presenting analysis and the results.

Arkansas began a NSPM study in 2017; the [case study](#) was filed one year later.

## Specific Actions for Implementation and Key Participants

NCUC would provide access to information, oversee the research, and subsequently report out to the regulated utilities and stakeholders. The study could be conducted by a third-party provider, with heavy involvement by staff from NC DEQ as well as the NCUC and the Public Staff. Additionally, it would be beneficial to incorporate a diverse set of stakeholders to review the process and provide input on the results.

## Alignment with Other Recommendations/Objectives and Prerequisites

NCUC action may be initiated in response to a petition filing, as part of a current or future docket, or enactment of legislation. This effort should follow the analysis of non-energy benefits outlined in Recommendation 23.

## **RECOMMENDATION 25: Develop a Mandatory Energy Efficiency Resource Standard**

*Note: The team did not reach a collective consensus on this recommendation. Specifically, representatives from CUCA, Dominion Energy, and Duke Energy abstained from participating on this recommendation and oppose it.*

## Current State of Play in NC

In 2007, the North Carolina legislature passed [Senate Bill 3](#), becoming the first Southeastern state to adopt a Renewable Energy and Energy Efficiency Portfolio Standard (REPS). The REPS allows energy efficiency measures to be used for meeting a portion of the purchase requirements. The use of EE measures varies by year and by utility type:

- *Investor-owned utilities*: 12.5 percent renewable energy (as percentage of retail sales) by 2021. EE measures can be used to meet up to 25 percent of this requirement, and up to 40 percent after 2021.
- *Electric cooperatives, municipal utilities*: 10 percent renewable energy by 2018, and there is no limit on the amount that may be met through EE.

REPS defines “Energy efficiency measure” as an equipment, physical, or program change implemented after January 1, 2007, that results in less energy used to perform the same function. “Energy efficiency measure” includes energy produced from a combined heat and power system that uses nonrenewable energy resources; the term does not include demand-side management.

## Summary of Recommendation

Separate from the existing REPS, develop a mandatory Energy Efficiency Resource Standard (EERS) to trigger cost-effective actions to achieve the 40 percent building efficiency goals outlined in EO80. Based on examples from other states, the target might be 10 percent electric energy savings and 10 percent demand reduction for investor-owned utilities, and 5 percent electric energy savings and 5 percent demand reduction for municipal utilities and electric cooperatives by 2030, below a baseline of each utility's total gross electric sales in 2020. This would include a low-income carve-out for electric energy savings of 2 percent (of the 10 percent target) for IOU's and 1 percent (of the 5 percent target) for munis and co-ops.

## Background

The REPS program is not generating consistent participation in EE measures. Participation in the energy efficiency utility programs is voluntary, and in some instances, utilities are not fully using EE to cost-effectively achieve their REPS goals. That is problematic for helping to create EE as a low-cost, "valued resource" within the state's current legislation under SB3 as well as achieving the goal of 40 percent state building energy savings under Executive Order 80.

This proposed solution suggests an EE mandate, separate from the current REPS, with a ramp-up period for energy efficiency goals to require utilities to achieve a 10 percent electricity savings as well as peak demand reductions over the next 10 years as compared to 2020 sales. Other state policies have delivered substantial savings through energy efficiency. For instance, Arkansas has delivered strong annual efficiency savings for many years, currently set by the Arkansas Public Utilities Commission at 1.2 percent of 2018 retail electricity sales.<sup>34</sup> Maryland established targets to reduce per capita energy usage and peak capacity by 15 percent by 2015 (based on 2007 electricity consumption).<sup>35</sup> Having achieved their goals, the programs continue to deliver significant savings.

A stand-alone EE standard would create an opportunity to once again lead the Southeast while driving economic development, reducing environmental impacts, and creating greater equity for low-wealth communities. The EE sector would see growth in job creation, reduced energy costs for all customers, and a cleaner environment for all citizens.

## Specific Actions for Implementation and Key Participants

The lead implementing organization could be the utilities themselves, or the NC Utilities Commission could suggest a third-party entity like the one used in Indiana. "Energizing Indiana" utilized as a single, independent, third-party entity, that was contracted by all of the utilities to help create a statewide approach with a uniform set of EE programs, coordinated marketing, outreach, and consumer education strategies. This could be accomplished via EE Technical Assistance entity (Recommendation 12).

Necessary stakeholders include (but are not limited to) utilities, local and state governments, industrial and consumer representatives, regulators, and academia.

## Alignment with Other Recommendations/Objectives and Prerequisites

New legislation will be required to establish the EERS program goals and funding mechanism for utility cost recovery and incentives. Full implementation of an EERS program separate from current REPS may also require a new rulemaking by the NCUC. As a result of the REPS program, there are good reporting structures and information in place that will help inform and hopefully reduce the time required for the legislative process. In addition, successful models operating in other states that can be adapted for a North Carolina program. The program will likely require new oversight for the low-income carve-out component included as part of this recommendation.

## **RECOMMENDATION 26: Establish Minimum Energy Efficiency Goals Within Current REPS**

### Current State of Play in NC

In 2007, the North Carolina legislature passed SB3, becoming the first Southeastern state to adopt a Renewable Energy and Energy Efficiency Portfolio Standard (REPS). The REPS allows energy efficiency measures to be used for meeting a portion of the purchase requirements. The use of EE measures varies by year and by utility type:

<sup>34</sup> APSC Docket No. 13-002-U, Order No. 43, page 10 of 12.

<sup>35</sup> Maryland Energy Administration, EmPOWER Maryland Planning website, accessed 8/4/19. <https://energy.maryland.gov/Pages/Facts/empowerPlanning.aspx>.

- *Investor-owned utilities*: 12.5 percent renewable energy (as percentage of retail sales) by 2021. EE measures can be used to meet up to 25 percent of this requirement, and up to 40 percent after 2021.
- *Electric cooperatives, municipal utilities*: 10 percent renewable energy by 2018, and there is no limit on the amount that may be met through EE.

REPS defines “Energy efficiency measure” as an equipment, physical, or program change implemented after January 1, 2007, that results in less energy used to perform the same function. “Energy efficiency measure” includes energy produced from a combined heat and power system that uses nonrenewable energy resources; the term does not include demand-side management.

### Summary of Recommendation

Within North Carolina’s current REPS framework, incorporate a 25 percent minimum, up to 40 percent maximum, EE contribution to the REPS goal for IOUs beginning in 2021, subject to cost-effectiveness screens.

### Background

The current REPS Program has an EE component that allows utilities to voluntarily meet part of their renewable energy targets through use of implemented EE Measures. This recommendation sets a mandatory minimum for IOUs of 25 percent of the REPS target to be met with cost-effective EE Measures beginning in 2021. This conservative target is preferred by utilities due to concern that EE opportunities that utilities can influence are declining as more mainstream EE equipment become available to customers outside of the utility EE program. Requiring a minimum EE target ensures that EE remains a valued resource despite the gains in renewable energy and avoided cost comparisons that tend to make EE less attractive component of the REPS program. Duke Energy Carolinas and Duke Energy Progress are currently meeting the 25 percent target under current NC-RETS reporting for REPS participation and this recommendation would ensure their continued compliance. Dominion is not currently meeting a 25 percent minimum.

The industrial/large commercial customer opt-out provision would remain intact.

### Specific Actions for Implementation and Key Participants

This recommendation would require legislation to modify the existing REPS program. This recommendation could be implemented with relative ease since it not a dramatic change to the current REPS program. However, opposition from groups desiring a more aggressive approach could impact the legislative process resulting in a slower and more difficult implementation. This recommendation is an alternative to Recommendation 25.

### Alignment with Other Recommendations/Objectives and Prerequisites

Legislative action is required to establish a mandatory minimum of 25 percent for IOUs. Following legislative changes, the NCUC would be involved in reviewing any changes to program costs and any additional cost recovery through cost recovery rider changes. The recommendation is not interdependent on any other recommendations although could be closely tied to the enhanced data reporting recommendations (30–32).

## **RECOMMENDATION 27: Provide “Download My Data” Functionality for All Utility Data**

*Some in the group view this as an intermediary target with the ultimate goal being for utilities to allow for automated data transfers to authorized third parties consistent with the Green Button Connect My Data standard, but this did not have full group consensus and resulted in Recommendation 29.*

### Current State of Play in NC

Most electric utilities in NC that have deployed Advanced Metering Infrastructure (AMI) meters providing some type of access to incremental electricity consumption data, including online access to monthly electricity consumption and billing data. However, the information is being provided on different timelines and in a variety of formats. Some water utilities in NC have smart meters and share more frequent data. Natural gas utilities only provide monthly data to most customers.

Duke Energy has committed to start implementing a data access program equivalent to Green Button “Download My Data” beginning in Q3 of 2019.

## Summary of Recommendation

This recommendation would provide all customer classes with the ability to download 24 months of utility data using a standardized XML format (Green Button “Download My Data” or similar standard). Customers should have access to the “freshest” data that a utility’s online portal can provide. The recommendation would take advantage of existing metering infrastructure to provide the data access rather than require significant investments in new meters just for the purpose of accessing incremental water and natural gas usage.

For electric customers with AMI meters, electric utilities must provide access to at least 24 months of electricity demand and consumption data for each billing period in addition to interval consumption data. Natural gas and water utilities that offer electronic copies of bills must provide access to at least 24 months of monthly consumption data in a standardized format. All utilities must provide a basic guide of how to access and use this data for energy efficiency opportunities.

## Background

While utilities in the state are currently providing access to some electricity consumption data from smart meters, it is being provided in a variety of formats. Standardizing this data statewide to be consistent with the nationally recognized standard like the Green Button “Download My Data” standard would allow for a more efficient analysis for energy efficiency and demand reduction opportunities by customers and any consultants/third parties they choose to work with.

According to MissionData, a nonprofit dedicated to advocating for energy data access, over 55 utilities across the country have adopted the Green Button “Download My Data” standard.

## Specific Actions for Implementation and Key Participants

The utilities would take the lead implementing this recommendation, but other stakeholders such as consumer advocates, customers from each rate class, and organizations that promote data access will be needed to ensure that the data is being provided in the most useful and effective manner. This recommendation would standardize existing data and mandate easy access to 24 months of incremental data. It will also be critical for utilities to provide some basic information for how customers can use this data to identify potential EE opportunities.

In the context of most electric utility investments and projects, this recommendation should be relatively easy to implement since it relies on the investment utilities have already made in AMI meters. However, it will require significant investment in IT infrastructure. The ease and speed of implementing these IT updates will depend on each utility’s existing IT infrastructure and customer portals.

## Alignment with Other Recommendations/Objectives and Prerequisites

For regulated utilities, the NC Utilities Commission will have to authorize cost recovery for the initial investment and annual administrative costs. Duke Energy recently estimated the initial cost at about \$850,000. Legislative action would not be required for the regulated investor owned utilities in NC, but legislation may be required to ensure compliance by municipal and cooperative utilities if they do not voluntarily implement a data standard like Green Button Download. The Commission will also likely have to adopt rules describing the Green Button “Download My Data” (or similar) standard as it applies to natural gas and water utilities in North Carolina to limit potential confusion.

## On-Going NC Initiatives and Resources

Depending on how far Duke Energy Progress gets with the deployment of AMI meters in its territory (DEC has already deployed smart meters for most customers), we anticipate the Duke utilities will be able to implement the “Download My Data” functionality by the end of 2020. Since most municipal and cooperative utilities in NC have already deployed AMI meters for their customers, implementing the standard should mostly require an update to their IT infrastructure, which we hope could also be completed by the end of 2020.

## **RECOMMENDATION 28: Establish Database of Rates for All North Carolina Electric, Natural Gas, and Water Utilities**

### Current State of Play in NC

Basic rate schedules are provided by utilities but are not provided in standardized formats or collected in one readily accessible location.

### Summary of Recommendation

Require all electric, water, and natural gas utilities in the state to publish all of their rate schedules (including the precise wording) in a standardized machine-readable XML format and publish any updates to these rates in a central database.

### Background

As utility rates become more varied by time and demand, it will become more complicated for customers and companies to assess the financial impact of EE/DSM opportunities. Standardizing the way rates are published will allow these calculations to become easier and support the creation of software that can keep these calculations up to date.

### Specific Actions for Implementation and Key Participants

Utilities and the NC Utilities Commission would be primarily responsible for implementing this recommendation. In order to reduce the burden on utilities, it may be easiest to task the NCUC with formatting existing rate schedules into an XML format and keeping this data up to date in a central database on the NCUC website. Costs for this could be recovered by the fee utility customers pay that funds the NCUC. Legislative approval may be necessary for the NCUC to make this provision in their budget.

The NC Utilities Commission will likely need some time to establish a docket and/or database for housing this rate data and will need time to develop rules around the requirement. Alternatively, the NC Clean Energy Technology Center, the organization that currently runs the DSIRE policy database, could compile and house the utility data.

It will also be critical for utilities to provide some basic information for how customers can access the data to identify potential EE opportunities. The NCUC could establish standardized language that each utility would publish on its website that would direct readers to the centralized database of rates. This information could also be included in the EE Toolkits (Recommendation 3).

### Alignment with Other Recommendations/Objectives and Prerequisites

For regulated utilities, the NCUC will have to authorize cost recovery for the initial investment and annual administrative costs of formatting the data or require the utilities to do it themselves. Legislation may be required to ensure compliance by utilities not regulated by the NCUC. Tasking the NCUC staff with formatting the rates may be the easiest approach to ensuring compliance with any new legislation and encourage voluntary submissions from unregulated utilities if no new legislation is created.

## ***RECOMMENDATION 29: Continue to Evaluate the Automatic Energy Data Transfer***

### Current State of Play in NC

Automatic Energy Data Transfer and other customer billing topics will likely be at least partially addressed in the NC Utilities Commission Docket No. E-100 Sub 161, Rulemaking Docket for Commission Rules Related to Electric Customer Billing. These proceeding will take place over the summer of 2019 with a Commission Order potentially in Q4 of 2019.

### Summary of Recommendation

Continue to work with all utilities on ways they can provide automatic transfers of data to third parties that customers have authorized to access their data.

### Background

While Recommendations 27 and 28 will provide a standardized format for data portability, they require customers to continuously download this data and provide it to their chosen service providers as new data is created. This additional downloading and uploading step introduces a time and process barrier. In utilities around the U.S. where “Download My Data” has been introduced, opportunities for service providers to provide energy services based on energy consumption data has been limited without access to up-to-date and ideally real-time data. The Green Button initiative has attempted to solve this problem by establishing the Green Button “Connect My Data” program that allows customers to provide their chosen service providers with automatic access to their data.

While Green Button “Connect My Data” has been proposed in North Carolina, utilities have continued to express concerns related to customer protections, liability, regulatory cost recovery issues, and implementation cost. This recommendation is for utilities and interested stakeholders to continue to pursue ways to address those issues in addition

to exploring other methods for providing automatic energy data transfers to trusted third parties such as Energy Star portfolio manager.

#### Specific Actions for Implementation and Key Participants

Utilities and stakeholders should continue to collaboratively work on these issues outside of this roadmap process throughout 2019 and work to address issues that may not be resolved by the Commission in North Carolina [Docket E-100 Sub 161](#).

#### Alignment with Other Recommendations/Objectives and Prerequisites

This recommendation builds on Recommendation 27 and requires continued discussion by parties to work on addressing these issues. Implementation of this recommendation could also assist in the development of new programs as identified in Recommendation 13.

### **RECOMMENDATION 30: Collect Existing Data on Energy Efficiency Metrics**

#### Current State of Play in NC

Some energy use and energy savings data are reported by entities in North Carolina. For instance, electric and natural gas utilities report state energy use to the U.S. Energy Information Administration. Electric utilities report the magnitude of the load that has opted out of utility nonresidential EE programs. Electric utilities, municipal power associations, and electric membership cooperatives report REPS compliance numbers to the NCUC, including EE measures and estimated energy savings. A number of universities and businesses report energy use and energy savings in sustainability reports. However, information is collected in different formats, and housed in different locations, inhibiting its use for statewide or sector analyses.

#### Summary of Recommendation

Identify the basic information needed to tell an “energy efficiency” story for North Carolina and search existing reporting mechanisms to find that data. Collect information on all types of energy (electricity, natural gas, fuel) in one place to ease analysis.

#### Background

The state and other EE service providers need good data to track outcomes, to enable robust investment in successful programs and redirection from less successful attempts. Some of the basic information needed to assess energy use trends over time and to identify EE opportunities include:

- Electricity consumption (statewide; sector-wide; in some instances down to firms or buildings), in kwh (from EIA’s [State Energy Data](#), overall and by sector; [EIA Commercial Buildings Energy Consumption Survey](#); [EIA Manufacturing Energy Consumption Survey](#); and [EIA Residential Energy Consumption Survey](#), and well as from utility filings in NC);
- Natural gas consumption (statewide; sector-wide; in some instances, down to firms or buildings), in mcf or therms;
- Fuels consumption, including gasoline, diesel, and propane (statewide; sector-wide; in some instances, down to firms or buildings), in gallons;
- Types of EE measures (in categories such as lighting; HVAC; process changes);
- Demand-side management programs; and
- An energy intensity metric for each fuel source, for each sector: per capita use, for the residential sector; per square foot, industrial and commercial (or dollar of profit, or unit produced)? For instance, using historical data, it is possible to calculate EE improvements in residential housing over time, in North Carolina:

## Residential Use Per Capita

Year	Units	2005	2006
Residential Consumption	thousand MWh	54,073	57,902
Population	thousands	8,686	10,046
Consumption per Capita		6.23	5.76
2015 Consumption at 2005 Rate			62,539
<b>Avoided Consumption</b>	<b>thousand MWh</b>		<b>4,637</b>
2015 eGRID GHG Emissions Factor	lb CO <sub>2</sub> E/kWh		0.9866
<b>Avoided GHG</b>	<b>million metric tons</b>		<b>2.075</b>
Conversion	lb to metric ton		0.000454
Residential Electricity Use GHG	million metric tons		25.3
<b>Reduction in Residential GHGs due to EE</b>			<b>8%</b>

As suggested by the above example, much of this data exists and is collected by a host of entities: federal agencies, North Carolina state and local governments, universities, and private firms. Finding and collecting that data would be an important starting point for any data tracking project. In the course of finding data, if some reporting regimes seem inconsistent with others, or incomplete, conversations could begin to explore the feasibility of modest tweaks to collect more complete, robust, or consistent data.

### Specific Actions for Implementation and Key Participants

NC DEQ has expressed interest in implementing this recommendation. Engagement by the Department of Commerce would enable tracking of additional statistics including workforce numbers related to energy use and energy savings. In addition, compilation of the data could be done through one of North Carolina's university energy centers, such as the NC Clean Energy Technology Center.

This recommendation is largely a data gathering exercise, yet early engagement with key stakeholders—including large energy users, small businesses, and industrial corporations—will improve the likelihood of ultimate success for a statewide tracking program. For instance, outreach to the large IOUs, munis or co-ops, large industrials, and private universities would be useful, to discuss availability of existing data sets.

### Alignment with Other Recommendations/Objectives and Prerequisites

No legislative or NCUC action is required to implement this recommendation. However, it could be useful to discuss the NC-RETS reporting program and any other reporting or tracking requirements that might relate to EE with NCUC, to explore data sharing and to discuss modest tweaks to reporting that might enhance a statewide energy savings data set. This recommendation is the first step in a series of recommendations related to data tracking (see Recommendations 31 and 32).

### On-Going NC Initiatives and Resources

A roadmap working group created a spreadsheet tracking existing energy use, energy savings, and GHG emissions of different government agencies and entities in North Carolina. The NC DEQ and perhaps the Department of Commerce could use this resource, to define the universe of existing reporting.

## **RECOMMENDATION 31: Data Repository for Energy Efficiency Metrics**

### Current State of Play in NC

Some energy use and energy savings data are reported by entities in North Carolina. For instance, electric and natural gas utilities report state energy use to the U.S. Energy Information Administration. Electric utilities report the magnitude of the load that has opted out of utility nonresidential EE programs. Electric utilities, municipal power associations, and electric membership cooperatives report REPS compliance numbers to the NCUC, including EE measures and estimated

energy savings. A number of universities and businesses report energy use and energy savings in sustainability reports. However, information is collected in different formats, and housed in different locations, inhibiting its use for statewide or sector analyses.

### Summary of Recommendation

Establish a transparent and straightforward repository of energy use, energy savings, and types of EE measures implemented, to collect EE data reported elsewhere. Gather the information collected in Recommendation 30, plus data noted in other recommendations, and present in an online repository that enables users to download aggregated energy use and savings data and produces colorful reports (perhaps using an application like [Power BI](#)) of aggregated progress towards energy efficiency goals or GHG targets.

### Background

Many of the recommendations in the EE Roadmap mention the need to track data on energy use and EE programs, to evaluate what works and what needs improvement. An online tracking repository with energy savings, costs and benefits would allow the public—including small businesses without capacity to assess EE projects on their own—to review projects and choose measures that are more optimal for their business and proven through use at other sites. This could build confidence in energy efficiency measures.

During the process of analyzing this recommendation, several stakeholders raised concerns about collecting and presenting energy use and savings information in one public space. These concerns should be taken seriously and can be navigated, to create a useful tool while building trust and getting buy-in from a wide range of actors across North Carolina.

The repository would initially hold data that has already been reported by agencies, firms, and others. In some cases, reported data is completely public. In others, most of the data is protected while aggregated outcomes are reported. In still others, the fact that a firm has reported is known, but the data itself remains within a trade association or is only shared with other reporting participants. The repository could begin with fully public data.

Over time, the repository manager might enter into confidentiality agreements to receive the underlying datasets. To anticipate receipt of this type of information, the repository should report on anonymous and aggregated data. Laws related to data sharing and information disclosure should be consulted before determining where the online repository should sit (i.e., a public agency, a private university, a private third-party data manager), with the goal of enabling public disclosure of aggregated data while protecting individual records. The repository manager must be trusted by large reporting entities, to facilitate a strong working relationship and an inclination to share data.

The repository manager should automate as much of the data collection and upkeep as possible, for instance by coding regular updates from the U.S. Energy Information Administration or entering into agreements with existing reporting regimes to share info in a particular format at certain intervals in the future.

### Specific Actions for Implementation and Key Participants

To implement this recommendation, information collected under Recommendation 30 is needed, as well as data identified and collected through other recommendations.

A public agency, a contractor for a public agency, or a university energy center like the NC Clean Energy Technology Center, could develop and maintain the repository. However, the receipt of data and the management of the repository should only be done by an entity that can share public aggregated data while protecting privacy and confidential information.

As noted, a legal review would need to be conducted to determine who can manage the repository in a way that protects underlying data. However, state agencies, with university, municipal, utility, and other partners, could manage the initial design of the repository. The Department of Commerce might be a good lead agency candidate, with support from NC DEQ. In addition, the work should engage the Southeast Energy Innovation Collaborative (E4 Carolinas / NC DOC) given their 2019 report on tracking energy data more generally.

It will be important to engage stakeholders with large amounts of potentially relevant data, including electric and other energy utilities and cooperatives. As part of conversations with those stakeholders, technical support, recognition

programs, and other incentives could be discussed. Data end users should be engaged, too, to make sure the tool would provide useful aggregated information for their purposes. A diverse group of stakeholders should be invited to review and test the repository.

### Alignment with Other Recommendations/Objectives and Prerequisites

Neither legislative nor regulatory action is required to stand up a voluntary repository based on already reported data. Data from Recommendation 30 would populate the repository. The repository will be critical to track and benchmark EE progress in the state so a number of other recommendations may ultimately depend on this information source.

## **RECOMMENDATION 32: Expand the Energy Efficiency Data Repository to Include Voluntary Reporting**

### Current State of Play in NC

Some energy use and energy savings data are reported by entities in North Carolina. For instance, electric and natural gas utilities report state energy use to the U.S. Energy Information Administration. Electric utilities report the magnitude of the load that has opted out of utility nonresidential EE programs. Electric utilities, municipal power associations, and electric membership cooperatives report REPS compliance numbers to the NCUC, including EE measures and estimated energy savings. A number of universities and businesses report energy use and energy savings in sustainability reports. However, information is collected in different formats, and housed in different locations, inhibiting its use for statewide or sector analyses.

### Summary of Recommendation

After launching the energy savings data repository (Recommendation 31) and demonstrating its utility in tracking energy use, energy intensity, and energy savings progress in the state of North Carolina, the repository can be built out by encouraging additional entities to begin reporting their energy use, energy savings, and types of EE interventions. One reporting tool could be selected as the “gold standard” for reporting. Entities could also have the option to enter data directly into the repository, and/or respond to periodic Department of Commerce surveys on general EE interventions. A recognition program could reward entities that report, as well as those that through reporting document big energy efficiency wins.

### Background

Although energy reporting exists in North Carolina today, many entities do not report their energy use or efficiency projects. To get a complete picture of energy efficiency in the state, additional participation in reporting programs should be encouraged.

A number of private firms expressed resistance to the idea of a mandatory reporting system. Therefore, the recommendation is to pursue a voluntary reporting strategy, tied to a rewards system. Several firms indicated that receiving recognition for reporting, or for documenting good corporate behavior through reporting, is a significant inducement to participation. In addition, it might be useful to offer reporting technical support, or access to EE incentives and programs, to firms that report energy use and energy savings data.

A number of jurisdictions use the federal Energy Star [Portfolio Manager](#) tool for reporting. While it appears to seek more data than may be necessary for tracking and benchmarking, the tool can be adapted to include or exclude fields. Moreover, it could be offered as the “gold standard” of reporting for firms wanting to be more comprehensive. Meanwhile, the online repository (Recommendation 31) could enable entities to report more streamlined information directly to it. Existing reporting requirements (e.g., REPS) might also be altered to add useful information to the repository without adding to a company’s reporting burden. Additionally, the Department of Commerce could conduct voluntary surveys of energy use and energy savings practices with industrial entities, perhaps based on an abbreviated version of U.S. Energy Information Administration [Form 846A](#). The key would be to encourage reporting on the metrics featured in the repository, to build out that dataset for useful analysis across the state and within sectors.

### Specific Actions for Implementation and Key Participants

It would be useful to have an online repository in place (Recommendation 31), demonstrating its value, before encouraging additional reporting. In addition, some entities might prefer to report directly to the repository. However, entities wishing to begin reporting right away could be directed to the Portfolio Manager (or whatever reporting mechanism is ultimately chosen as the “gold standard”).

The entity managing the repository would need to be involved, to prepare for additional reporting including directly through the portal. The Departments of Commerce and Environmental Quality would also likely be involved.

Stakeholders would include utilities and coops with information on energy use, and large users of energy who do and do not currently report their energy use or energy savings. It would be important to engage stakeholders to explore additional reporting opportunities.

#### [Alignment with Other Recommendations/Objectives and Prerequisites](#)

Since reporting would be voluntary, there is no need for legislative or regulatory changes. Recommendations 30 and 31 should be well underway before the start of a recognition campaign to encourage reporting, but reporting may be encouraged at any time once the format/reporting program is agreed upon. Voluntary reporting will be critical to track and benchmark EE progress in the state so a number of other recommendations may ultimately depend on this information source.

#### [On-Going NC Initiatives and Resources](#)

Some commercial customers already use Energy Star Portfolio Manager to internally track EE metrics. This practice could be standardized and included in the voluntary reporting.

## APPENDIX B: OTHER RESOURCES

These documents are available online at the Nicholas Institute website: <https://nicholasinstitute.duke.edu/publications/north-carolina-energy-efficiency-roadmap>.

NC RETS analysis

North Carolina EE Roadmap Objectives (10/8/18)

List of EE Workshop & Roadmap Participants

State Energy Efficiency Planning—10 States' Experience

Slides from 10/26/18 workshop

North Carolina EE Stakeholder Survey

Survey results from 10/26/18 workshop prep work

NC's shared goals and objectives brainstorming discussion (10/26/18)

Sector Breakout Summary—10/26/18 EE Workshop

Thematic work groups timeline

Solution Evaluation Criteria

Final Evaluation Criteria Matrix (all themes)

EE Working Group Final Recommendation Template

Slides from 5/23/19 workshop

Notes from 5/23/19 Energy Efficiency Recommendation Presentations

Combined Feasibility/Impact Matrix

Call notes from subject matter expert focus groups:

- Q&A for Co-op SMEs

- Q&A for Industrial SMEs

- Q&A for Municipal Utility SMEs

- Q&A for Natural Gas SMEs

- Q&A for Public Staff SMEs

- Q&A for State Agency SMEs

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American Council for an Energy Efficient Economy  
Advanced Energy  
Appalachian Voices  
American Association of Retired Persons  
Blue Ridge Energy  
City of Asheville  
City of Elizabeth City, Electric Department  
Carolina Utility Customers Association  
Dominion Energy  
Duke Energy  
Durham Public Schools  
Electricities  
Energy Efficiency for All (National Housing Trust)  
EnSave  
Environmental Defense Fund  
Green Opportunities  
Interfaith Power and Light  
Marine Corps Installations East - Camp Lejeune  
Mathis Consulting  
NC Attorney General's Office  
NC Building Performance Association  
NC Clean Energy Technology Center  
NC Community Action Association  
NC Conservation Network  
NC Department of Environmental Quality  
NC Dept. of Commerce  
NC Governor's Office  
NC Home Builders Association  
NC Housing Finance Agency

NC Justice Center  
NC Sustainable Energy Association  
NC Utilities Commission  
NC Electric Membership Corporation  
NC Manufacturers Alliance  
NC Retail Merchants Association  
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Southern Alliance for Clean Energy  
Southern Energy Management  
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UNC Energy Management  
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