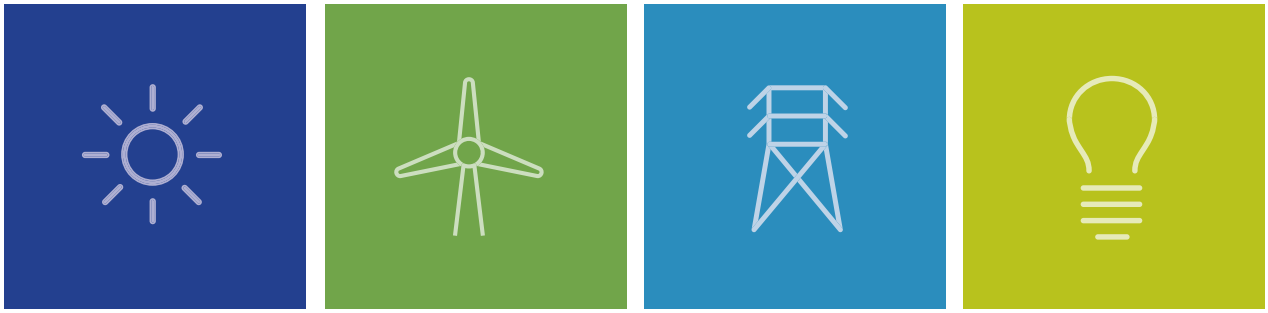
North Carolina

Clean Energy Plan

Transitioning to a 21st Century Electricity System



Supporting Document

PART 4

Stakeholder Engagement Process & Comments

DRAFT

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NORTH CAROLINA
Department of Environmental Quality
State Energy Office

Preface

This is a draft of North Carolina's Clean Energy Plan (CEP). The public comment period is open from August 16, 2019 through September 9, 2019. Comments may be submitted online at https://deq.nc.gov/cleanenergyplan.

The Clean Energy Plan was written by the Department of Environmental Quality as directed by Executive Order No. 80..[1] DEQ was tasked with the creation of a CEP to encourage the use of clean energy resources and technologies and to foster the development of a modern and resilient electricity system. The purpose of the CEP is to outline policy and action recommendations that will accomplish these goals. The CEP is made up of the main document titled *Policy and Action Recommendations* and six supporting documents.

Part 1: Energy Sector Profile and Landscape

Part 2: North Carolina's Energy Resources

Part 3: Electricity Rates and Energy Burden

Part 4: Stakeholder Engagement Process

Part 5: Energy and Emissions Modeling

Part 6: Clean Energy Jobs and Economic Outlook

This supporting document, Part 4: Stakeholder Engagement Process and Comments, provides an overview of the stakeholder process used by DEQ to determine recommendations. There is a description of the process and its goals, followed by an in-depth look at the output of the stakeholder process. The section concludes by summarizing formally submitted comments, and relevant material from Workshops and supporting efforts are appended.

[1] https://files.nc.gov/ncdeq/climate-change/EO80--NC-s-Commitment-to-Address-Climate-Change---Transition-to-a-Clean-Energy-Economy.pdf

Table of Contents

List of Tables

List of Figures

List of Abbreviations

CEP	Clean Energy Plan
CPRE	competitive procurement of renewable energy
CT	combustion turbine
DEQ	North Carolina Department of Environmental Quality
DER	distributed energy resource
DOA	Department of Administration
DOC	Department of Commerce
DOT	Department of Transportation
DROC	disaster recovery operations center
EDF	Environmental Defense Fund
EE	energy efficiency
EO80	Governor Cooper's Executive Order 80
ESI	Energy Savings Initiative
EV	electric vehicle
GHG	greenhouse gases
GSA	Green Source Advantage
IOU	investor owned utility
IRP	Integrated Resource Plan
ISOP	Integrated System Operations Plan
LLC	limited liability company
NC	North Carolina
NCCAA	NC Community Action Association
NCCETC	North Carolina Clean Energy Technology Center at NCSU
NC A&T	North Carolina Agricultural and Technical University
NCBPA	NC Buildings Performance Association
NCDOT	North Carolina Department of Transportation
NCEMC	North Carolina Electric Membership Cooperative
NCMA	North Carolina Manufacturers Alliance
NCORR	North Carolina Office for Recovery and Resiliency
NCSEA	North Carolina Sustainable Energy Association
NCSU	North Carolina State University
NCUC	North Carolina Utilities Commission
NI	Duke University Nicholas Institute
NRDC	Natural Resources Defense Council
PACE	Property Assessed Clean Energy
PIPP	Percentage of Income Payment Program
RAP	Regulatory Assistance Project
RE	renewable energy
RMI	Rocky Mountain Institute
RNG	renewable natural gas
RTI	Research Triangle Institute
SELC	Southern Environmental Law Center
TOU	Time of Use
UNC	University of North Carolina
USDA	U.S. Department of Agriculture
WMBE	Women Minority Owned Business Enterprise

1. Overview of Stakeholder Engagement Process

It is the intent of the Department of Environmental Quality (DEQ) that the Clean Energy Plan (CEP) will be a "living" document that provides a roadmap for pursuing our collective vision, with the idea that it can be revisited periodically as advancements in technology occur, implementation costs are reduced, and policies and regulatory actions take effect.

In preparing the CEP, DEQ created an open and inclusive public engagement process that sought stakeholder input to develop a series of policy, regulatory, administrative, and program recommendations that achieve the vision of a clean energy future as defined by the stakeholder community. The objectives of the stakeholder engagement were to build a collective understanding of stakeholder groups' perspectives on the existing system and vision for the future, prioritize which existing structures are or are not supporting achievement of clean energy and to strengthen the stakeholder community's capacity to collaborate in this work.

This chapter explains the overall engagement strategy and summarizes the feedback that was received throughout the process. All stakeholder-related materials and presentations from this process can be found on the Clean Energy Plan development website.

1.1 Summary of Approach

The public engagement process conducted for the CEP development was comprised of four types of events, which are referred to as methods in this chapter. Method 1 was a series of facilitated stakeholder Workshops, which were day-long events attended by 60-80 experts and key stakeholders with a vested interest in clean energy. Method 2 involved broader public outreach, achieved through regional listening sessions. These events were half-day sessions intended to educate members of the public about the CEP development process and to receive feedback. Method 3 involved combining with existing venues or events to collect feedback. Method 4 was an online comment portal, where members of the public who were unable to attend any of the in-person events could respond to specific questions and submit general comments. All of these methods are described in more detail in Section 1.3.

This chapter summarizes the outputs of the facilitated Workshops and other engagement methods, and is structured around three central themes:

- Vision building
- Changing energy landscape
- Prioritizing recommendations

These themes are representative of the approach to the public engagement process, and form the basis for the summary and discussion found later in this chapter.

1.2 Topics Explored

As a key part of developing the CEP, DEQ investigated and sought feedback on a range of topics. These topics were delineated at the start of the stakeholder process, but they evolved with the conversation occurring at public engagement events. Questions and topics that were covered during the public engagement process included:

- Ways to ensure all North Carolinians, including underserved communities, have access to clean, reliable, and affordable energy.
- The role of emerging technologies such as distributed energy resources (e.g. solar, storage, energy efficiency, demand management, microgrids, electric vehicles, wind), decreasing costs of those technologies, consumer preferences, and new energy service providers.
- The role of existing and new distributed energy resources (DERs) in transitioning North Carolina (NC) into a clean energy economy.
- The role of power sector transformation occurring in policy, regulatory spaces, and utility business models across the country.
- Creation of a more reliable and resilient power grid in the face of increasingly severe weather events.
- The ways in which clean energy can spur economic expansion and economic development, including innovation, workforce development and educational opportunities.
- The opportunities for reducing environmental and public health impacts, including opportunities for reducing carbon emissions in the power sector and the economy as a whole.
- Participants were asked to describe their interest in the CEP development process and their priority goals for participating. They were also asked about motivating factors for participating that they wanted DEQ and other state agencies to understand better.

When asked about their priority goals for contributing to the process, participants' answers revolved around several central themes. A sense of urgency about the impacts of carbon emissions globally and in NC was a large part of this conversation. Many participants were concerned for the safety of their or subsequent generations' future, and they highlighted the need for immediate action. Stakeholders urged DEQ and NC to be bold in their actions going forward, and they mentioned the need to prevent large fossil fuel infrastructure projects in the future. The idea that not all "clean energy" is clean was a comment heard frequently at Regional Listening Sessions; participants urged DEQ to concentrate on renewable sources of energy when creating the CEP, and to cease the use of fossil fuel-based energy sources. Equity and environmental justice was brought up repeatedly; participants mentioned that any clean energy solutions that are implemented need to be distributed in a way that benefits the most marginalized communities in the state.

Factors that participants wanted DEQ staff and other stakeholders to understand better followed along the same lines of the priorities for participating in the CEP development process. The short time window to address climate change was mentioned at most events as a central motivating factor for participating. The themes of equity and environmental justice, technological innovation, and access to clean and renewable energy sources were also central to participants' motivations. Many other environmental concerns were raised that, while not directly covered in the CEP, indicate a widespread interest in environmental issues and a state population that is engaged with these issues.

1.3 Stakeholder Engagement Methods

DEQ utilized 4 methods of engagement to collect feedback and comments about the CEP: facilitated Workshops, regional listening sessions, combined events, and online and direct input. These four methods

are described in detail below. Figure 1 illustrates the timeline of public engagement and the CEP development process. DEQ's public engagement process was carried out from February to July 2019.

DEQ engaged with stakeholders from a variety of backgrounds and disciplines to understand their vision for NC's clean energy future. The stakeholder group was made up of representatives from organizations in the categories listed below.

- Distributed energy resource/renewable energy system providers and integrators
- Investor-owned utilities, municipalities, and electric cooperatives
- Local governments, council of governments, and other supporting entities
- Elected officials
- Large corporate businesses and finance groups
- Manufacturing and industrial organizations and trade associations
- Healthcare and commercial buildings organizations
- Higher education institutions
- Environmental justice, underserved communities, and faith-based organizations
- Affordable housing and community development organizations
- Consumer advocates
- Youth and students
- Environmental organizations
- Energy efficiency system and service providers
- Residents of NC
- Others as requested

Throughout the series of Workshops and public meetings that are described in the following sections, DEQ and participating stakeholders identified needs, issues, barriers, solutions, unrealized opportunities, equity concerns and required actions. Stakeholders and members of the public engaged in the process, which helped DEQ better understand their vision for a clean energy future in NC. Throughout the stakeholder and public engagement process, participants were given information about future energy demand, generation and supply strategies, and national trends in power grid modernization to help frame the discussion around issues relevant in NC. Rate impacts, economic and job opportunities, environmental and health impacts were also considered. The public engagement process culminated with stakeholders recommending policy, regulatory, administrative, local government, public, and business actions for achieving NC's clean energy future. This report documents all the actions recommended by stakeholders, which informed DEQ's final recommendations for policy and other changes. DEQ's final prioritized recommendations can be found in the Policy and Action Recommendations text of the CEP.

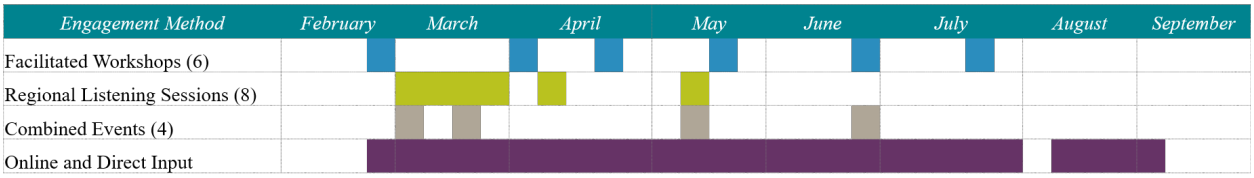


Figure 1: DEQ Public Engagement Process Timeline

1.3.1 Method 1- Facilitated Workshops (Raleigh)

A series of six full-day, facilitated stakeholder Workshops were held in Raleigh from February to July 2019. These structured Workshops were organized to obtain feedback from a diverse group of stakeholders on key questions. Technical support was provided by the Regulatory Assistance Project (RAP), and facilitation support was provided by the Rocky Mountain Institute (RMI). Participants were required to submit a request to participate form for each Workshop to ensure commitment to the stakeholder process. Additional participants were added as necessary. Participating organizations were encouraged to nominate individuals with sufficient understanding of the electric power sector to represent their constituents. Table 1 below shows the event details from each Workshop, including the number of participants. See Table 2 for details of the six Workshops and points of discussion that were brought up in each Workshop.

Table 1: Event Details from Facilitated Workshops

Event	Location	Date	Number of Participants
Workshop 1	Raleigh	2/25/19	82
Workshop 2	Raleigh	4/1/19	72
Workshop 3	Raleigh	4/22/19	62
Workshop 4	Raleigh	5/22/19	62
Workshop 5	Raleigh	6/26/19	67
Workshop 6	Raleigh	7/24/19	76

The Workshops were organized around three themes: 1) vision building, 2) changing energy landscape and 3) recommendations, as described in more detail in Table 2.

Table 2: Approach for Facilitated Stakeholder Workshops

Workshop #1 (February 25, Raleigh)	Workshop #2 (April 1, Raleigh)
Activities: 1. Stakeholders discuss NC's current energy direction and changing landscape; vision for a clean energy future; current policies, regulatory and business practices; and the ability of current policies/laws/practices to achieve the vision. 2. Develop educational or framing materials 3. Engage stakeholders to present perspectives Milestones: Stakeholders learn and share perspectives on their vision of a clean energy future how well the current system works through facilitated discussion.	Activities: 1. Stakeholders share views and prioritize ideas from Workshop #1 Milestones: Stakeholders share their positions on issues raised thus far; elements of agreement and disagreement are identified
Vision Building and Current Landscape: What is NC's vision of a clean energy future, how different is it from the current direction, and how well do current policies, regulatory and business practices help achieve that vision?	
Workshop #3 (April 22, Raleigh)	**Workshop #4 (May 22, Raleigh)**
Activities: 1. Identify policy and technology trends that are driving clean energy deployment, the opportunities presented by these trends, and barriers that exist to seizing those opportunities 2. Develop educational or framing materials 3. Engage outside expertise and data on technology trends and opportunities presented 4. Engage stakeholders to present perspectives Milestones: Stakeholders learn and share perspectives on the changing technology and policy landscape for clean energy	Activities: 1. Stakeholders share views and prioritize ideas from Workshop 3 Milestones: Stakeholders share their positions on issues raised thus far; elements of agreement and disagreement are identified
Changing landscape: what policy and technology trends are influencing how we foster clean energy use?	
Workshop 5 (June 26, Raleigh)	**Workshop 6 (July 24, Raleigh)**
Activities: 1. Stakeholders identify areas of policy or regulation that need to be developed or updated to overcome rules or practices that prevent NC from achieving the clean energy vision. 2. Develop educational or framing materials 3. Engage outside expertise on policy and regulation 4. Engage stakeholders to present perspectives Milestones: Stakeholders better understand the suite of possible options for achieving NC's clean energy vision.	Activities: 1. Stakeholders share views and prioritize ideas from Workshop 5 Milestones: Stakeholders share their positions on key elements of NC's CEP; elements of agreement and disagreement are identified
Recommendations: What policy or regulatory actions should be taken to achieve the vision?	

Expert and technical presentations were provided at several Workshops as part of the objective to build a collective understand of the energy landscape across all stakeholders. These individuals were invited to present at stakeholder Workshops due to their expertise in areas related to clean energy, renewable energy, grid modernization, and other topics that were of interest to the stakeholder group. Many of these expert presenters also participated in the stakeholder process. A full list of expert and technical presenters, along with the topics they discussed, is detailed in Table 3.

Table 3: Expert and Technical Presenters at Facilitated Workshops

Workshop	Presenter	Affiliation	Topic Covered
1	Kate Konschnik	Duke University Nicholas Institute	NC's Electricity System
	Jonas Monast	UNC-Chapel Hill School of Law	Regulatory Structures and Barriers
	Stephen Kalland	NCSU Clean Energy Tech Center (CETC)	DERs and Distribution Planning
	Brad Ives	UNC-Chapel Hill	Large-scale Renewable Energy
	Robert Cox	UNC-Charlotte Energy Production and Infrastructure Center	Grid Modernization and Resilience
	Jeffery Petrusa	RTI International	Clean Energy's Impacts on Job Growth
3	Stephen Kalland Ivan Urlab Charles Bayless	NCSU CETC NC Sustainable Energy Assoc. (NCSEA) NC Electric Cooperatives	New Clean Energy Opportunities
	Hannah Polikov Jonas Monast	Advanced Energy Economy UNC-CH School of Law	Evolving Regulatory Structures and Concepts
	Ric O'Connell Autumn Proudlove Robert Sipes	GridLab NCSU CETC Duke Energy	Grid Modernization and Planning
4	Daniel Brokshire Dallas Burtraw Zach Ambrose Brianna Esteves	NCSEA Resources for the Future Cities Initiative CERES	CEP Modeling and Other Collaborative Efforts
5	Franz Litz Amanda Levin Jennifer Weiss	Georgetown Climate Center NRDC Duke University Nicholas Institute	CEP Modeling and Other Collaborative Efforts
6	David Doctor	E4 Carolinas/ Southeast Energy Innovation Collaborative	Other Collaborative Efforts

1.3.2 Method 2: Regional Listening Sessions

The second method of public engagement employed by DEQ was a series of Regional Listening Sessions. These Listening Sessions were statewide outreach events organized in both metropolitan and rural areas to increase public access to the CEP development process and to engage with more residents of NC. Attendees were shown video recordings of Workshop 1 and were asked to provide feedback on a variety of questions, and were invited to comment outside the structured questions. These sessions were all open to the public. Regional Listening Sessions were held in the locations detailed in the Table 4 below. A full list of organizations that participated in regional listening sessions can be found in the Appendix.

Table 4: Event Details from Regional Listening Sessions

Location	Host	Date	Number of Participants
Charlotte	UNC-Charlotte EPIC	3/8/19	38
Asheville	The Collider	3/14/19	82
Rocky Mount	Rocky Mount Event Center	3/19/19	13
Fayetteville	Fayetteville State University	3/25/19	11
Wilmington	Cape Fear Community College	3/27/19	30
Hickory	Western Piedmont COG	3/29/19	23
Elizabeth City	Museum of the Albemarle	4/11/19	10
Greensboro	NC A&T State University	5/17/19	61

1.3.3 Method 3 - Combined Events with Other Venues

DEQ also sought feedback from the public at preexisting events throughout the state. These combined events involved an overview of EO 80, the CEP process, and requests for attendees to provide written feedback on the same survey questions and vision building activities provided to the Workshop attendees. Due to the nature of these events and the fact that DEQ did not convene them, discussion of the CEP with event participants during the combined event session was usually not an option. Participants were shown the online comment portal and were encouraged to submit additional feedback in that way. Feedback was sought at 4 events, the details of which are presented below.

Table 5: Event Details from Combined Events

Location	Host	Event Type	Date	No. of Participants
Hickory	North Carolina Manufacturers Alliance (NCMA)	Air Quality Compliance and Permitting Workshop	3/5/19	43
Raleigh	North Carolina Manufacturers Alliance (NCMA)	Air Quality Compliance and Permitting Workshop	3/19/19	53
Raleigh	Environmental Stewardship Initiative	Annual Conference	5/15/19	39
Chapel Hill	UNC Institute for the Environment	Environmental Leadership Fellows Training Workshop	6/25/19	18

1.3.4 Method 4: Online and Direct Input

Online input from the public was accepted from February 25 until July 31, 2019 on the DEQ CEP website and by email. There were 3 survey forms available on the website that had specific questions for members of the public to answer. These included a survey about citizen perspectives, a survey about key values to maintain in the State's electricity system of the future, and an opportunity to answer in-depth questions that were asked of Workshop participants at the end of Workshop 1. Additionally, a public comments email address was made available for use by members of the public to submit general feedback or comments about the CEP. Comments received in this manner were handled with public comments received during Regional Listening Sessions, and are included in the figures presented in Section 2: Overview of Stakeholder Feedback. There were 122 online participants from February to the end of July.

1.4 Other Related Stakeholder Processes

Several other stakeholder processes were conducted concurrently with DEQ's CEP stakeholder engagement processes. While these initiatives were not conducted by DEQ, information gathered at the events were used to inform policy recommendations that are included in the CEP. The processes and work products that came from these initiatives are summarized below. For more information about these related efforts and their associated work products, see the Appendix.

Below are stakeholder engagement efforts that provided a process for soliciting input and working towards consensus on energy-related priorities for NC. Additional information regarding the three efforts below are provided in CEP Supporting Basis: Stakeholder Engagement. The recommendations generated from these related initiatives were incorporated into the CEP stakeholder process.

1.4.1 Cities Initiative (Environmental Defense Fund)

The program was designed to help NC municipalities reduce their greenhouse gas emissions. EDF conducted an initial survey to establish baseline information about goals, needs and priorities, then facilitated four half-day roundtables hosted in participating cities. Each session included experts, discussion and working groups and focused on identifying barriers, business needs, potential partnerships, innovative resources and consensus action items. Phase One of the program (which occurred in 2018) identified consensus action items that could reduce barriers and foster partnerships to enable faster and deeper GHG reductions. Phase Two of the program began in late 2019 to focus on implementation of consensus action items.

1.4.2 Energy Efficiency Roadmap (Duke University Nicholas Institute)

To capitalize on the energy efficiency opportunities in the state, the Nicholas Institute (NI), in partnership with NC DEQ initiated a process to develop a comprehensive state energy efficiency roadmap. This initiative, launched in August 2018, convened over 100 energy efficiency stakeholders 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 EE policy goals and recommendations to inform the state-wide CEP. Recommendations related to economic development include developing

apprenticeship programs with a focus on energy efficiency, collecting workforce data and supporting a state-wide economic impact study, and creating a Clean Energy Fund or Green Bank, noting that employment in the solar industry in Connecticut has grown approximately 30% since the creation of that state's Green Bank.

1.4.3 Southeast Energy Innovation Collaborative (E4 Carolinas)

More than fifty energy organizations collaborated on issues and solutions with the objective to have the Southeast recognized as the nation's energy innovation leader. Task force recommendations included creating an energy industry inventory to improve promotion and access to regional energy assets, assessing energy workforce needs, facilitating better collaboration between community colleges and universities for job training and placement, modernizing electric grid planning, surveying NC's energy entrepreneurship ecosystem and expanding the deployment of energy innovation technologies.

2. Building a Collective Vision of NC's Energy Future

Facilitated stakeholder Workshops 1 and 2 were focused on vision building and establishing a collective understanding of NC's current electricity system. The main question that was asked of participants through various activities and questions was how well current policies, regulatory and business practices help achieve the vision laid out by the stakeholders.

2.1 Agreement on Current Electricity System

Participants were asked to delineate the extent to which they agreed with statements pertaining to NC's electricity system as it is now. The statements posed were as follows:

NC's electricity system as it is now:

1. Is set up to achieve what it was intended to achieve over the last 100 years
2. Gives customers options for controlling their energy use and the source of their energy
3. Supports the procurement of clean energy from a regulatory/utility business model perspective
4. Can physically accommodate increasing levels of renewable energy from a technology perspective
5. Suitably addresses equity concerns
6. Is reliable and resilient during severe weather events

Participants were asked to consider each statement individually, followed by a discussion about their answers. An online polling platform was used to collect participant responses, and paper forms were available in the case of technical difficulties. Survey results were collected at facilitated Workshop 1, all regional listening sessions, combined events, and via the online comment portal.

Table 6: Total Responses for Survey Questions from All Events

Category		Statement	Percentages					
		NC's electricity system as it is now…	*Disagree*	*Somewhat Agree*	*Agree*	*Strongly Agree*	*Total*	*No. of Responses*
1	State of Current System	…is set up to achieve what it was intended to achieve over the last 100 years	25%	33%	34%	8%	100%	553
2	Customer Choice	…gives customers options for controlling their energy use and the source of their energy	71%	20%	7%	2%	100%	456
3	Clean Energy Procurement	…supports the procurement of clean energy from a regulatory/utility business model perspective	57%	25%	13%	5%	100%	529
4	Grid Capacity for RE Integration	…can physically accommodate increasing levels of renewable energy from a technology perspective	34%	32%	21%	13%	100%	511
5	Equitable Access	…suitably addresses equity concerns	60%	25%	12%	3%	100%	502
6	Grid Reliability and Resiliency	…is reliable and resilient during severe weather events	36%	44%	17%	4%	100%	501

The results from all events together, which includes 18 total public engagement events and 122 online responses, are detailed in Table 4. There were between 456 and 553 responses to each question.

Based on results from Statement 1, a majority of participants indicated that they somewhat agreed or agreed that the electricity system as it exists in NC today was set up in a way to meet its intended objectives of serving loads reliably, affordably, and efficiently (Figure 2). While there was some consensus that the current system seemed to be organized in a way to meet goals of years past, participants also indicated that the system as it exists now is becoming outdated. Comments from regional listening sessions highlighted grid modernization efforts, storage technology, and other upgrades that the grid needs for a clean energy transition.

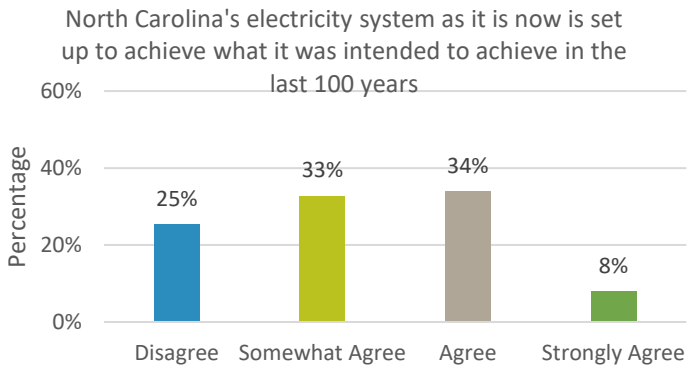


Figure 2: Polling Results from All Events (Statement 1 – Current System)

There was consensus on the part of participants that the current electricity system does not offer customers options for controlling their energy use and source, with 71% of respondents indicating that they disagreed with Statement 2 (Figure 3). Participants mentioned that the current utility business model does not allow for customers to choose between service providers, nor does it allow for choice in energy source. Participants of Workshops and listening sessions also mentioned that while programs for controlling and reducing energy use seemed to exist and be effective, the adequacy and size of such programs was insufficient, public awareness was limited, and individuals who could benefit from such programs were not getting access.

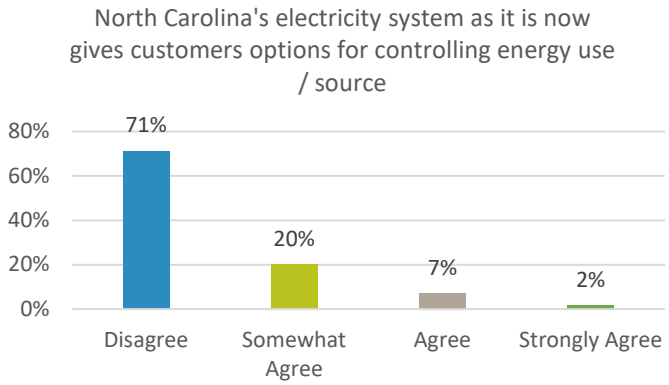


Figure 3: Polling Results from All Events (Statement 2 – Customer Choice)

When asked about whether or not NC's electricity system supports the procurement of clean energy from a regulatory or utility perspective, over half (57%) of polling respondents indicated that they disagreed with the statement (Figure 4). Many Listening Session participants indicated that while major utilities have existing programs that somewhat incentivize renewable energy, those programs are often underutilized. Participants also indicated that while they believe the electric grid is capable of handling increased clean energy resources, the current regulatory structure and regulated monopoly in the state leads to a disincentivized landscape for clean energy procurement.

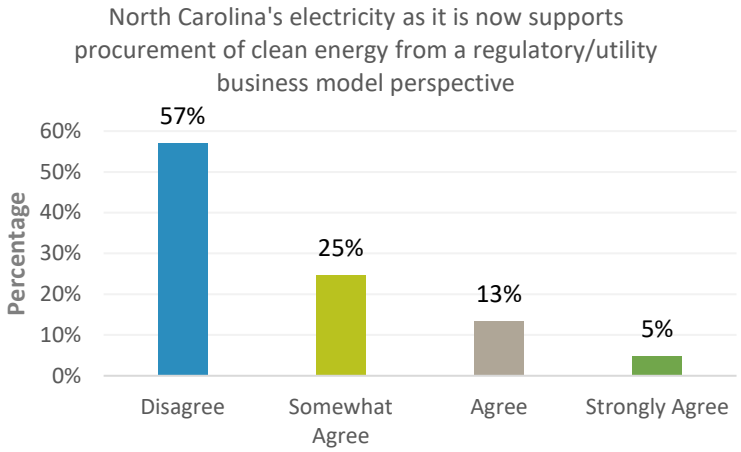


Figure 4: Polling Results from All Events (Statement 3 – Clean Energy Procurement)

There was less of a consensus built around whether or not NC's electric system is capable of accommodating increasing levels of renewable energy, with roughly half (53%) of participants stating that they somewhat agreed or agreed with the statement, and 34% stating they disagreed (Figure 5). In further discussions, participants commented that there is room for growth in terms of RE added to the grid, but that there does not seem to be an incentive to do so from a utility perspective. Participants mentioned that renewable energy is no longer cost prohibitive, so new renewable resources should be added to the grid at a higher rate than they are currently.

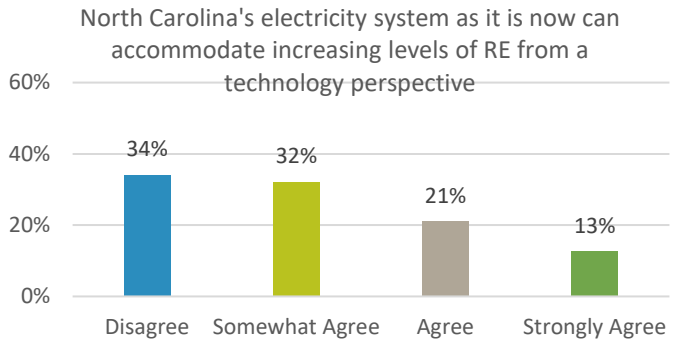


Figure 5: Polling Results from All Events (Statement 4 – Grid Capacity for Renewable Energy)

A major theme that emerged at most public engagement events was the issue of equitable access to energy. Members of the public expressed that low income and minority communities are often impacted the most by high energy costs, spending disproportionately large percentages of their monthly income on energy bills. The point was also raised that existing deployed renewable energy resources in NC do not necessarily benefit those low income or minority communities living closest to them. Participants wanted the CEP to address the environmental and societal impacts that existing fossil fuel infrastructure has on marginalized areas in the state, as well as the displaced jobs that would result from the transition to cleaner energy technologies as traditional plants are displaced or downscaled. Many Workshop 1 and regional listening session participants highlighted the need for equity and environmental justice to be considered not just as a component of the CEP, but as a central issue to be addressed throughout all potential recommendations. The polling results from this question are illustrated below in Figure 6.

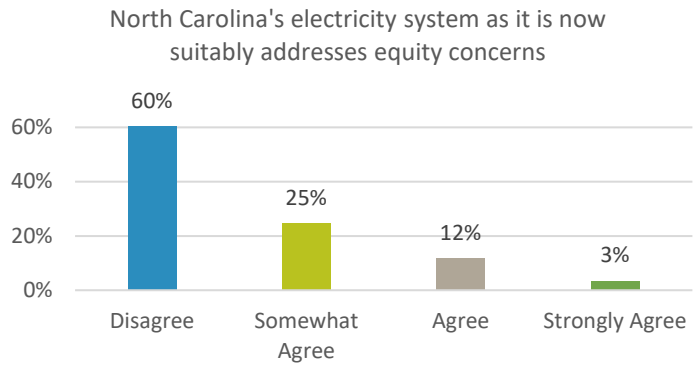


Figure 6: Polling Results from All Events (Statement 5 – Equitable Access)

Participants indicated that they disagreed or somewhat agreed that NC's electricity system is reliable and resilient in the face of severe weather (Figure 7). Many individuals, particularly in eastern locations that were hit harder by recent hurricanes, cited incidents where power was out for extended periods of time after major storms. But there was some discourse about the differences between reliability and resiliency, which was part of the reason for the lack of consensus. Overall, the participants indicated that NC's electricity system is very reliable, providing power when called upon. However, the participants noted that due to size and frequency of past weather events and expected future events, the resiliency of the electricity system will be challenged to continue to provide vital services in the wake of disaster events and during periods of recovery.

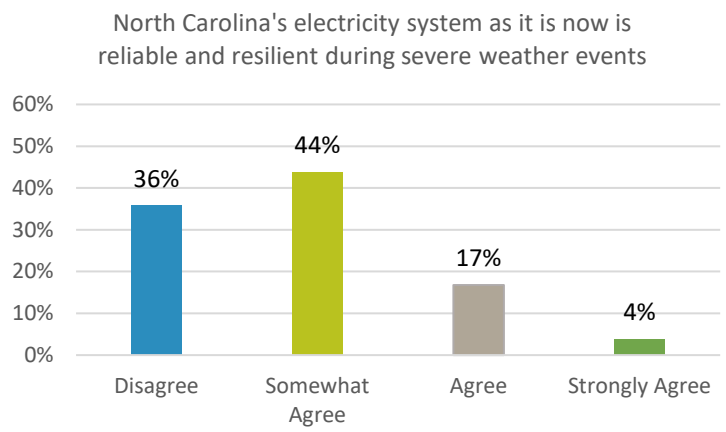


Figure 7: Polling Results from All Events (Statement 6 – Reliability and Resiliency)

2.2 Values to Uphold and Promote Going Forward

In addition to the interactive polling exercise described above, participants of Workshop 1 and Listening Sessions/combined events provided input about important values to consider in the development of a CEP and going forward into a clean energy future. Participants were provided a list of values created by DEQ staff, comprised of 27 values or tenants in the categories of Community and Society, Grid and Resource Planning, Consumer, and Economy, and were asked to pick their top three values from the entire list. Choices of values are as follows:

- Community choice
- Environmental justice
- Equity
- Fairness
- Affordability
- Public policy leadership
- Environmental/carbon reduction
- Conservation
- Efficiency
- Public health
- Universal service
- Regulatory certainty
- Future-focused (longer planning horizons, lower stranded assets)
- Utility compensation aligned with public interest
- Energy independence
- Safety
- Reliability
- Resiliency
- Security (physical/cyber)
- Adaptive
- Customer choice
- Customer satisfaction
- Third-party and customer data access/ownership
- Competition
- Innovation
- Economic/job growth
- Grid investment efficiency

Following the worksheet activity, participants of Listening Sessions engaged in a brief dialogue about why they voted in the manner they did, and DEQ was able to further develop an understanding of values that are important to members of the public. These values were used throughout the CEP development process to ensure the stakeholder activities, discussions, and prioritization of actions and recommendations were based on the public's greatest needs.

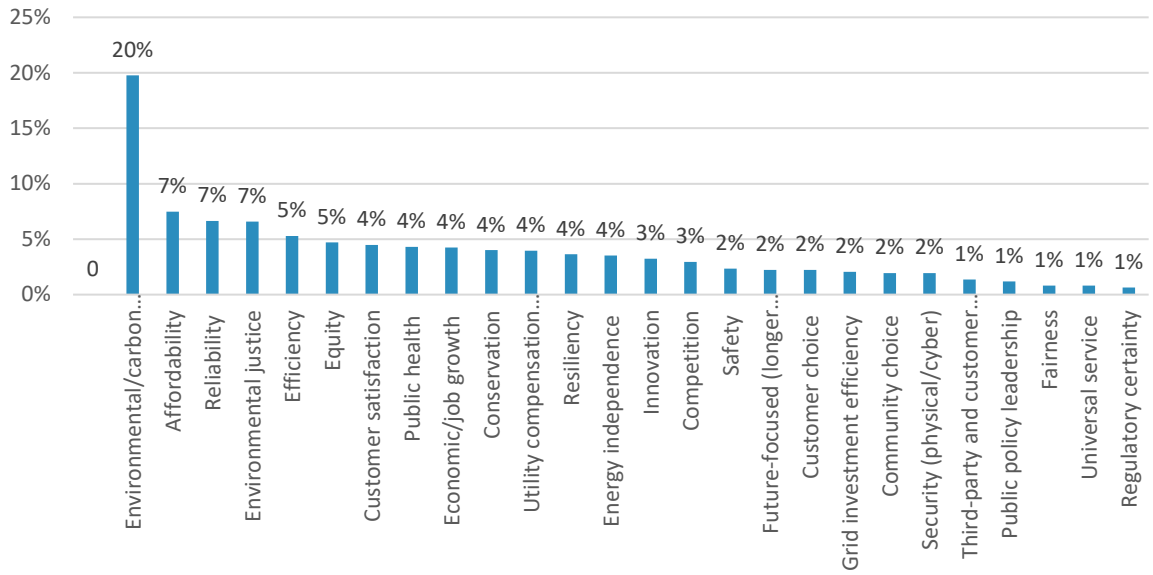


Figure 8: Selection of Key Values from All Events

Figure 8 summarizes the consensus around key values selected by the stakeholders. There were 459 respondents to the values survey, across all engagement methods, with each participant marking three (3) top values. Environment and carbon reduction ranked first, at 20% of all responses, followed by affordability, reliability, and environmental justice at 7%. Other values below these top 4 were all at 5% or lower, with many falling in the 4% range. Many of the top values were related to community and society, including affordability, environmental justice, equity, and carbon reduction, among others. There was overwhelming consensus around the environment and carbon reduction value across all events, including from the business and industry community (represented at NCMA and ESI events), clearly indicating that the public believes this should be a top priority in a clean energy transition and future.

Community and social values were emphasized in many comments and points of discussion during these regional listening sessions, as was the need for a CEP that addresses decarbonization of the electricity sector. The environmental and carbon reduction value was ranked in the top 3 values in all the surveys including those at the Workshop, regional listening sessions and combined events. Affordability, equity, and environmental justice were also of high priority to participants, but were not always ranked in the top 3 values at every event.

2.3 Features of Existing Electricity System to Maintain

During the Public Engagement Process, participants were asked to consider what features of the existing system should be maintained going forward with a transition to a clean energy economy. Feedback was collected at Workshop 2, all regional listening sessions via notecards and worksheets and the online input portal.

Features of the system that participants wanted to retain included: grid reliability and safety, innovation, affordability, past and existing incentives for renewable energy, and NC's regional leadership in the

growth of solar energy. Participants indicated that several of these features, particularly renewable energy incentives, should be maintained going forward but should be expanded well beyond their current scope to be more effective statewide. Although members of the public were concerned about the grid's reliability during severe weather events, most participants seemed to agree that the grid and electricity system is reliable on a routine basis, and provides safe and affordable power to residents of NC.

2.4 Challenges to the Deployment of Clean Energy Resources

In order to help identify opportunities for the transition to a clean energy economy, participants in the public engagement process were asked to describe features of the existing energy system that they viewed as challenges to the deployment of clean energy resources and technology. Participants of Workshop 1 were asked to consider this question as part of their post-Workshop working group assignments, which were presented at Workshop 2. Listening Session participants were also asked to consider this same question at the end of the event. Feedback was collected on notecards during the event and via online submission after the event.

Challenges that were described and discussed at all events clustered around several common themes. Many participants identified myriad policy barriers to clean energy procurement, deployment, and research and development. One comment that was echoed often was the outdated nature of the utility business model. Members of the public and stakeholders that contributed to the discussion about this issue mentioned that the lack of customer voice in the decision making process related to energy and the lack of customer choice when it comes to the source of their energy. Participants also mentioned the lack of competition in the state and the ability to implement lower cost energy resources into system planning as barriers to NC's clean energy future.

A lack of equitable access to affordable and clean energy was another challenge that participants identified as something that needed to be changed going forward. As mentioned previously, Workshop and regional listening session participants recognized that the existing system does not equally benefit all users across the state, and should be modified to ensure that equitable access to clean energy is prioritized going forward.

2.5 Vision of a Clean Energy Future for North Carolina

Feedback from Workshops, public engagement at Listening Sessions and other events, and online comments were compiled over the course of the CEP development process in order to determine a collective vision for a clean energy future. Participants from Workshop 1 were asked to consider the question of what their vision for a clean energy future would look like at the conclusion of Workshop 1, and were asked to present their thoughts at Workshop 2. The same questions that were asked to Workshop participants were also posed at regional listening sessions and via the online comment portal.

Workshop participants were separated into the following working groups to determine a collective vision:

1. Environmental groups
2. Utilities
3. Local governments
4. Consumer advocates

5. DER/RE providers and advocates
6. Business groups
7. Higher education

Each group was asked to respond to the following questions:

- What are the group's three priority goals for participating in the CEP process?
- What are some motivating factors for you, your organization, or the people your organization represents that you would like the state representatives and/or other stakeholders to understand better?
- What is your vision of a clean energy future for NC? (please state this in 1-2 sentences)
- What three features of the existing system do you see as challenges to deployment of clean energy resources that should be addressed going forward?
- What three features of the existing system do you want to ensure are maintained going forward to support deployment of clean energy resources?

Groups created brief presentations focusing on their answers to these questions, and their work products were presented at Workshop 2 and are included as reference material in the Appendix.

3. Assessing the Changing Energy Landscape

Workshops 3 and 4 were focused on identifying policy and technology trends that are influencing how clean energy use is fostered in NC. Presentations from experts focused on the changing landscape from the lens of new clean energy opportunities, evolving regulatory structures and concepts, and grid modernization and planning. During each of these presentation panels, participants were asked to consider the following questions:

1. National and state-level trends that present opportunities that I would like NC to explore
2. Barriers to capturing these opportunities in NC that need to be addressed
3. National and state-level trends that present challenges that I would like NC to avoid

Summaries of the issues raised by participants related to these questions are presented in the next two sections.

3.1 National Trends

National and state-level trends related to new clean energy opportunities spanned a range of topics. Participants suggested that NC should focus on the trends around distributed energy planning at a utility level, (including specifics such as switching to a distributed resource planning model), evolving regulatory compensation structures to allow for more DDERs and EE, creating performance-based incentives for utilities, and increasing competition in the utility market. Energy efficiency was focused on as a resource, and participants wanted to see increased EE opportunities for large communities and industrial users. Additionally, participants noted that incentives should be structured to align with the benefits of reducing energy usage and GHG emissions. It was recognized that most of these options for progress require utility or NCUC action, so participants highlighted the need for both of these entities to be involved in the conversation about new opportunities in the clean energy space in NC.

Participants also identified national trends that NC should avoid in the future. Current national trends related to new clean energy opportunities too often omit equity and environmental justice as a policy and system-level consideration, and participants urged NC to consider equity throughout the decision making process, not just as a single element. Participants also mentioned the heavy burden that low-income rate-payers bear.

3.2 Barriers to Action in NC

Many participants identified the current utility structure and business model as a barrier to clean energy adoption, and called for third-party competition or business model reform to address this. There was an emphasis on education about issues related to clean energy, and participants noted that gaps in public knowledge about clean energy could prove to be a challenge in the coming years. In addition to having progressive policies related to clean energy adoption, participants underscored the need to improve public education related to the topic. Participants also emphasized that large investments in fossil fuel infrastructure that are being decided upon currently could complicate the transition to a clean energy economy, with outdated infrastructure becoming a stranded asset in the future. Finally, there was emphasis on the lack of focus on energy efficiency policy in the state, something participants had identified as something they wanted NC to explore going forward.

3.3 Workgroup Deliberation

Based on the discussions at Workshop 3, participants organized into working groups based on one of the following seven topics:

1. Customer Access to Renewables
2. DERs and Interconnection
3. Grid Modernization
4. Utility Business Model
5. Utility System Planning and Investment
6. Equitable Access and Just Transition
7. Grid Resiliency Enhancements

Table 8 (next page) details the stakeholders that were a part of each working group. It is important to note the diverse mix of organizations that entered into conversations about what often developed into complex topics.

Table 7: Memorandum Working Group Members

Working Group Name	Working Group Members
Customer Access to Renewables	Paul Cameron (City of Durham), Christy Daniel (Duke Energy), Tobin Freid (Durham County), Erik Hall (NCSU), Kathy Kaufman (Town of Carrboro), Adam Long (UNC Chapel Hill), Greg Sponseller (City of Raleigh),
DERs and Interconnection	Sterling Bowen (private citizen), Richard Harkrader (Carolina Solar Energy), Autumn Proudlove (NC CETC), Elizabeth Severt (Cape Fear Public Utility Authority), David Tsai (Duke Energy)
Grid Modernization	Lori Collins (DEQ), Chris Doerfler (3DFS), Anne Lazarides (NC WARD), Greg Monty (NC A&T State University), Evan Shearer (Duke Energy), Joe Stevens (Duke Energy)
Utility Business Model	Sarah Adair (Duke Energy), Zach Ambrose (Ambrose Strategy), Daniel Brookshire (NCSEA), Dionne Delli-Gatti (EDF), Molly Diggins (Sierra Club)' Nick Jimenez (SELC), Miriam Makhyoun (EQ Research), Ryan Miller (NCBPA' Paul Mott (NC Electric Cooperatives)' Sally Robertson (NC WARN)' John Thigpen (NRDC), Jennifer Weiss (Nicholas Institute), Michael Youth (NC Electric Cooperatives)
Utility System Planning and Investment	Charles Bayless (NC Electric Cooperatives), Vickie Foust (NC A&T State University), Simon Sandler (NC CETC), Will Scott (NC Conservation Network), Andrew White (First Solar)
Equitable Access and Just Transition	Jacquie Ayala (NC Justice Center), Dale Evarts (Private Citizen), Tiffany Hartung (The Nature Conservancy), Mike Hughes (Duke Energy), Aiden Graham (NC State AFL-CIO), Rory McIlmoil (Appalachian Voices), Daniel Parkhurst (Clean Air Carolina), Walter Robinson (NC State Climate Office), Nicole Spivey (Private Citizen), Alvin Warwick (IBEW), Rachel Weber (Dogwood Alliance)
Grid Resiliency Enhancements	Robert Cox (UNC-Charlotte), William Geisler (1ROK Energy), CC Maurer (Advanced Energy), Vicki Lee Parker (NC Business Council), Jamie Russell (App State), Evan Shearer (Duke Energy)

In between Workshops 3 and 4, these stakeholders met with each other, outside experts, and other relevant organizations to create a 2-page memorandum that addressed the following questions:

1. Briefly describe the nature of this policy tension/question - what is happening?
2. To what extent does this policy tension exist in NC? If it exists, why is it relevant to the state?
3. What policy or regulatory action might be required to address the tradeoffs you see? What entity would need to take the action you've identified?
4. How are people in other places responding to this tension? What are the most innovative and promising solutions? Do these responses seem feasible in NC?
5. Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

The stakeholder groups presented their draft memorandums during Workshop 4, where they answered questions and received feedback from the stakeholder group. Memos were then revised before Workshop 5, often involving much deliberation on the part of the stakeholders outside of the Workshops. Groups were also asked to note when there was consensus or disagreement about these questions amongst group members, as well as anything else related to the topic that the group wanted to comment on that was not already addressed. These memorandums may not represent consensus in all cases, but serve to highlight items of interest or importance that were needed to forward the vision outlines in previous Workshops. To see full group memorandums, see the Appendix.

4. Policy and Action Recommendations

4.1 Identifying Action Areas

After extensive review of comments and feedback from the Public Engagement Process, DEQ determined four central categories that were addressed most often during discussion.

- Utility Incentives and Comprehensive System Planning
- Customer Choice and Economic Development
- Equitable Access and Just Transition
- Carbon Reduction and Resilience
- Beneficial Electrification and Energy Efficiency

Within these four categories, eleven Action Areas were identified. The first seven of these served as the basis for stakeholder workgroups that were formed at Workshop 3. Each workgroup was tasked with creating a memorandum for consideration by DEQ containing specific policy recommendations to address their Action Area. Memorandums were submitted at Workshop 4 for review by the stakeholder participants, and then were revised prior to Workshop 5. The recommendations in these memorandums informed DEQ's policy recommendations presented in the Policy and Action Recommendations chapter of this report. For the full memorandums created by each workgroup, see the Appendix.

Workshops 5 and 6 focused on prioritizing recommendations that were determined throughout the Public Engagement Process. Stakeholders wrote down two recommendations that they found important, and then went through a prioritization exercise where each individual was asked to rank the importance of five other participants' proposed recommendations. From this scoring exercise, a list of prioritized recommendations was produced for break out discussion by the stakeholders. The following sections detail the proposed recommendations for each action area as well as the workgroups' sense of what entities would need to take action on each recommendation. Additional comments provided by the stakeholders about these recommendations are also included in Tables 8-12.

The prioritized recommendations that were elevated by the stakeholders during Workshops 5 and 6 form the basis of the Policy and Action Recommendations section of the CEP.

4.1.1 Recommendations for Customer Choice and Economic Development

The following table presents the full list of recommendations for the strategy area *Customer Choice and Economic Development* that were considered by the stakeholder group.

Table 8: Customer Choice and Economic Development Recommendations

Focus Area	Specific Recommendation	Key Actors	Additional Information	Source of Recommendation
Increase customer access to clean energy resources	End ban on third-party sales of electricity	Legislature	Allow for new renewable energy procurement options	Memo, Cities Initiative
	Achieve greater participation from smaller customers by revising Duke Energy's Green Source Advantage Program under HB589	Duke Energy, NCUC	Allow for new renewable energy procurement options by reducing cost and increasing ease of access of the Green Source Advantage program	Memo, Cities Initiative
	Expand the cap or redesign the solar rebates under HB589/allow more participation	Legislature		Memo
	Require utilities to invest in a specific amount of solar paired with storage	Legislature, NCUC		Memo
	Implement solar rebate program for co-ops/municipal utilities	Legislature		Memo
	Require utilities to offer virtual or group net metering	NCUC, Legislature, IOUs, Co-ops, Municipal providers	Provides options for renters and customers without suitable sites for solar and option to subscribe to community solar programs	Memo
	Require incorporation of value of solar when considering net metering terms	NCUC		Memo
	Require utilities to provide an easy option to purchase renewable energy through electric bills	NCUC, IOUs, Co-ops, Municipal providers	Provide a voluntary option for customers to be able to purchase renewable energy through their utility to serve their power needs, via a credit/billing mechanism on their utility bill.	Memo
	Restore the 35% renewable energy state tax credit	Legislature		Memo

	Enact a statewide commercial PACE and Pay As You Save programs	Legislature, NCUC	NC allows PACE financing. However, the State does not have active PACE programs. Administration burden of the program at the county level is too high, and requires state-level approval.	Memo
	Aggregate data access at a safe level to allow local governments to prioritize programs (e.g. assistance to low-income, high energy-burden communities)	Legislature, NCUC or utility partnership	Due to privacy concerns, NC utilities do not provide third parties with access to customer usage data aggregated at a fine level. Utilities can propose aggregation of data at a level that enables cities to prioritize programs in energy-burden communities or meet other similar needs.	Cities Initiative
	Legislative action to provide market certainty for offshore wind (OSW) industry in North Carolina (developers, supply chain manufacturers, etc.)	Legislature, Governor		Other
	Assess and evaluate transmission infrastructure necessary to accommodate the electricity produced from OSW resources and wheel it to load centers in the Piedmont	IOUs, NCUC		Other
Facilitate interconnection of greater Distributed Energy Resources (DERs) and compensate them for the value added to the grid	Design tariffs that provide accurate price signals to demand-side resources about costs and value to the grid (e.g. more robust Time of Use (TOU) pricing and/or Real Time Pricing)	Legislature, NCUC	Utilities can send price signals to DER owners, which can help them maximize their return on investment. Tariffs can shift system peak which may need to be considered.	Memo
	Implement compensation tariffs for DERs such as Value of DERs tariff	Legislature, NCUC		Memo
	Improve interconnection processes	Legislature, NCUC, Utility partnership	Fast-tracking of interconnection for systems paired with energy storage, enforcement of required response time in the Interconnection Standard, interconnection standards as well as process improvements, utilities providing interconnection capacity by feeder or area so developers can target those feeders or areas	Memo
	Identify optimal locations for distributed generation based on current grid infrastructure	NCUC, Utility	Can be accomplished by compiling hosting capacity maps	Cities Initiative

	Support compensation for generators or load that responds to dispatch signals or prices (e.g. storage-paired resources)	Legislature, NCUC, Utility	Bring Your Own Device program can provide compensation rate or incentive for participating. Rules for participants would need to be established (i.e., allowing utility to control the system a t certain times)	Memo
	Inclusion of non-wires alternatives (NWAs) in the planning of T&D upgrades (e.g. distribution deferral through energy storage) procured typically through an RFP or a tariff designed to compensate NWA	Legislature, NCUC		Memo
	Upgrade electric grid to accommodate more DERs	Utilities	Physical or virtual changes to the distribution system that enable more variable load or greater utilization of DERs such as smart meters, improved communication infrastructure, data transparency and accessibility, voltage regulators or line and substation capacitors	Memo
Increase clean energy economic development opportunities	Develop a local government supported green energy bank	Legislative action and/or partnership		Cities Initiative
	Convene Entrepreneurship Task Force to foster innovation and commercialization of energy related businesses and technologies (include universities, investors, utilities, large energy companies, incubators, and entrepreneurs)	Governor, State Agencies, Local Governments, Businesses	1. Identify a lead organization (e.g., university) and invite members; 2. Create survey of region's energy entrepreneurship ecosystem; 3. Determine survey cost and identify funders; 4. Understand region's strengths and gaps	SEIC
	Identify the region's suppliers/supply of energy workforce and employers/demand for energy workforce to calculate the region's workforce shortage/surplus and other characteristics	Governor, State Agencies, Local Government, Universities, Businesses	Offer policy recommendations regarding energy workforce need; Guide colleges/universities in academic/training offerings	SEIC
	Develop a searchable online inventory of region's energy sectors and assets	State Agencies, Universities		SEIC
	Conduct (1) an OSW supply chain assessment and (2) a ports and other transportation infrastructure assessment to identify State assets and resource gaps for OSW industry in North Carolina	Dept of Commerce, Ports Authority, Dept of Transportation, chambers of commerce, economic developers		Other

4.1.2 Recommendations for Equitable Access and Just Transition

The following table presents the full list of recommendations for the strategy area *Equitable Access and Just Transition* that were considered by the stakeholder group.

Table 9: Equitable Access and Just Transition Recommendations

Focus Area	Specific Recommendation	Key Actors	Additional Information	Source of Recommendation
Address equitable access and energy affordability	Develop roof top solar and community solar rebate programs to increase access to diverse groups of customers, especially low-income	Legislature, NCUC		Other
	Implement a Percentage of Income Payment Program (PIPP) combined with a weatherization component	Legislature, NCUC, DEQ, NCCAA	Ohio PIPP/ Electric Partnership Plan (EPP) and Maryland examples	Memo
	Eliminate or dramatically reduce fixed charges	NCUC		Memo
	Include non-energy benefits (NEBs) in cost-effectiveness testing	NCUC, Legislature		
	Invest more in low-income home repair, efficiency, and weatherization programs (also, see PiPP above), and appliance rental programs, particularly for multifamily housing and mobile homes.	Governor, Legislature, DEQ, NCORR, DHHS, Local Gov.		Memo
	Create a state-wide project management coordination system for delivery of energy efficiency, urgent repair, and weatherization programs, to hold these programs to a state-wide standard	DEQ, DHHS, Local Gov.		Memo
	Expand tariffed on-bill financing programs or rural cooperatives and municipal utilities by creating, hiring, or facilitating the NC Electric Membership Corp (NCEMC) to be a state-level program administrator	NCEMC, Local Gov.		Memo
	Create a Green Bank & Loan Loss Reserve Fund to make efficiency, renewables, and repair dollars available to gov. buildings, public power providers, rural electric cooperatives, schools, etc.	Governor, DEQ, Commerce, Third-Party administrator, Local Gov.	e.g., Greenbank network.org	Memo

Foster a just transition to clean energy	Expand DEQ's authority to require the use of Cumulative Impact Mapping & Analysis and an Environmental Justice Impact Analysis in decisions regarding permits and permit renewals	Legislature, Environmental Management Commissions, DEQ	Legislative action needed to give DEQ this authority; DEQ may need to make investments in monitoring program ($$ from state budget)	Memo
	Implement carbon pricing policy that dramatically reduces carbon emissions and sets up Polluter Pay Funds, with the majority of revenue going back to frontline and vulnerable communities	Legislature		Memo
	Target investment in resilient infrastructure and technical assistance for flood mitigation and climate adaptation/resilience planning in climate-vulnerable and low-income communities	DEQ, Housing Finance Agency, USDA, NCORR, Local Governments		Memo
	Increase funding to the NC housing trust fund to reduce the disproportionate burden communities of color and poor communities bear from climate impacts	Legislature		Memo
	Targeted investment in renewables, energy efficiency, home repair, and weatherization training programs through partnerships with schools	DEQ, Commerce, Education, Local Gov.		Memo
	Create long-term jobs with family-sustaining wages and benefits for low income communities in renewables/grid infrastructure industries	Legislature, DEQ, Commerce, Local Gov.		Memo
	Drive up labor standards in the solar industry by prioritizing contractors that provide family-sustaining wages and benefits for utility scale solar contracts, particularly those with any public funding	Commerce, Governor, Local Gov.		Memo
	Expand existing Registered Apprenticeship Programs (RAPs) to create career pathways across the energy sector	Commerce, Governor, DEQ, Local Gov, Higher Education		Memo
	Technical assistance for local community from state and utility in planning for community transition where power plants are retired	DEQ, Commerce, NCUC, IOUs, Local Gov, Higher Education		Memo
	Encourage Women Minority Owned Business Enterprise (WMBE) contracts and hiring through tax incentives and policy requirement	Governor, Commerce, Legislature		Memo
	Develop best practices that guarantee protections for displaced fossil fuel workers	NCUC, Commerce, IOUs, DEQ, Local Gov.		Memo

4.1.3 Recommendations for Carbon Reduction and Resilience

The following table presents the full list of recommendations for the strategy area *Carbon Reduction and Resilience* that were considered by the stakeholder group.

Table 10: Carbon Reduction and Resilience Recommendations

Focus Area	Specific Recommendation	Key Actors	Additional Information	Source of Recommendation
Strengthen resilience and flexibility of the grid	Update the State Energy Assurance Plan to reflect 1) existing reporting requirements (fed, state, local, etc.) to reduce redundancies. 2) cybersecurity concerns and publicly available data	State agencies, Universities, Utilities		Memo
	Coordinate resilience planning with DROC (disaster recovery operations center) and require NC Emergency Management's Recovery Support Functions to address cybersecurity concerns in conjunction with energy resiliency issues.	Governor, NC Office of Recovery and Resiliency, DEQ		Other
	Develop an active energy Resilience Planning Resource to assist local governments and disadvantaged communities	Universities, Governor, Local Government, State Agencies		Memo
	Use defense in depth or a layered grid approach to increase reliability and improve resilience	NCUC, Utilities		Memo
	Develop a system that formalizes how to quantify human costs of power outages	NCUC, Universities, Governor		Memo
	Create pilots that offer DER & community energy solutions and microgrids at state facilities an critical facilities (e.g., emergency responder stations, public shelters, medical facilities)	Governor, State agencies, Utilities, NCUC, Local government		Memo
Develop pathways to further	Set carbon mass cap on the electric power sector for 2030, 2040 and 2050	Legislature, NCUC	Amend Chapter 62 of the N.C. General Statutes to allow NCUC to consider additional objectives such as carbon emissions reduction. Establish	Memo

decarbonize the electric power sector			measurement methods and tools to track the progress.	
	Require addition of carbon pricing when considering least cost resources for IRP	Legislature, NCUC	Amend Chapter 62 of the N.C. General Statutes to allow NCUC to consider additional objectives such as carbon reduction. For example, require economic costs and risks associated with climate change in least cost utility system planning.	Memo
	Increase renewable energy and energy efficiency targets in state renewable portfolio standard for 2030.	Legislature		Other
	Use innovative rate design to encourage customer behavior that helps achieve clean energy goals, such as "clean peak" generation and storage deployment	Legislature, NCUC	Can offer reduced dependence on gas combustion turbines (CTs) for peaking and encourage solar/storage pairing	Memo
	Evaluate benefits and disadvantages of establishing an instate carbon (GHG) emissions trading program or NC joining a regional carbon (GHG) emissions trading program	Governor, Legislature Environmental Management Commission, DEQ		Memo
	Incorporate GHG scoring for state funded projects (e.g. State Transportation Improvement Program, Clean Water State Revolving Fund, Drinking Water State Revolving Fund)	Governor, Legislature, state agencies, local government	1. Add GHG impact to project scoring formulas 2. State should ask for guidance on the scoring formula from cities with carbon goals or policies	Cities Initiative
	Develop implementation pathways for policy measures identified in a study currently underway that will determine the extent and location of available biogas/biomethane resources in the state and the percentage of NC's GHG reductions that can be met with biomethane	Duke University, RTI, East Carolina University	RTI, International is leading an analysis between Itself, Duke University and East Carolina University to measure available biomethane and the probabilities, based on technical and economic factors, for its development. The analysis will include determining the climate, environmental, societal, and economic effects of the use of biogas and will recommend policy measures to accelerate biomethane development, and the best uses for the gas (ie, transportation fuel, RNG/pipeline, on-site energy generation).	

	Facilitate renewable natural gas (RNG) transport to end users and buyers to accelerate development / accelerate GHG reductions from in-state biomethane sources	NCUC, Local Distribution Companies, Dept. of Transportation, Commerce, and Agriculture		
	Create technical support services for biomethane development, particularly for suppliers who own the waste but are not engaged in biomethane production for their primary income.	Governor, DOT, Dept. of Transportation, Commerce, and Agriculture		
Create strategies for electrification in transportation and consumer energy use sectors	Conduct an analysis of the costs and benefits of using electrification to reduce energy burden and GHG emissions in consumer end-use sectors in NC, such as in homes, buildings, transportation and agriculture sectors	DEQ, DOT, DOC, Universities,		
	Develop rate structures that help make charging EVs economic and encourage off-peak charging of vehicles (e.g. time of use pricing)	NCUC, Governor, Legislature	Rate design can make it economically viable to install charging in locations like multi-family dwellings, workplaces, and other public places. It can also help EV drivers save money as well as reduce overall power system costs and emissions	Other
	Amend building codes and standards to support EV adoption	Governor, NC Building Code Council, Legislature	For example, new multi-family and single family homes could be required to be EV-infrastructure ready	
	Increase the use of EVs in public transportation and evaluate options for transitioning public transit, public and private fleet transportation, and other modes of transport to higher utilization of EVs.	Public transit districts, local governments, private fleet managers, utilities		
	Increase electric transportation access for low-income consumers	Utilities, NCUC, Legislature		
	Adopt EV bulk purchasing programs to address EV adoption obstacles	DOA, DOC, Local government	Bring together local governments, nonprofits, electric utilities, auto dealerships, and auto manufacturers to boost EV sales through a combination of community engagement and EV purchasing incentives.	

	Adopt procurement policies for all state agencies to purchase a certain number of EVs based on operational and economically feasible options for the agency.	Governor's office, DOA		
	Encourage public and private entities to promote EV adoption by offering EV charging infrastructure at the workplace.	Local and state government, private businesses	Private business owners can offer EV charging at workplaces, the state government could incentivize infrastructure at private locations, or the utilities can help by adopting rate design that encourages this, or they can offer incentives to get infrastructure installed.	

4.1.4 Recommendations for Utility Incentives and Comprehensive System Planning

The following table presents the full list of recommendations for the strategy area *Utility Incentives and Comprehensive System Planning* that were considered by the stakeholder group.

Table 11: Utility Incentives and Comprehensive System Planning Recommendations

Focus Area	Specific Recommendation	Key Actors	Additional Information	Source of Recommendation
Modernize the electric grid to support clean energy resources	Require better utilization of energy efficiency, storage and renewables to manage peak demand	NCUC		Other
	Support regionally appropriate DERs	IOUs, Rural Cooperatives and Public Power providers	e.g., appropriately sited solar on the distribution grid. Ask utilities to analyze cities/towns and identify optimal locations for distributed generation based on current grid infrastructure	Memo, Cities Initiative
	Support energy storage that provides localized power to offset demand	State/Local Government, Private sector		Memo, Corporations and Large Users
	Utilize smart inverters, transformers and power controllers that facilitate bidirectional flow of power	IOUs, Rural Cooperatives and Public Power providers		Memo
	Utilize capacity improving investments to aid faster, more stable redirection of power as needed	IOUs, Rural Cooperatives and Public Power providers		Memo
	Assess feasibility of new incentive structures for suppliers, consumers, and technology providers to deliver solutions to the grid to enable high levels of renewable generation	NCUC, Legislature, Governor	Create a workgroup to evaluate this option	Memo, Corporations and Large Users
	Develop framework for transparent analysis and decision making	NCUC	Create a workgroup to evaluate this option, e.g., solar + storage projects beginning to out-compete new natural gas facilities	Memo
	Create a technical framework for real time asset management and situational awareness on the distribution grid	NCUC	Create a workgroup to evaluate this option	Memo

	Explore alternate cost recovery and/or incentives for utilities and third parties to invest in grid upgrades, storage investments and renewable sources	NCUC, Legislature, Governor	Create a workgroup to evaluate this option. Develop a public/private entity supported state clean energy fund (e.g., green energy bank)	Memo, Corporations and Large Users, Cities Initiative
	Increase speed and transparency of the interconnection process by updating or easing interconnection rules to facilitate higher levels of DERs	NCUC, Legislature	Create a workgroup to evaluate this option. Request a SOP to provide early determinations if interconnection requests are feasible	Memo, Corporations and Large Users, Cities Initiative
	Create accountability of progress made towards grid modernization by setting goals, targets, timelines and communication mechanisms to inform stakeholders	NCUC	e.g., CO2 reduction, DER integration, reduction of outage time	Memo
Modernize utility business model	Shift to a performance-based regulatory model (potentially including but not limited to Multi-Year Rate Plans, Performance Incentive Mechanisms)	NCUC, Legislature		Memo
	Launch public process to align utility incentives with public interest and grid needs	NCUC, Governor		Memo
	Support beneficial electrification	NCUC, IOUs, Rural Cooperatives and Public Power providers, State/Local Government, Private sector	e.g., more electric-vehicle supply equipment (EVSE), potentially via a Low-Carbon Fuel Standard (LCFS); electric water heaters; heat pumps; etc.	Memo
	Implement revenue decoupling	NCUC, Legislature	i.e. remove linkage between utility revenue and kwh sales	Memo
	Support shared savings mechanisms	NCUC, IOUs, Rural Cooperatives and Public Power providers	i.e. utility sharing potential savings with customers for energy efficiency and demand-side management	Memo
	Explore and implement new procurement models to incentivize least cost procurement, including non-wires alternatives	NCUC, Legislature, Governor	e.g., green tariffs (already exploring with Green Source Advantage (GSA)), competitive solicitations (already exploring with Competitive Procurement of Renewable Energy (CPRE) program), aggregating DERs to	Memo

			provide services (e.g., bring your own device (e.g., batteries, thermostat))	
	Explore and implement new tools to more quickly retire carbon-intensive utility assets			
Require comprehensive utility system planning processes and investment strategy reviews	Establish stakeholder-centered generation, transmission, and distribution system planning process that requires Duke Energy (DEP/DEC) to transition from an IRP to an Integrated System Operations Plan (ISOP) using a holistic, iterative and transparent process	Duke Energy (DEP/DEC), Legislature, NCUC, SCUC	Process should initially include an Integrated Resource Plan (IRP) and Integrated Distribution Plan (IDP), ultimately moving towards an Integrated System Operations Plan (ISOP) approach; implementation in 2022 (Duke's goal)	Memo, Southeast Energy Innovation Collaborative
	Enable early stakeholder intervention on plan submissions (filings) and require plans to demonstrate optimization of DER integration, costs, benefits, grid flexibility and compensation mechanisms.	Duke Energy (DEP/DEC), Legislature, NCUC, SCUC	Include full quantification of operation benefits of renewable resources, electric vehicle infrastructure build out, and energy storage	Memo
	Enforce interconnection study timelines for utility scale projects	Duke Energy, NCUC	Feasibility, systems, etc. studies have timelines that the utility is meant to keep, but currently there is no enforcement	Memo
	Expand utility cost benefit methodology to include societal and environmental benefits	NCUC, Legislature		Cities initiative

4.1.5 Recommendations for Energy Efficiency

The following table presents the full list of recommendations for the strategy area *Energy Efficiency* that were considered by the stakeholder group. The recommendations, which were prioritized by Workshop participants, were developed by the Energy Efficiency Roadmap stakeholder process carried out by the Duke University Nicholas Institute. For the full Energy Efficiency Roadmap report, see the Appendix.

Table 12: Energy Efficiency Recommendations

Focus Area	Short-Term (1-3 years) Recommendation	Key Actors	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	
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 Non-Profit	
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)	Non-profit	
Building Code Improvements	Increase energy awareness on NC Building Code Council (Rec 6)	Governor	Establish a defined pathway to net-zero energy-ready homes (Rec 7)

Statewide Clean Energy Fund	Create NC Clean Energy Fund (Rec 18) to include utility financing programs (Rec 19)	Non-Profit	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 non-utility) 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	
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)	Non-Profit, Utilities	
	Improve project management coordination for weatherization, urgent repair (Rec 10) with improved measurement and verification of programs (Rec 11)	Universities, Utilities	

5. Other Recommendations Submitted

5.1 Recommendations from the Corporate Sector

Companies that participated in the CEP stakeholder feedback sessions and signed the letter to Governor Cooper offered several specific suggestions for action (see the Appendix for the full letter). These suggestions were summarized by Ceres and presented at Workshop 4 in Raleigh.

The business community made the following recommendations:

- For energy efficiency, businesses recommended increasing efficiency in the built environment through improved building codes, financing mechanisms to mitigate up-front costs, and new directives and incentives for utility-based energy efficiency programs.[2]
- To improve access to renewable energy, businesses recommended offering more attractive utility green tariff programs, providing more choice in the energy marketplace with options such as third-party purchase power agreements (PPAs) and wholesale market options, and easing the interconnection process.[3]
- To promote the deployment of energy storage, businesses suggested creating incentives for investments such as tax abatement, facilitating integration of energy storage technology projects and making storage an integral part of utility planning.[4] Companies also had specific recommendations to accelerate the deployment of electric vehicles.

5.2 Recommendations from the Agriculture Sector

The following recommendations were offered by members of the agriculture industry from the Energy and Environment Innovation Foundation, LLC and Rivendell Farms of the Carolinas. These representatives participated in the CEP Workshops and submitted a letter which is included in the Appendix.

The proposed recommendations were:

- Conduct a combined farmland use and solar/renewable energy storage GIS mapping study to optimize the use and sustainability of farms, forests and solar production in NC.
- Provide financial incentives for NC Electric Cooperatives to build large community-based solar projects, leveraging the skills and experience of the Cooperatives in negotiating policies that keep the grid resilient, reduce carbon emissions and balance profits.
- Increase collaboration with the farm community to improve coal ash cleanups that may limit investment in solar power and renewable energy.
- Encourage farmers to install solar energy production facilities with a land use and solar energy benefits education and incentive program.

[2] Ceres. (2019, May 22). NC Clean Energy Plan Stakeholder Workshop Presentation: Corporate Support for Clean Energy. Presented at CEP Facilitated Workshop #4.
[3] Ibid.
[4] Ibid.

5.3 Summary of Formally Submitted Comments

The following organizations and groups submitted formal comments about the CEP:

American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)

Appalachian Voices

Business Groups *(Ameresco, Appalachian Mountain Brewery, Arjuna Capital, CREE, Ingersoll Rand, Mars Inc., New Beligium Brewing, National Association of Energy Service Companies, Sierra Nevada Brewing Company, Schneider Electric, Unilever)*

DEQ Environmental Justice Board - Clean and Equitable Transition Subcommittee

Duke University

Energy and Environment Innovation Foundation and Rivendell Farms

Environmental Groups *(Southern Environmental Law Center, Environmental Defense Fund, NRDC, NC Conservation Network, Sierra Club, NC League of Conservation Voters)*

NC Clean Energy Business Alliance (NCCEBA)

NC Sustainable Energy Association (NCSEA)

NC WARN

Southern Environmental Law Center (SELC)

UNC School of Law

These formal letters are included in the Appendix in their original form, but the recommendations that were proposed by these groups are summarized here in the order listed above. DEQ has incorporated those recommendations that are consistent with the priorities identified through the Workshop process and in alignment with the overall CEP goals

AFL-CIO

- DEQ should integrate "Just Transition" as a core principle of its CEP, utilizing the ILO's framework for implementation, as well as codify best practices & include as recommended protections for displaced workers in the fossil fuel industry
- Create a "Just Transition Task Force" to oversee the implementation of EO 80 Recommendations and to outline best practices for displaced workers and communities impacted by coal plant closures and the transition to a renewable energy economy
- Provide guaranteed seats for stakeholders within Labor, workers in impacted industries, and residents of communities that stand to lose significant revenue in the tax base from coal plant closures
- Create a dedicated funding stream for workforce training, bridge funding for displaced and transitioning workers, and other priorities as identified by the "Just Transition Task Force"
- Look to other states, particularly those in the US Climate Alliance, for best practices and models for implementation of EO 80 Recommendations

Appalachian Voices

- Important to include rural areas & the electric co-ops that serve them in planning & implementation of CEP
- Expanded investments in energy efficiency & distributed solar can address problem of energy cost to households below federal poverty level – disproportionately high now
- Co-ops set rates without public oversight or accountability; ignore need for energy efficiency investments, especially among low-income households
- Rural communities largely left out of benefitting from energy savings, jobs, & economic development due to expanded investment in renewables & energy efficiency
- Address significant barriers to expanding clean energy opportunities for rural & low-income communities: inequitable & harmful rate structures, lack of regulation of & lack of transparency of co-ops; commit a substantial amount of dedicated resources & administrative support for CEP implementation in rural communities

Business Groups

- Increase energy efficiency in the built environment by improving building codes, financing mechanisms, and incentives for utility-based EE programs
- Increase customer access to renewables by offering more attractive utility green tariff programs and provide more choice in the energy marketplace with options like third party PPAs and wholesale market options
- Help businesses and large energy users save money, attract investments and talent, and stay competitive by offering more choice & competition for renewable energy
- Expand and promote the deployment of energy storage by creating incentives for this investment such as tax abatement, facilitating integration of energy storage technology projects and making storage an integral part of utility system planning
- Accelerate the deployment of electric vehicles through local and state-wide initiatives

DEQ EJ Board - Clean and Equitable Transition Subcommittee

- Creating greater opportunities for historically under-utilized businesses to grow and prosper through enhanced local government contracting and procurement is necessary to generate greater equity and shared prosperity (Brichi, 2004; Edelman and Azemati, 2017; Robinson, 2017).
- Regarding necessary equity considerations, the DEQ CEP, especially in the Customer Choice and Economic Development bucket, must not only include recommendations for workforce development but also business development. For business development, the plan should stipulate that the State will develop strategies to ensure that the clean energy supply chain is inclusive and equitable, that is, creates contracting and procurement opportunities for historically underutilized businesses (i.e., MBEs, DBEs, WBEs, and veteran- and LGBTQ-owned enterprises). Research shows that these types of businesses are far more likely to employ minority workers than majority-owned businesses.
- In both the public and private sectors, supplier diversity is increasingly becoming a necessity for success based on market-driven factors rather than simple contracting and procurement

government-mandates. (Shah & Ram, 2006; ConnXus, 2017; Lazarus, 2017; Johnson, 2018). While continuing to acknowledge and striving to comply with anti-discrimination laws enacted roughly four decades ago (AAAEO, 2019), public and private sector entities are increasingly recognizing how disruptive demographic trends are dramatically transforming the world of contracting and procurement and, in the process, making supplier development a strategic imperative rather than just a compliance issue (D&B Supply Management Solutions, 2009; LePage, 2014; Lohrentz, 2016; Rutherford, 2016; Suarez, 2016a; Rimmer, 2017; Zerp, 2018; LISC Los Angeles, 2018; Hussain, 2019; Vazquez & Frankel, 2017; Weissman, 2017; Fairchild and Rose, 2018; Fulkerson, 2018). More specifically, organizations that embrace supplier development as a strategic imperative recognize that the innovative capacity of small diverse suppliers, who typically are more flexible, agile, and driven to succeed than large firms, can boost their performance, reduce the cost of goods and services, and drive continued business growth in an increasingly diverse marketplace (GEP, 2019). Many of these small firms are owned by people of color, women, and/or members of the LGBT community (Vazquez & Frankel, 2017; Suarez, 2019a; Rimmer, 2017; Suarez, 2019a).

- The fact that there is overlap between those communities which have historically been under-utilized for supply-side investment and those which are disproportionately impacted by climate change, mean that the intentional inclusion of these communities (communities of color, low income communities) must be a part of any plan to promote increased utilization of clean energy in an inclusive way.

Duke University

Letter 1: Drew Shindell, Nicholas Professor of Earth Sciences

- Include a section in the CEP on "Necessary Targets Beyond EO80" that acknowledges that new gas infrastructure may pose an unnecessary risk to the climate and health of NC citizens and the need for regulatory impact assessments (RIAs) that account for the impact of methane (including social cost)
- Include a permanent moratorium on new gas infrastructure in the state
- Require that the investor-owned utilities account for the social cost of emissions, including in-state and upstream methane, in their Integrated Resource Plans so that decision makers have a more accurate picture of the costs and impacts of natural gas

Letter 2: Role of Biogas in NC

- Determine the extent and location of available biogas/biomethane resources in the state across all organic waste resources to determine the percentage of NC's GHG reductions can be met with biomethane.
- Facilitate RNG transport to end users and buyers to accelerate development / accelerate GHG reductions from in-state biomethane sources.

EEIF/Rivendell Farms

- Conduct a combined farmland use and solar/renewable energy storage GIS mapping study to optimize use & sustainability of farms, forests & solar production

- Involve key stakeholders in NC Department of Agriculture and key agricultural counties in the CEP development process
- Promote & provide financial incentives for work of the NC Electric Cooperatives to build several large community-based solar projects
- Expand & increase meetings of NC Energy Policy Council (like SC Energy Office)
- Find better and lower cost ways to pay for coal ash cleanups

Environmental Groups

- Additional carbon emission reduction goals from the electrical use sector of 60% from 2005 levels by 2030, 85% by 2040, and carbon neutrality by 2050
- Establish a declining carbon emissions cap to incentivize flexible and cost-effective reduction opportunities, starting no later than 2021; design the policy to allow for emission allowance trading and explore participation in the Regional Greenhouse Gas Initiative (RGGI)
- Adoption of Performance-Based Ratemaking (PBR) using metrics that incentivize regulated utilities to reduce GHGs
- Establishment of a stand-alone energy efficiency resource standard that ramps up to 2.0% of retail sales in new energy efficiency savings annually by 2030

NCCEBA

- Create a new energy policy that empowers market forces to drive innovation, clean energy, and lower costs
- Encourage decentralized, clean energy options for EV charging and energy storage; prohibit control by incumbent utilities
- Approving generation additions & retirements must include reducing carbon & lowest cost standards
- Improve grid management to make grid bi-directional & able to integrate more DERs instead of new charges, increase interconnection, add compensation for new grid services
- Prohibit members & staff of NCUC & NC Public Staff from working for a utility or any businesses they have been regulating for at least two (2) years

NCSEA

- Reform NC's energy business model through electric decoupling and the establishment of performance-based regulation
- Reform NC's energy planning to include integrated distribution planning (IDP in IRPs, taking advantage of clean energy and cost savings opportunities of DERs
- Expand the solar rebate program to include solar + storage to provide further benefits to the grid
- Start a "Green Bank" or revolving fund to allow for non-profits and government entities to utilize clean energy assets and technologies not feasible in the current market structure
- DERs and accountability in grid modernization to incorporate new clean energy assets on the grid

NC WARN

- Establish a science-based emission reduction target
- New natural gas infrastructure is incompatible with NC's climate goals and would exacerbate the problem of uneconomic stranded assets. Utility planning should account for the changing economics of natural gas vs. renewable energy; plans including significant renewable energy would provide least-cost energy to NC customers statewide
- Properly implemented energy efficiency (EE) and demand response (DR) programs are low-hanging fruit for rapid reduction of both electricity consumption and peak demand; building and equipment EE upgrades pay for themselves
- Establish a path for addressing the broadly identified issue of utility motivation; mandated EE components, aggressive EE savings rate address utility reluctance to reduce consumption; implement a savings-funded EE payment mechanism
- CEP should include a timeline for implementing recommendations, next steps included for each recommendation, as well as which parties can take those steps

SELC

Letter 1: Comments Regarding the Inclusion of Swine Waste-to-Energy in the State CEP

- Recommended that swine waste-to-energy projects that do not meet environmental performance criteria that aim to address environmental, public health, and racial equity concerns not be included in the CEP
- This technology should not be considered clean, even though it may reduce methane emissions from industrial hog operations

Letter 2: Role of Forest-Derived biomass in North Carolina's CEP

- Biomass is inconsistent with NC's climate goals and is not "clean" and poses a threat to NC's communities
- There are public health concerns related to biomass emissions of particulate matter, nitrous oxides, carbon monoxide, & carcinogens such as benzene & formaldehyde
- Biomass as an energy source is uneconomic, and is "significantly more expensive than clean energy alternatives like wind, solar, and energy efficiency."

UNC School of Law

- Need to reexamine the role of least cost planning, relationship between environmental impacts & consumer prices. It may be less costly to society to avoid potentially large rate increases in future by investing upfront in higher cost generation options.
- Recommendations for NCUC decision-making that would not require changes to existing law include: NCUC's approach to least cost planning includes short-term as well as long-term considerations; near-term technological advances potentially alter electricity demand projections; current investments do not foreclose potential for new technologies & energy services to deliver consumer & environmental benefits; Identify investments that could lead to multiple benefits for the electricity sector

- Establish carbon pricing to limit emissions while also generating revenue to fund adaptation projects, and/or establish a broader market that extends beyond the electric power sector; consider joining the Regional Greenhouse Gas Initiative (RGGI) with other mid-Atlantic and northeastern states
- Establish limits on GHG emissions for power plants, and/or create emissions allowances for power plants
- Implement a carbon tax with revenues dedicated to resiliency & mitigation efforts, or implement a revenue-neutral carbon tax the returns revenues to NC residents

Appendix: Reference Material

A.1 Participating Individuals and Organizations

The following is a complete list of organizations that participated throughout the stakeholder process or provided written comments about the CEP. Bolded names indicate facilitated Workshop participants that were present at one or more Workshop; individuals that participated in the Workshops are listed with the organization they represented. Organizations that were represented at regional listening sessions are not bolded, but are followed by the number of representatives present. Organizations that were involved in multiple parts of the public engagement process (the Workshop stakeholder process, regional listening sessions, and/or formally submitted comments) are delineated with a star (*).

Advanced Energy (Brian Coble, CC Maurer)
Alexander County (1)
Alliance to Protect Our People and the Places We Live (APPPL) (1)
Ambrose Strategy (Zach Ambrose)
Anchor QEA (1)
API (John White)
Appalachian Energy Center (Jamie Russell)
***Appalachian State University** (Jason Hoyle) (2)
***Appalachian Voices** (Rory McIlmoil) (1)
Blue Horizons Project (1)
Blue Ridge Community College (1)
Blue Ridge Public Radio (1)
Candidate for NC House of Representatives (1)
Cape Fear Public Utility Authority (Elizabeth Severt)
CASE Consultants International (1)
Cavanaugh & Associates (1)
Center for Biological Diversity (1)
Citizens Climate Lobby (2)
City of Asheboro (2)
City of Asheville (2)
City of Charlotte (2)
City of Durham (Paul Cameron)
City of Greensboro (3)
City of Raleigh (Megan Anderson, Greg Sponseller)
City of Statesville (1)
Civil Engineers, PLLC (1)
Clean Air Carolina (Daniel Parkhurst, Andrew Whelan)
Climate Listening Project (1)
Climate Reality Project (1)
Council of Governments (1)
Creation Care Alliance (1)
DECAC (2)
***Dogwood Alliance** (Joseph Lee, Rachel Weber) (1)
***Duke Energy** (Sarah Adair, Conitsha Barnes, Christy Daniel, Stephen De May, Mike Hughes, Mark McIntire, Evan Shearer, David Tsai) (2)
Duke University Nicholas Institute (Kate Konschnik, Tim Profeta, Jennifer Weiss)
Durham County (Tobin Fried)
Dynapower (Chris Larsen)
E4 Carolinas (David Doctor)
Earth Team Jubilee Church (1)
East Carolina University (1)
Eastern Band of Cherokee Indians (EBCI) (1)
Energy & Environment Innovation Foundation (Chris Hardin, Norbert Hector)
Energy Innovation Task Force (ETIF) (1)
Energy Intelligence Partners (Ron DiFelice)
EnerVision Battery, Inc. (Tuan Vo)
Enpira (Daniel Kauffman)
Entsorga Group (Paolo Carollo)
Environment North Carolina (Drew Ball)
Environmental Consultant (1)
Environmental Defense Fund (Dionne Delli-Gatti, Paelina DeStephano, Liz Shenaut) (1)
Environmental Stewardship Greensboro (1)
Enviva (Chris Brown)
EQ Research (Miriam Makhyoun)
Fayetteville PWC (Keith Lynch)
First Solar, Inc. (Andrew White)
Forge Greensboro (1)
Forsyth Tech Community College (1)
Franklin Energy (Jesse Gary)
French Broad River Garden Club (1)
Green Form (1)

Green Saves Green (1)
GreenGo Energy UC, Inc. (2)
Henderson County (1)
Henderson County Democratic Party (1)
Hometown Strong (Lilian Faulconer)
Intelli-Products, Inc. (2)
International Brotherhood of Electrical Workers (Alvin Warwick)
Interstate Renewable Energy Council (Larry Shirley)
KPMJ (Raj Shelat)
Land of Sky Clean Vehicles Coalition (1)
Land of Sky Regional Council (1)
LaPlaca and Associates, LLC (1)
Mathis Consulting (1)
Mayor of Elizabeth City (1)
Mecklenburg County Air Quality (MCAQ) (1)
Middle Sound Lookout (1)
Mooresville Hydrail Initiative (1)
Mountain Xpress (1)
National Hurricane Center (2)
***Natural Resource Defense Council** (Luis Martinez, John Thigpen) (1)
***NC A&T State University** (Vickie Foust, Greg Monty) (11)
NC Aquariums (1)
***NC Biotechnology Center** (Randall Johnson) (1)
NC Building Performance Association (Ryan Miller)
NC Business Council (Vicki Parker)
NC Clean Energy Business Alliance (NCCEBA)* (Chris Carmondy)
NC Clean Energy Technology Center (Allison Carr, Stephen Kalland, Isaac Panzarella, Autumn Proudlove, Simon Sandler)
NC Climate Solutions Coalition (1)
NC Conservation Network (Pete Polonsky, Will Scott)
NC Department of Commerce (David Kaiser)
NC Division of Air Quality (DAQ) (2)
NC Electric Membership Cooperatives (Charles Bayless, Paul Mott, Michael Youth)
NC Environmental Justice Network (1)
NC House of Representatives (2)
NC Institute for Climate Studies (NCICS) (1)
NC Interfaith Power & Light (Eric Scheier, Susannah Tuttle)
NC Justice Center (Jacquie Ayala)
NC Manufacturers Alliance (Jimmy Carter)
NC State AFL-CIO (Aiden Graham)
NC State Climate Office (Walter Robinson)
***NC State University** (Erik Hall) (1)
NC Sustainable Energy Association (Daniel Brookshire, Ivan Urlab)
NC WARN (Anne Lazarides, Sally Robertson)
NCUC Public Staff (Layla Cummings, Jack Floyd)
New Belgium Brewing (1)
New Castle Community Schools (2)
Orange County Commission for the Environment (1)
Orsted (Hayes Framme)
Ovanova (John Carey, Daniel Kemp)
***Private Citizens** (Brian Magi, Elias Varn, Nicole Spivey, Dale Evarts, Sterling Bowen) (99)
Research Triangle Cleantech Cluster (Emmit Owens, Susan Sanford)
RM Radical Justice Group (1)
SAS Institute, Inc. (Jerry Williams)
Self-Help Credit Union and Ventures Fund (Melissa Malkin-Weber)
Shaklee (2)
Siemens Industry, Inc. (Tim Gasper)
***Sierra Club** (Cassie Gavin, Molly Diggins, David Rogers) (28)
South Wings (1)
Southeast Energy Efficiency Alliance (Anne Blair)
Southeastern Wind Coalition (Adam Forer, Katherine Kollins, Jamie Simmons)
Southern Alliance for Clean Energy (2)
***Southern Environmental Law Center** (Nicholas Jimenez, Gudrun Thompson, Jasmine Washington) (1)
Southern Forests Conservation Coalition (2)
Sunrise Movement (Shaina Nanavati) (1)
Sustainability Advisory Committee on Energy and the Environment (SACEE) (1)
Temple Emmanuel Environmental Movement (TEEM) (1)
The Daily Advance (2)
The Lilies Project (1)
The Nature Conservancy (Tiffany Hartung)
Town of Carrboro (Kathy Kaufman)
Town of Cary (Emily Barrett)
Triangle J Council of Governments (Lyndsay Gavin)
UNC Asheville (1)

UNC Chapel Hill (Adam Long, James Bottomley, Brad Ives)

***UNC Chapel Hill School of Law** (Ethan Blumenthal, Jonas Monast)

UNC Charlotte (2)

UNC Charlotte EPIC (Robert Cox, David Young)

UNC Greensboro (3)

Upper Coastal Plain Council of Governments (UCPCOG) (1)

US Environmental Protection Agency (Denise Mulholland, Carol Lenox, Dan Loughlin, Colby Tucker)

US Fish and Wildlife Service (Kathy Matthews)

***Volvo Technology of America** (Skip Yeakel) (1)

Wake Forest University (2)

Waste Reduction Partners (1)

Western Carolina University (1)

Western Piedmont Council of Governments (WPCOG) (1)

Williams (Kelly Adams, Mike Davis, Mackenzie King)

Wilson Community College (2)

WNC Renewables Coalition (1)

WNC Renewables Coalition (Michelle Myers)

Women Organizing for Wilmington (1)

1ROK Energy, LLC (William Geisler)

350 Wilmington (1)

3DFS Software-Defined Electricity (Chris Doerfler)

A.2 Workshop Breakout Group Presentations

This section includes the breakout group presentations that were created by stakeholder process participants for Workshop 2. The presentations are included here in the following order:

1. Environmental Groups
2. Utilities
3. Local Governments
4. Consumer Advocates
5. Distributed Energy/Renewable Energy Service Providers
6. Business Groups
7. Higher Education Institutions

Environmental Table

April 1, 2019

Clean Energy Plan Goals

What are our three priorities?

1. **Targeting**
   Determine how much the electric sector needs to reduce emissions for NC to hit the EO80 statewide target of 40% reduction of GHG emissions below 2005 levels.

1. **Equity**
   a. Distribution of energy assets across the state
   b. Value of resiliency
   c. Need to distribute benefits and any costs equitably among ratepayers
   d. Plan for economic transition of fossil fuel generation communities

1. **Look Beyond 2025**
   North Carolina must go further than EO80 after 2025 and actions before 2025 should not conflict with long-term deep decarbonization

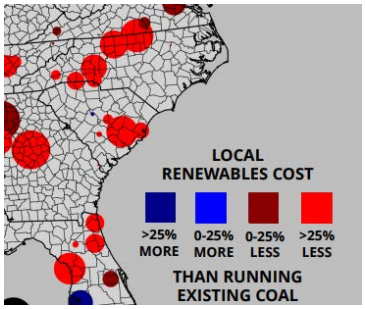
1. **Targeting**
   How much does the electric sector need to reduce emissions for NC to hit the EO80 statewide target of 40% reduction of GHG emissions below 2005 levels, assuming all other sectors essentially stay flat or see marginal reductions?

Table 1-1: North Carolina GHG Emissions Inventory by Source Sector (MMT CO2e)

	Historic					Projected		
	1990	2005	2012	2015	2017	2020	2025	2030
Electricity Use	**54.57**	**79.27**	**66.85**	**58.48**	**52.60**	**45.74**	**40.59**	**42.46**
Electric Power Generation	46.28	73.27	55.95	51.10	45.32	38.34	32.99	34.70
Imported Electricity[a]	8.29	6.10	10.90	7.37	7.28	7.39	7.60	7.76
Residential/Commercial/Industrial Combustion[b]	**26.77**	**26.02**	**18.66**	**21.15**	**20.92**	**22.52**	**23.26**	**23.92**
Industrial	17.59	14.21	10.00	9.97	9.93	11.32	12.16	12.62
Commercial	3.79	5.06	4.17	5.76	5.72	5.84	5.76	5.93
Residential	5.39	6.75	4.48	5.43	5.28	5.36	5.35	5.38
Transportation	**40.21**	**55.19**	**46.36**	**49.02**	**48.73**	**45.27**	**41.80**	**39.22**
Gasoline & Diesel Highway	35.13	48.21	41.60	44.00	44.05	40.47	36.02	34.02
Non-Highway	5.08	6.96	4.72	4.98	4.62	4.74	4.91	5.12
Alternative Fuel Vehicles	0.00	0.03	0.04	0.05	0.05	0.06	0.87	0.08
Agriculture	**7.06**	**10.65**	**10.56**	**10.38**	**10.53**	**10.51**	**10.47**	**10.44**
Manure Management	2.59	6.02	5.63	5.90	6.05	6.06	6.09	6.11
Agricultural Soil Management	2.87	2.74	3.18	2.74	2.84	2.82	2.78	2.75
Enteric Fermentation	1.60	1.89	1.74	1.73	1.64	1.63	1.60	1.58
Burning of Agricultural Crop Waste	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste Management	**6.35**	**8.52**	**9.09**	**8.44**	**8.77**	**9.39**	**10.17**	**11.07**
Municipal Solid Waste	5.47	7.23	7.52	6.82	7.09	7.52	8.26	9.00
Wastewater	0.92	1.29	1.57	1.61	1.68	1.77	1.92	2.06
Industrial Processes	**1.04**	**3.83**	**5.39**	**6.03**	**7.18**	**8.84**	**11.31**	**12.73**
Natural Gas and Oil Systems	**0.86**	**1.17**	**1.28**	**1.32**	**1.25**	**1.40**	**1.47**	**1.55**
Gross Emissions	**136.89**	**184.74**	**158.18**	**154.82**	**150.08**	**143.57**	**138.28**	**141.37**
Net Carbon Sinks - LULUCF[c]	**-35.64**	**-32.66**	**-33.97**	**-34.16**	**-34.83**	**-34.83**	**-34.83**	**-34.83**
Net Emissions	**101.25**	**152.08**	**124.22**	**120.66**	**116.06**	**109.55**	**104.25**	**107.35**
Percent Reduction in Net Emissions from 2005					**24%**		**31%**	

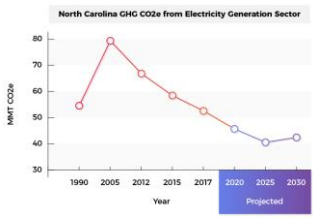
2. **Equity**

a. Distribution of energy assets across the state
b. Value of resiliency
c. Need to distribute benefits and any costs equitably among ratepayers
d. Plan for economic transition of fossil fuel generation communities



3. Look Beyond 2025

North Carolina must go further than EO80 after 2025 and actions before 2025 should not conflict with long-term deep decarbonization

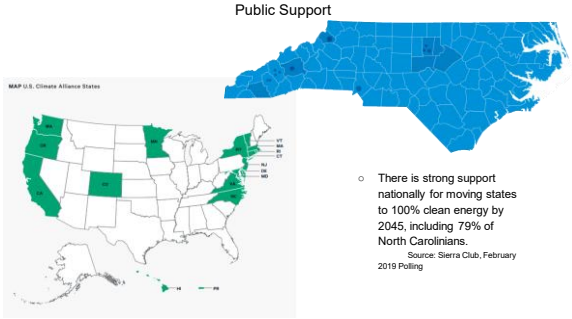


Motivating Factors

Urgency

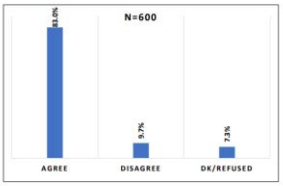
We have 12 years to cut emissions in half to avoid a 1.5C temperature rise, according to the IPCC's report last year.

Public Support



- There is strong support nationally for moving states to 100% clean energy by 2045, including 79% of North Carolinians.
  Source: Sierra Club, February 2019 Polling

Now, more than ever, state lawmakers should be reducing regulations and allowing for more private-sector development of renewable energy sources such as solar, wind and waste-to-energy technology.



	N=	Agree	Disagree	DK/Refused
RDU	192	78.6%	15.6%	5.7%
Charlotte	154	86.4%	5.2%	8.4%
Greensboro	107	84.1%	7.5%	8.4%
Wilmington	31	83.9%	16.1%	0.0%
East	63	81.0%	4.8%	14.3%
West	53	88.7%	7.5%	3.8%
Liberal	142	84.5%	9.9%	5.6%
Moderate	164	84.1%	8.5%	7.3%
Conservative	260	81.9%	11.2%	6.9%
Republican	197	85.3%	6.1%	8.6%
Democrat	257	79.4%	14.4%	6.2%
Unaffiliated	131	87.0%	6.9%	6.1%

Over 80% of all voters agree that lawmakers should be reducing regulations to allow for more private-solar development. Unaffiliated and Republicans voters agreed over 85% while Democratic voters were just under 80%.

What is our vision of a clean energy future in NC?

A full transition to 100% clean energy by 2045 through deployment of renewable energy, energy efficiency and other clean technologies.

We envision a just and equitable process in North Carolina to do our part in keeping global warming below 1.5C.

What three features of the existing system are challenges for clean energy deployment?

1. Lack of alignment between utility incentives and public desire for 100% clean & renewable energy

2. Environmental and public health impacts are not factored into generation cost assessment

3. Limitations on financing options for renewable energy and energy efficiency

What three features do you want to ensure are maintained going forward to support clean energy resources?

1. Support for strong homegrown solar and energy efficiency industries.

2. Maintain & expand the Renewable Energy Portfolio Standard & Residential Energy Conservation Codes.

3. Build upon our existing clean energy R&D cluster.

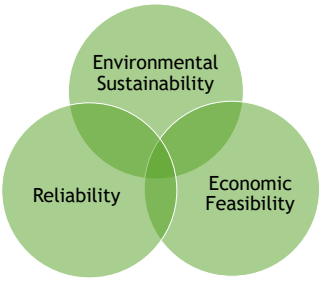
Utility Group

April 1, 2019

Sarah Adair, Duke Energy
Mike Davis, Williams | Transco
Jason Hoyle, New River Light & Power
Keith Lynch, Fayetteville PWC
Elizabeth Severt, Cape Fear Public Utility Authority
Michael D. Youth, NC Electric Cooperatives

This presentation reflects a collaborative effort of the workshop participants identified above; it does not necessarily reflect the official position of any one of the utilities identified above.

Priorities



Motivating Factors

- We recognize that our customers increasingly want:
  - Environmentally-friendly/low- to zero-carbon operations,
  - Reliability,
  - Affordability, and
  - Safe operations.
- Our customers also increasingly want:
  - Control,
  - Convenience, and
  - Choices.

Visions

- Duke Energy's strategic vision includes generating cleaner energy and modernizing the grid to make it more secure and resilient and to give customers more options and control. We share EO80's objectives of continuing to reduce carbon emissions, expanding charging infrastructure to meet growing demand for zero-emission vehicles and continuing to promote and expand energy efficiency programs to help customers reduce and control energy use.
- Fayetteville PWC and New River Light & Power view clean energy as necessary to address climate change and as an opportunity to invest/retain capital in local communities, create blue/white/green collar jobs, increase property values, and earn a return on equity.
- NC's Electric Cooperatives envision a Brighter Energy Future where decisions are made not only based on affordability, reliability, and safety, but also with three new tenets in mind: low carbon, grid flexibility, and beneficial electrification.

What is Working Well

- **Reliable and Affordable**
  - Utilities provide reliable service, 24/7
  - Long-term planning balances customer rate impact, generation balance and grid stability
- **Low carbon generation**
  - Existing nuclear units provide zero-carbon energy and are a critical component of a low-carbon portfolio, as well as, provide a capacity factor above 90%
  - North Carolina is second in the nation in solar capacity and continues to connect renewables to the grid

Challenges

- Much of the existing electricity infrastructure was designed to be unidirectional, flowing from large central generation to transmission to distribution to load. The existing grid was not designed – from either an engineering or a financial perspective – for a high penetration of distributed energy resources.
- Lack of timely investment recovery mechanisms create barriers transitional grid modernization. (Duke Energy)
- Limits in full-requirements power supply contracts on implementing/supporting energy efficiency investments, peak demand reduction, and renewable energy generation options that our customers demand. (New River Light & Power)
- Customer surveys have taught us that different customers want different services – for example, one customer may place an emphasis on affordability, while another may place an emphasis on carbon attributes. Utilities strive to balance these customer desires.
- We need a mechanism to coordinate clean energy policy among the North Carolina Utilities Commission, the North Carolina Economic Development Board, the Energy Policy Council, and the Environmental Management Commission. (Williams | Transco)

DEQ Clean Energy Workshop 2: Local Government Insights

APRIL 1, 2019

Process for Local Government Feedback

- Discussion at original Raleigh stakeholder meeting among local governments in attendance
- Discussion among North Carolina members of the Southeast Sustainability Directors Network, made up of local government sustainability staff
- Input from EDF Cities Initiative

3 PRIORITY GOALS FOR PARTICIPATING IN THE CLEAN ENERGY PLAN

1. Define and remove barriers to achieving local greenhouse gas emission reduction goals
    1. Examples:
        1. Auto-adoption of most up-to-date building energy codes
        2. Deregulation of NC electricity market
        3. Incentives for solar - Better net-metering rates/incentives for battery storage
        4. Increase options for renewable energy procurement
        5. More options for retaining RECs
2. Speak for the needs of a unique constituency- local governments are both large ratepayers and can speak on behalf of their broader communities
3. Create integrated strategies that focus on demand-side and supply-side, prioritizing where there will be the biggest impact.

MOTIVATING FACTORS

- The impacts of climate change are felt locally and local governments bear the greatest costs and effort to address these
- Strive to deliver on residents' expectations
- Local governments are leading by example, but our action is not enough to meet the reductions that need to be made
- Residents are asking for goals, such as 100% renewable energy, and we need state/utility support to meet those goals
- Belief that working together to align goals and strategies will amplify impacts

VISION FOR A CLEAN ENERGY FUTURE

- North Carolina is a leader in clean energy, sustainable transportation, and waste management using a multi-sector approach that leverages partnerships that have long term benefits including risk mitigation and positive economic impacts. The socio-economic, environmental, and other benefits of clean energy are inclusive of lower-income communities, urban & rural communities and traditionally underserved regions of the state.

EXISTING SYSTEM CHALLENGES

- Price for energy does not factor in the social and environmental costs of GHG emissions
- Lack of consumer choice
- Renewable energy procurement is expensive, complicated, limited
- Existing options for accessing clean energy are not equitable
- Lack of funding and finance options for energy and efficiency related investments
- Lack of accounting for GHG impacts in investment/funding decisions at the state level

EXISTING SYSTEM BENEFITS

- Grid reliability
- Affordable energy
- Building codes— it is good to have state-level codes. However, more aggressive adoption of amendments would drive building energy performance.
- We have momentum in building a robust clean energy economy and have create further opportunities for innovation

Consumer Protection

DEQ Clean Energy Plan Stakeholder Group

Groups with influence on this conversation

NC WARN

NC Justice Center

NC Interfaith Power & Light

Pritchard Engineering

Sunrise Movement

Advanced Energy

NCUC Public Staff

DEQ's Environmental Justice Advisory Council

Environmental Justice
+
Consumer Advocacy
=
Consumer Protection
?

No endorsement implied by any group

2

We hope for a process & plan that is

Clean

Provides a path to a verifiably pollution-free energy system

Fair

Ensures that the system is equitable for all stakeholders
Fairness = ***equitable,*** *NOT equal*

Efficient

Enables an open system that maximizes each user's value

3

Why

Clean?

Science and Ethics: moral obligation to act

Fair?

Burdens of life cycle impacts are felt based on socioeconomic status

Efficient?

Urgency: there is limited time and infinite complexity

4

Vision

We envision a just transition to a fair energy system that provides equal opportunity to all participants to maximize their clean energy potential.

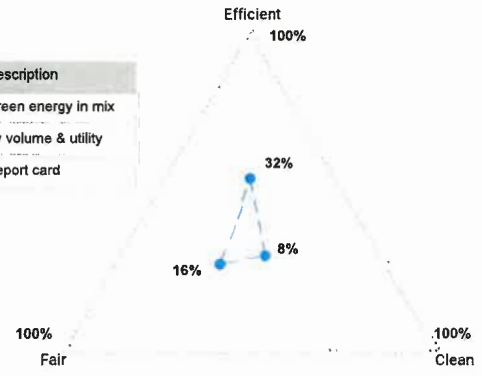
In this future, everyone can choose to exchange clean energy among each other over a reliable network at fair rates, efficiently providing abundant clean & affordable energy to all North Carolinians.

Clean - Fair - Efficient

5

Status

	Score	Source	Description
Clean	8%	EPA	Green energy in mix
Fair	16%	EIA	By volume & utility
Efficient	32%	ACEEE	Report card



Things to fix: Access

Clean

Absence of strong policy mandates and price signals toward cleanliness

Fair

Market constructs and impacts vary disproportionately by demographics

Efficient

Current system does not allow us to maximize benefits of energy efficiency

Things to keep: Market

Clean

A statewide standard for clean energy

Fair

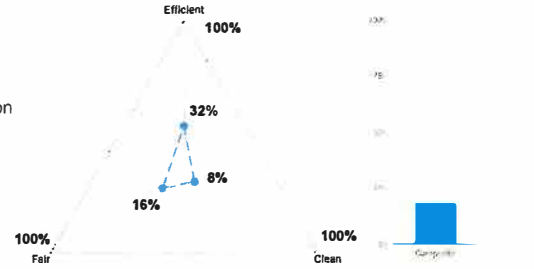
Compensating users for performance based on transparent metrics

Efficient

Allowing users to exchange their energy rights with each other

Conclusion

Consumer Protection



	Clean	Fair	Efficient	Overall
Score	8%	16%	32%	19%
Fix	Policy & Price	Jurisdiction Friction	Transparency	Access
Keep	Clean Standard	Performance Rates	Right to Trade	Market

STAKEHOLDER GROUP 9

DISTRIBUTED/RENEWABLE ENERGY PROVIDERS AND ADVOCATES

E.O. 80 Workshop #2
April 1, 2019

Renewable Energy Category

Biofuels, Biomass, Hydro, Solar, Wind

- Kevin Alzamora — **Ovanova** - kevin@ovanova.co
- Daniel Brookshire — **North Carolina Sustainable Energy Association** - daniel@energync.org
- Chris Brown — **Enviva** - christopher.brown@envivabiomass.com
- Chris Carmody — **North Carolina Clean Energy Business Alliance** - director@ncceba.com
- Paolo Carollo — **Entsorga** - carollo@enstorga.it
- Adam Forrer — **Southeastern Wind Coalition** - adamf@sewind.org
- Hayes Framme — **Orsted** - hayfr@orsted.com
- Richard Harkrader — **Carolina Solar** - rharkrader@carolinasolarenergy.com
- Daniel Kemp — **Ovanova** - daniel@ovanova.co
- Katharine Kollins — **Southeastern Wind Coalition** - katharinek@sewind.org
- Larry Shirley — **Interstate Renewable Energy Council** - leshirleyjr@gmail.com

Goals for Participating in Clean Energy Plan Process

1. Create a viable path for a rapid transition of NC's energy portfolio to primarily clean energy sources.
2. Ensure that the perspective of clean energy providers and advocates is considered in the final Clean Energy Plan.
3. Expand this stakeholder planning process to incorporate recommendations for policy and regulatory reforms of NC's energy system.

Motivating Factors

- **Elements that are critical to a clean energy future**
  - **Carbon Emissions Reduction -** *Replacing fossil fuels with renewable and distributed energy sources*
  - **Diversity in Energy Sources** – *Diversify the power generation mix; Expand access to the grid for non-utility generators.*
  - **Political Leadership** – *Courage to innovate; Willing to listen and act on stakeholders needs; Engage constituents on issue.*
  - **Resiliency and Reliability – Q***uickly recover from disruptions; Keep the lights on and the EVs charged*
  - **Sustainability** – *Encourage the use of renewable sources of energy; Relying on finite resources is short term vision.*
  - ***Technical Research*** – *Investment in technology research to enable new clean energy sources; Energy Storage.*

Vision for Clean Energy Future

North Carolina should quickly transition to a clean and efficient energy system that is affordable and accessible to all. Future energy policy and regulations should properly incentivize utilities, independent power producers, and consumers to make this vision a reality.

Success of Current System

- **Physical Structure –** *Existing grid currently distributes energy throughout state across a wide range of geographies.*
- ***Regional Leader****– Thanks to historic forward-thinking policies, North Carolina is a regional leader in renewable energy and energy efficiency. But, we face significant challenges for maintaining our leadership position.*
- **Reliable** – *The system provided energy to most everyone in the state; general public does not think about it much, which is good and bad.*

Challenges of Current System

- **Entrenched & Exclusive System Inhibiting future Growth of Renewable and Distributed Energy**– *NC's historic advances in renewable and distributed energy is now threatened by long interconnection delays and decreasing market access; Monopoly system should merit more accountability, not less.*
- **Lack of Transparency to Consumers** – *Customers do not know how and why they pay what they pay; Do not have choice on power generation. How can a consumer gain access to a renewable and distributed options for home or business?*
- **Energy Planning and Utility Investment Decision Making is Outdated** – *Traditional energy resource planning in NC prioritizes costly centralized generation and does not adequately value or plan for better distributed energy options*

NC Clean Energy Plan Development
Business Working Group

Participants:

- John Thigpen - JLL
- Ryan Miller – North Carolina Building Performance Association
- Jerry Williams - SAS
- Lori Collins - DEQ
- Tim Gasper - Siemens Industry
- Vicki Lee Parker - NC Business Council
- Rob Morrow - Building Clarity
- Skip Yeakel - Volvo

NC Clean Energy Plan Development
Business Working Group

What are the group's three priority goals for participating in the Clean Energy Plan process?

- Increase capacity and access to affordable renewable energy
- Increase building efficiency requirements
- Increase number and use of EVs and charging networks
- Improve size of skilled workforce and invest in development of a future skilled labor pipeline

NC Clean Energy Plan Development
Business Working Group

What are some motivating factors for you, your organization, or the people your organization represents that you would like the sate representatives and/or other stakeholders to understand better?

- Competition for global revenues is intensifying as companies are increasingly requested to acknowledge climate change issues and demonstrate proactive strategies to mitigate impacts. Doing business with good corporate citizens is a risk mitigator for customers and a competitive differentiator for suppliers. Demonstrating environmental responsibility also helps with employee recruitment and retention.
- 3rd party sales of electricity allow businesses to spend its limited capital on other business core competencies and growth initiatives, which could lead to additional tax revenue for the state. Through PPAs, they also enable electricity rates to be negotiated and the business can control rates for 15-20 years, leading to budget certainty.
- New entrants to the workforce have an increased desire to work for companies with strong sustainability values. There is also a labor market shortage for the trades. A well crafted clean energy plan can address both of these issues and enable NC businesses to continue to thrive into the future.
- Small and mid-size businesses have not traditionally had a large voice in NC's energy future. We want this plan to include customization to increase participation of those businesses and allow the benefits of clean energy improvements to impact them as well.

NC Clean Energy Plan Development
Business Working Group

What is your vision of a clean energy future for North Carolina? (please state this in 1-2 sentences)

Proactive bipartisan policies and actions that facilitate equitable access to renewable and efficiency energy options for all NC businesses, municipalities, universities, nonprofits, etc., serves as a catalyst for innovation, new business development and continued economic development in the State of North Carolina, and strengthens our resiliency to natural threats and preserves opportunities for future generations.

NC Clean Energy Plan Development
Business Working Group

What three features of the existing system do you see as challenges to deployment of clean energy resources that should be addressed going forward?

- Lack of 3rd party sales and state incentives to encourage expansion of clean energy generation
- Political Will
- Duke Energy interconnection approval process & rates they are willing to pay for qualified systems as well as general access to utility data.

NC Clean Energy Plan Development
Business Working Group

What three features of the existing system do you want to ensure are maintained going forward to support deployment of clean energy resources?

- Reliability, Safety, Affordability
- REPS
- Continued investment in smart grid and smart metering technologies

Higher Education Working Group

April 1 Clean Energy Plan Workshop

Higher Education Working Group

Working Group Members

- Robert Cox, UNC Charlotte
- Erik Hall, NC State
- Shanna Harwell, NC State
- Walter Robinson, NC State
- Jaimie Russell, App State
- Jen Weiss, Duke University

Our Process

- Include public universities, private colleges and universities, and community colleges.
- Sent out a "survey" to over 250 higher education facility managers, sustainability directors and faculty.
- Received 45 total responses

Higher Education's 3 Top Priority Goals

- Facilities management:
  - Each higher education institution will develop an internal operation plan to go beyond the Executive Order 80 goal of 40 percent reduction in energy use.
- Research:
  - Faculty, staff and students will research clean energy opportunities that will support building sustainability leaders throughout the state.
- Education:
  - Faculty, instructors, and extension agents will educate students, decision-makers and the general public on these clean energy opportunities.

Motivating Factors

- We are educating our leaders of the future. We need to insure that they are both informed about and committed to carbon neutrality and global warming.
- There is an absolute lack of skilled tradespeople needed to build and run current and future energy systems. We HAVE TO make North Carolina a leader in vocational education for energy.
- Our children's future is my motivating factor.

Clean Energy Vision 2025: "Tweets from the Future"

- "A university in which roofs are solar gathering elements and buildings receive their cooling and heating from solar and renewable systems and all street lights use solar-based motion detector LEDs, and wind enhancement elements that tap energy from wind movement."
- "Students seek out UNC System institutions and employers hire our graduates because we model what innovating for sustainability looks like (and the critical/creative/systems thinking that enables this...)."
- "Finally -- they let us buy clean, green power! And it will be generated mostly in North Carolina. Hard to believe there were people who said it couldn't be done -- charging up all our electric cars was too big a market to pass up."
- "We just opened our third NetPositive building today on our campus, using state of the art PV energy storage, and high efficient geothermal systems, & repurposing of all rainwater. Thanks #NCCleanEnergyPlan for all your work these past 5-years!"

Top 3 Challenges and Opportunities

Top 3 Challenges

1. State Level
   a. First cost of Renewables
   b. DEP Monopoly of Electrical production and distribution
   c. Reliance on natural gas
2. University Level
   a. Carbon fuel infrastructure
   b. No Strategy/Leadership
   c. Funding dedicated to RE

Top 3 Opportunities

1. State Level
   a. Reliable energy transmission/distribution
   b. Net/Smart metering
   c. PUC Oversight
2. University Level
   a. Strategic Planning
   b. District Energy/Cogen
   c. Energy Research

Ares of Consensus and Non-Consensus

Consensus

1. The state requires that new building Operating and Maintenance (O&M) costs be calculated only out for 10 years, an excessively short life-cycle that leads to short-sighted design decisions based on lower first cost.
2. Commonly available "flexible" utility options in the state are fueled by natural gas fired Combined Cycle Gas Turbines (CCGT), leading to a future in which the state becomes dependent on natural gas as opposed to renewable energy options.
3. Utilities oversight, regulation, and incentives for renewables.

Non-consensus

1. Greater consideration of nuclear power

DASHE – Design Application for Sustainable Higher Education

- Using a participatory design methodology to create multiple models of clean energy futures for North Carolina's higher education system.
- Bridging the gap between visions of a sustainable future and the current state of higher education.
- Create a platform that will allow all stakeholders including students, faculty, staff, and the general public to access campus energy data along with technically feasible clean energy options plus estimated costs. Participants can create numerous variants of clean energy futures. Using crowd sourced inspiration and aspirations of a sustainable future coupled with the real-world data to create realistic solutions.
- Precedents:
  - Block by Block <blockbyblock.org>
  - UT Austin LCOE Calculators <energy.utexas.edu/calculators>

A.3 Workgroup Memos

This section includes the memorandums created by the workgroups for Workshop 5. They are included in the following order:

Group 1: Customer Access to Renewables

Group 2: DER Compensation

Group 3: Grid Modernization

Group 4: Utility Business Model

Group 5: Utility System Planning

Group 6: Equitable Access and Just Transition

Group 7: Grid Resiliency Enhancements

Working Group: Customer Access to Renewables

Group Members: Paul Cameron, City of Durham; Christy Daniel, Duke Energy; Tobin Freid, City of Durham and Durham County; Erik, Hall, North Carolina State University; Foster Johnson, DEQ; Kathy Kaufman, Town of Carrboro; Adam Long, University of North Carolina at Chapel Hill; Greg Sponseller, City of Raleigh

Executive Summary

The Customer Access to Renewables working group was tasked with answering five questions about the existing tensions around customer access to renewable energy and providing potential solutions to ease these tensions in North Carolina. The group was composed of members of city and county governments, universities, and utilities. Below are the group's key findings and the answers to the five questions.

Key Findings

- While the number of options for North Carolina customers to utilize renewable energy has increased recently, most of these options come with upfront or increased costs which may limit participation
- There are many legislative and policy changes or utility programs that could increase customer access to renewables, but some may come with tradeoffs for either the customers or the utility
- Effective solutions will require customers stating their desires, utilities stating their abilities and limitations, and the utilities commission finding the overlap in what is necessary and possible
- Due to the inherent tension with this topic, initial solutions should focus on small and quick wins that can ease tensions and build momentum towards larger changes

Briefly describe the nature of this policy tension/question – what is happening?

Utility customers in North Carolina want greater access to cheaper renewable energy. Both customers and utilities recognize that affordability, reliability, and fairness are key components of energy delivery but customer access to cost competitive renewables may be limited by these factors. This has created a tension between the utilities and their customers in North Carolina's regulated utility market.

With recent implementation of additional renewable programs, such as community solar, solar rebates, solar leasing, and the Green Source Advantage program, the tension is less about the availability of renewable energy programs, and more regarding the accessibility and affordability. Customer access to renewables is expanding, however most renewable energy programs in North Carolina require upfront costs or are non-subsidized – meaning these programs can increase costs for customers choosing to participate. In a state with low energy costs, the increase in cost associated with renewable access programs may limit participation. Additionally, some programs may require a significant level of understanding and upfront effort which could also limit participation.

One point of contention within the group was whether subsidizing renewable energy programs is fair to all customers. While subsidizing renewable energy programs would likely increase usership, there is an argument that the burden of those programs should not be borne by customers who are not participating. The counter argument to this is that there are already disproportionate health burdens from fossil fuel facilities and economic burdens from facilities that are no longer lowest cost. By increasing renewable energy capacity, these health and economic burdens may be alleviated. While there was not a consensus on this issue, it was generally agreed upon that there should be ways of addressing customer equity without depressing the growth of renewable energy.

To what extent does this policy tension exist in NC, if so, why is it relevant to the state?

Due to the nature of the regulated market, this tension is well established in North Carolina. However, as mentioned above there have been several changes made in the past few years that have increased customer access to renewables in North Carolina. These additional renewable energy options have essentially shifted the tension from availability of renewable programs to the acessibility of these programs. This is relevant to the state because customer adoption of renewable energy is one possible strategy in moving towards meeting Executive Order 80.

What policy or regulatory action might be required to address the tradeoffs you see?

There are several policy and regulatory actions that can be taken in order to expand customer access to renewables and ease the existing tension. These actions, however, may come with positive and negative tradeoffs and must be analyzed further. Each action should be evaluated to determine the positive and negative impacts it would have on all stakeholders. Example criteria to be evaluated could include: environmental impacts, economic impacts, and impacts on customer equity. The major potential actions recommended for further analysis, along with the responsible parties, are laid out in Table 1 below.

Table 1. Potential Regulatory and Policy Solutions to Relieve Tensions with Customer Access to Renewables

Action	**Responsible Party**
End the ban on third-party sales of electricity	Legislature
Alter solar rebate program to allow for more participation	Legislature
Develop innovative rebate programs to increase access for diverse groups of customers, especially low-income residents	Legislature
Create rebate programs for municipality and co-op customers	Legislature
Restore 35% renewable energy state tax credit	Legislature
Require or incentivize utilities to offer on-bill financing	Legislature
Remove the cap on net-metering for renewable generation	Legislature
Require state government buildings to install renewable energy systems, where feasible	Legislature and Governor
Enact state-wide commercial PACE program	Legislature and Utilities Commission
Require utilities to invest in specific amount of solar+storage	Legislature and Utilities Commission
Require virtual net metering for community solar customers	Utilities Commission
Require all utilities to offer net metering	Utilities Commission
Revise GSA program to allow for participation of smaller customers	Utilities Commission
Require incorporation of value of solar when considering net metering terms	Utilities Commission
Require utilities to provide easy options to purchase renewable energy through billing	Utilities Commission and Utilities
Empower customers to voice their opinions, desires, and need for best generation options	Utilities, Governor, Local Government
Provide resources to increase NCUC understanding of customers' needs and capability of alternate sources	Utilities Commission and Higher Education

How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

There are several strategies being used by other states to respond to this tension including:

Renewable Energy Purchasing Programs: Eight states require utilities to provide an option for customers to purchase renewable energy. Most of these states have regulated electricity markets, indicating that this could work in North Carolina. In Washington, this program allowed customers to purchase over three GWh of renewable electricity in the first ten years. Because these programs are often as simple as checking a box, this option could have a larger usership than programs that require customers to install solar PV, sign a solar lease, or choose a community solar project to enroll in.

On-Bill Financing: Two common forms of this include PACE and "Pay As You Save" financing. Currently, 34 states, including North Carolina allow PACE financing, but North Carolina does not have any active PACE programs. Due to the existing rule allowing PACE financing, it is seen as feasible to introduce PACE programs in North Carolina. Roanoke Co-op has an on-bill financing program that could be a model for other co-ops and municipal utilities in North Carolina if they could be required or incentivized to adopt such a program.

Additionally, New York State is currently establishing a "Green Bank" in order to more efficiently finance projects that will reduce emissions and save customers money. While this may not take the form of on-bill financing, a similar program in North Carolina could increase the financing options for renewable projects.

Rebates: While North Carolina has several energy efficiency and solar rebates, some states have more extensive and innovative rebates that allow for larger and more diverse groups of customers to take advantage of them. For example, four states (CA, MN, NM, and NY) have rebates specifically for low-income customers. These rebates are often similar to other programs but have larger rebates. Implementing similar rebates for low-income customers in North Carolina is seen as feasible and a way to increase access to renewables for all customers.

Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

North Carolina should consider a multi-faceted response through varied leading entities each with specific internally motivated actions that do not deregulate the utility market.

Utilities. Utility providers should move to expand their customers' affordable and highly efficient/renewable choices for power generation and delivery. By leveraging their long-term forecasting abilities and power generation option knowledge, utility providers should look for the cost inflection point - the point where the cost of renewable power (generation/storage/transport) becomes the clear economic winner - and consistently hedge towards the *future low-impact sources* and pivot from the *current low-cost sources*. Although price conscious customers (manufacturing, public, etc.) may choose low-cost options, the market is drifting towards low-impact options and will begin to drive the utility providers if the choices are available - even if not initially the most cost effective.

Utility Customers. Customers must consistently voice their opinion/desires and choose the best power generation option available for their specific situation. Asking for (demanding) low-impact and affordable, renewable options - not a one size fits all approach - or the most cost effective, and possibly less-efficient, option is the customer's right. However, customers should consider their inherent duty to

the community and reasons beyond cost that make renewables/high efficiency power generation options the right choice and make decisions that transcend only financial cost.

Public Utilities Commission. As the Utility Commission sits squarely between the utilities and customers, it must consistently search for overlaps, dissociations and opportunities to be managed effectively in advocating for both. To achieve this, the Commission should put sufficient time and energy into understanding the growing need for renewable/high efficiency power generation from both the utility and customer points of view as opposed to relying on historical reference. The UNC system research capabilities and energy technology centers should be heavily relied upon to assist in this understanding. When points of overlap exist that integrate renewable/highly efficient power generation, the Commission should prioritize these over short-term lower efficiency/lower-cost options.

What are the best ways to interconnect greater amounts of Distributed Energy Resources (DER) and compensate them for the values they provide to the grid without compromising fairness for all customers and reliability?

Definition of DERs:
Distributed Energy Resources (DERs) are distribution system-interconnected[1] generation or Energy Efficiency (EE) sources that provide grid services including energy, ancillary services, and capacity. These resources may be:

- Active (operating to control active power, reactive power, or voltage) or passive (operating without controlling active power, reactive power, or voltage);
- Behind or in-front of meter;
- Generators, load, energy storage, or a combination thereof; and/or
- Utility-, customer-, or third-party-owned.

Current Framework for DER Compensation in North Carolina:

- The Competitive Procurement for Renewable Energy (CPRE) program established under HB589 has created a competitive bidding process for projects interconnected to the existing grid infrastructure; generators receive energy payments that are aligned to the avoided cost (average cost of the next marginal unit of energy) of the utility.
- CPRE also enables solar plus storage projects and the first tranche has demonstrated that solar plus storage is a limited[2] but possibly growing cost-effective solution for the NC energy and capacity markets. More reductions in storage prices and fair compensation policies are necessary for this trend to grow and possibly to radically change the NC energy market place. The inclusion of energy storage to a project in the CPRE causes the offer to be placed behind other offers in the interconnection queue.
- CPRE attempts to balance the interest of utility customers and the solar developers by establishing a fair, independently-administered process for procuring clean renewable energy at economically beneficial terms for customers. CPRE Tranche 1 was successful in establishing a 600 MW competitive procurement process that will provide twenty years of renewable energy at pricing below Duke's Avoided Cost.
- The Integrated Resource Planning process relies on least-cost resources and not clean energy goals, placing it into direct conflict with EO 80. The state does not currently have distribution system planning rules.
- The CPRE Independent Administrator estimates that the first tranche of procurement will provide $375 million in savings for Duke customers in the Carolinas over the term of the contracts (when compared to the 20-year avoided cost). CPRE provides the System Operator with flexibility to help manage the balancing challenges that come with increasing levels of renewable generation.
- As required by the federal Public Utility Regulatory Policies Act, utilities provide a standard offer contract to small qualifying facilities (QFs). Federal statute requires this standard contract to be made available to QFs up to 100 kW, but North Carolina requires that this contract be available to systems up to 1 MW. This size limit will decrease to 100 kW once an aggregate capacity of 100 MW is reached for this program. The contract length is 10 years, and capacity credits are only provided when the utility's integrated resource plan indicates a need for that type of a resource. Negotiated contracts may have a term of up to 5 years. Prior to the enactment of H.B. 589, North Carolina required projects up to 5 MW to be eligible for a 15-year standard contract.
- Net Metering is the current compensation mechanism for behind-the-meter solar in North Carolina, but there are only ~4,000 solar PV systems below a certain capacity operating in North Carolina today. Net metering provides retail rate compensation for behind-the-meter systems up to 1 MW. Net excess generation may be carried forward, but is granted to the utility at the beginning of the summer billing season. H.B. 589 called for a study of the costs and benefits of net metering and for the state's investor-

[1] Less than 69 kVa (FERC)
[2] Due to current regulations.

owned utilities to file new net metering rates after this study is completed. A Commission proceeding has not yet been opened to implement these changes. Virtual net metering and meter aggregation are currently not allowed in North Carolina.

- H.B. 589 legalized solar leasing in North Carolina, but requires lessors to meet certain requirements and be registered with the Utilities Commission. Although leasing rules were approved by the Commission in early 2018, only two companies have registered to be solar lessors. Third-party power purchase agreements are currently not permitted in North Carolina.
- H.B. 589 established a solar rebate program, providing rebates to 20 MW of capacity each year (5 MW is reserved for residential applications and 2.5 MW is reserved for non-profits). The rebate amounts are as follows: Residential – 60 cents/Watt up to $6,000; Non-Residential – 50 cents/Watt up to $50,000; and Non-Profit – 75 cents/Watt up to $75,000. The rebate program was fully subscribed within days of opening in January 2019. The rebate program expires at the end of 2022.
- H.B. 589 required Duke Energy to establish a community solar pilot program for up to 40 MW of capacity. Each community solar project may be up to 5 MW in size. The statute requires that participating customers be compensated at the avoided cost rate. Duke Energy's community solar pilot program was approved in April 2019.
- North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (REPS), established by Senate Bill 3 in August 2007, requires all investor-owned utilities in the state to supply 12.5% of 2020 retail electricity sales (in North Carolina) from eligible energy resources by 2021. Up to 25% of the requirement may be met through energy efficiency technologies; after 2021, up to 40% of the standard may be met through energy efficiency. Municipal utilities and electric cooperatives must meet a target of 10% renewables by 2018 and are permitted to use demand side management or energy efficiency to satisfy the standard without limitation. Commission Rule R8-67(b) requires each electric power supplier to annually file its plan for complying with North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (see G.S. 62-133.8). These REPS Compliance Plans are included in each utility's Integrate Resource Plan filing; there is currently an open docket (Docket No. E-100 Sub 157) to review the utilities most recent filings re: compliance with SB3. All filings by utilities in NC for DSM programs- which primarily take the form of rebates for targeted EE measures in specific sectors (some deemed and some prescriptive) and do include demand response offerings for consumers- as well as the fees charged to rate payers for the same and the resulting programs available to consumers and businesses, relate to compliance with the requirements in SB3. C&I customers can also choose to participate in "curtailable rates" which can have a similar impact to DR programs but are not provided to customers as part of compliance with SB3. Demand Reduction (DR) capability (at the generator) for the 2019 Summer Peaks, based on the 2018 IRP, are:

  DEC Summer 2019: 992 MW
  DEP Summer 2019: 923 MW

Additional Clarifying Questions

1. *Briefly describe the nature of this policy tension/question – what is happening?*
   a. Injecting more DERs onto the grid is in tension with the need to modernize the grid to enable more DERs.
   b. Increasing penetration of DERs is in tension with (the lack of) both access to the data on where these resources are most valuable and the mechanisms for utilities to purchase these services.
2. *To what extent does this policy tension exist in NC, if so, why is it relevant to the state?*
   a. The tension around grid modernization exists because our policy and market frameworks did not contemplate customer-owned or third-party resources at the time of their creation, and general statutes require the incumbent utilities to prioritize lowest cost sources.
   b. Because NC is part of a regulated monopoly territory, third-party data access has not been required for the incumbent utilities to fulfill obligations to ratepayers.
3. *What policy or regulatory action might be required to address the tradeoffs you see?*

a. See the section below on guiding principles and types of solutions, as well as the table of DERs.

4. How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

a. The states that have made the most progress on DER integration have adopted policies that require considerations in system planning other than (only) lowest cost (examples are included in the table of DERs)

5. Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

a. See the section below on guiding principles and types of solutions, as well as the table of DERs.

Guiding Principles for DER Compensation in North Carolina:

- Interconnecting greater amounts of DERs, specifically renewable fuel-based generation and Demand Side Management (DSM) will increase deployment of clean energy and reduce greenhouse gas emissions.
- The Integrated Resource Planning process relies on least-cost resources and not clean energy goals, placing it into direct conflict with EO 80. The addition of carbon costs into the economic evaluation would improve the likelihood of renewables being dispatched and integrated into utility plans.
- Maximizing DER penetration will require increased investment in the distribution system and expanded Integrated System Planning. Such planning will be the best tool to ensure cost and compensation allocation is fair and that grid upgrades which are necessary to manage greater interconnection of distributed capacity also provide the same or greater reliability than current state.
- A change from the current NC energy regulation and legislation which currently emphasizes least cost over other considerations such as GHG emissions reductions will be necessary to achieve a cleaner, lower carbon grid.
- Compensation for DER services[3] in addition to compensating energy is likely to lead to:
  - Wider and higher participation/interconnection of renewables by enabling investors to stack revenue streams;
  - More targeted locations for these resources; and
  - Increased technological and financial innovation.
- Compensation structures should be a means to develop price signals which encourage DERS to provide valuable grid services through:
  - **Locational Planning and Transparency:** More, public and granular visibility of load, supply, and distribution constraints (e.g, hosting capacity, thermal and voltage limits) on the grid is needed in order for DERs to be able to provide locational value. Visibility into system constraints down to the distribution level are necessary in order to determine where the assets can provide the most benefit for the grid. This information is a critical component to grid planning and enabling more DERs on the grid. Southern California Edison (SCE) is one utility that provides a helpful level of distribution-level information.[4] See comparison of Duke Energy's[5] and SCE's grid maps in Appendix A.
  - **Fair Compensation and Cost Allocation:** For example, studies should address how behind-the-meter customer generators (e.g. net-metered customers) should pay or be compensated for full additional or avoided local costs (i.e., reserve requirements, addition or avoided T&D investment) instead of spreading incurred or avoided costs to non-solar customers. This practice can be part of standard analysis of interconnection costs and benefits.

[3] e.g. energy, spinning and non-spinning reserves, frequency regulation and response, capacity avoidance/deferral, dispatchability, reactive power support, voltage regulation, avoiding T&D investment, etc.

[4] https://ltmdrpep.sce.com/drpep/#

[5] https://www.oasis.oati.com/duk/index.html

        - Upgrades to the electrical grid[6] are necessary to accommodate more DERs and the burden of cost should be studied in order to fairly allocate them.
    - **Time-Based Pricing:** Particularly for DSM resources, hourly compensation is a dominant form of compensation in the restructured markets such as PJM, ERCOT, MISO and ISO-NE. Hourly, locational, marginal prices are the most accurate form of short-term variable costs including energy, capacity and ancillary services and are the most effective signals to these resources about when they are most valuable.
    - **Long-Term Contracts:** Particularly for generators, long-term "off-take" contracts with a combination of fixed and variable prices (see time-based pricing, above) are necessary for new investments in clean energy generation. Conversely, absence of long-term contracts advantages incumbent technologies and suppliers. Energy sellers and some buyers prefer long-term price stability because it decreases the risks for each and cost of capital for sellers to make these investments.
- Renewable programs targeted specifically for government, non-profit and low-income customers, who might benefit from increased use of solar but for whom financial barriers to ownership are much higher, must be attainable. Though the HB589 leasing provision is a good start at offering a zero up-front solar cost to customers, North Carolinians could do a better job at consumer education around leasing options and there are very few currently eligible lessors.[7]
- Overwhelming demand for the first years of the NC solar rebate program shows the current rebate program needs to be redesigned and rebate reduced to reach more applicants and to align to the lower solar prices in today's market.

Types of solutions the Clean Energy Plan (CEP) can and should address are:

- Tariffs that are not compensation offers for DERs, but price signals to loads, e.g. more robust Time Of Use (TOU) riders and/or Real Time Pricing. These tools let owners or operators of DSM measures maximize their return on investment by targeting the most valuable loads to curtail.
- Compensation tariffs for DERs such as Net Metering or a Value of DERs tariff.
- RFPs should be used where possible and most effective as the effects of competition always benefit rate payers; these procurement actions can be broad (e.g. state-wide calls for services/products, resources, or resource types) or targeted to a specific distribution substation.
- Improved interconnection processes:
    - Fast-tracking of interconnection for systems paired with energy storage.
    - Enforcement of required response time in the Interconnection Standard.
    - Interconnection standards as well as process improvements (e.g. utilities could potentially waive certain interconnection standards that are applied too broadly and use a different protocol for distribution system safety for grid tie inverters that provide ancillary services such as VARs).
    - Utilities providing interconnection capacity by feeder or area so developers can target those feeders or areas.
- Compensation for generators or load that responds to dispatch signals or prices (e.g. storage-paired resources).
- Inclusion of non-wires alternatives (NWAs) in the planning of T&D upgrades (e.g. distribution deferral through energy storage) procured typically through an RFP or a tariff designed to compensate NWA.

[6] Physical or virtual changes to the distribution system that enable more variable load or greater utilization of DERs such as smart meters, improved communication infrastructure, data transparency and accessibility, voltage regulators or line and substation capacitors

[7] The bill allows customers to lease PV systems, and Duke Energy is also permitted to lease PV systems. Leased systems are limited to 100% of contracted demand, 20 kW for residential systems, and 1 MW for nonresidential systems. Costs associated with marketing, installing, and owning leases may not be recovered from nonparticipating utility customers, and the Commission will not have jurisdiction over the financial terms of leases. Third-party lessors must hold a certificate issued by the Commission.

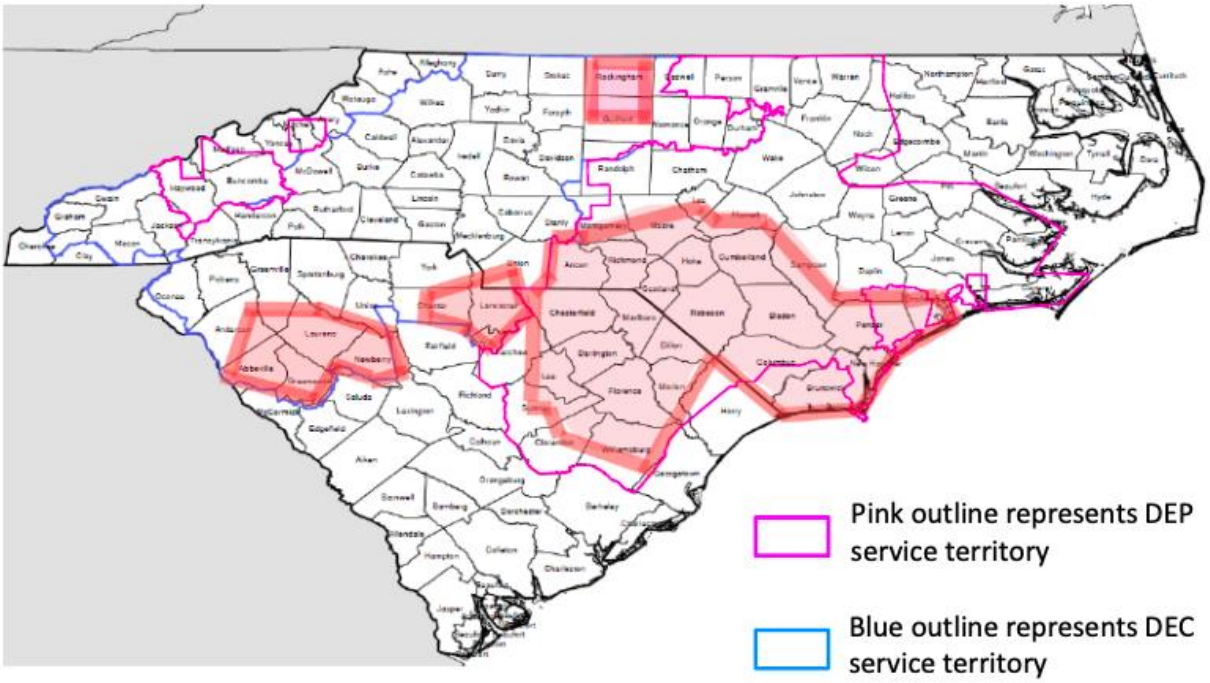
- Distribution planning and Integrated System Planning expansion and improvement: the group recognizes that distribution planning can take many forms and may also carry costs or benefits not yet born or avoided by rate payers.
- Grid upgrades: Physical or virtual changes to the distribution system that enable more variable load or greater utilization of DERs such as smart meters, improved communication infrastructure, data transparency and accessibility, voltage regulators or line and substation capacitors

Appendix A

Duke's Map for developers[8]

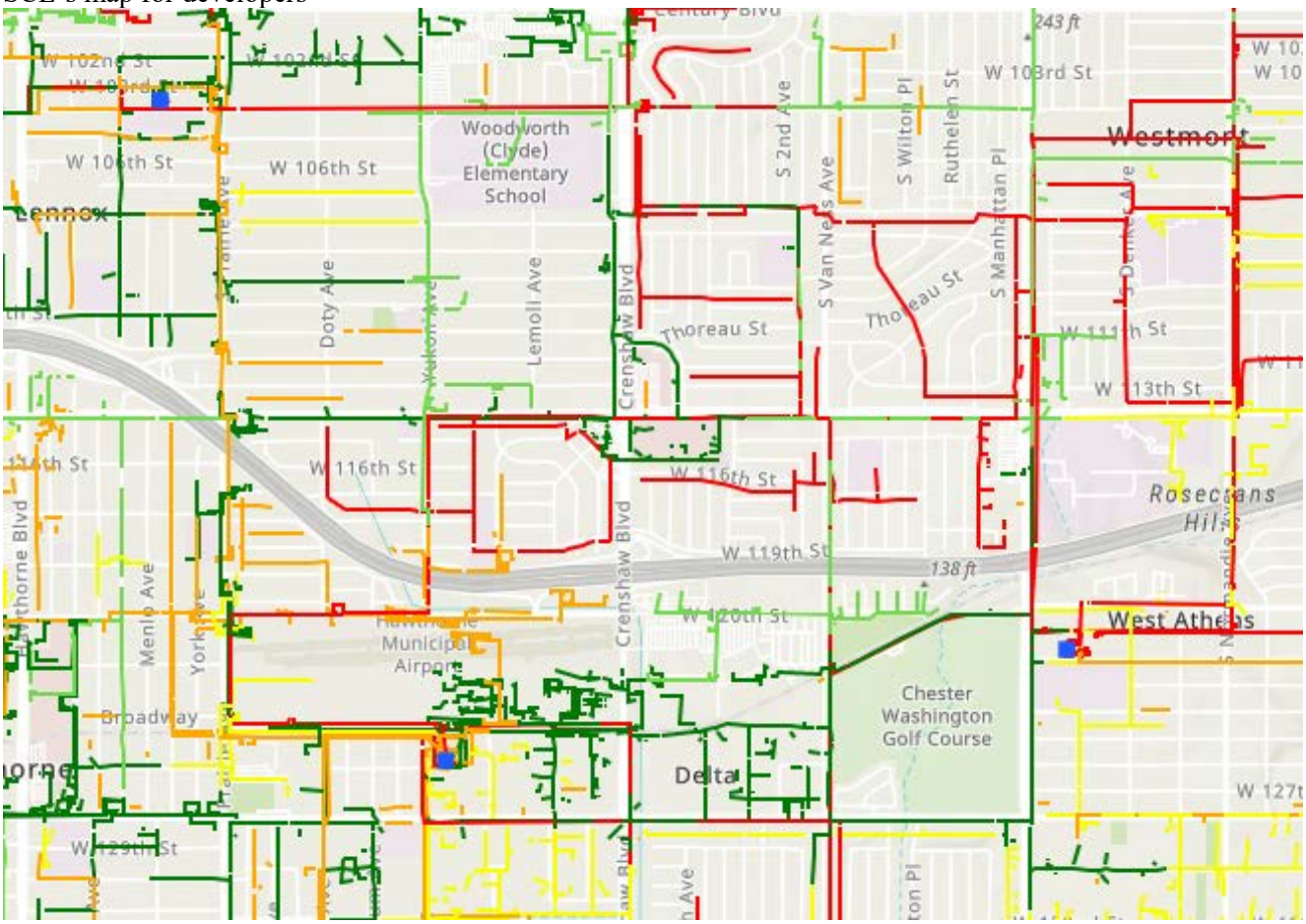
Attachment 1

DEC and DEP Constrained Areas



[8] https://www.oasis.oati.com/duk/index.html

SCE's map for developers[9]



[9] https://ltmdrpep.sce.com/drpep/#

Grid modernization to support clean energy	*What are the key grid upgrades or investments needed to enable greater adoption of clean energy by customers and utilities while maintaining affordability for ratepayers and reliability?*

Summary:

There is potential debate about how to define grid modernization, this group chose to focus on the technologies, upgrades and investments that are required to enable greater adoption of clean energy and did not address the definition of grid modernization. We are suggesting upgrades and investments that will work towards creating a "lean grid," that maximizes power output, while minimizing resources and CO2 emissions.

The implementation of these key upgrades and investments should be done using a transparent evaluation process that considers the stacked benefits that result. The cost recoupment and the impact of that recoupment on low income individuals and small businesses should also be considered.

Establishing different segment goals (i.e. CO2 reduction, DER integration, pricing targets, reduction of outage time, etc.) and setting reasonable timelines is a good way to provide accountability on the progress made toward grid modernization and inform all stakeholders as to where more resources or attention must be paid.

High level upgrade and investment recommendations include:

- Regionally appropriate DERs that harness the natural energy producing environment to maximize the DER
- Energy storage that provides localized power that offsets demand
- Smart inverters, transformers and power controllers that facilitate the bidirectional flow of power
- Capacity improving investments to aid in faster, more stable redirection of power when needed

More detailed areas for innovation and improvement are outlined in the body of this paper.

1. Briefly describe the nature of this policy tension/question - What is happening?

Transformation of the electric power system to a system powered by high levels of clean fuels requires integrated planning of technology adoption so as to occur at high speed and in a way that exploits demand flexibility, high potential for energy efficiency, and the low cost of renewables to offset costs of equipment modernization. Whereas supply and load balancing already are executed as a system level function, traditional power system management structures do not provide

- a mechanism for successful management of a rapid and extensive grid technology transformation
- pricing signals that reflect environmental costs
- incentive structures that could drive participants to choose efficient transformational actions

Optimal engagement of renewables and complementary grid and usage technology will require transparency in planning. Likewise, operational effectiveness under conditions of 2-way power-flow will require a significant increase in availability of transmission and distribution data to enable monitoring, control, and system protection.

Challenges for grid modernization include decisions about the scale (utility or smaller scale) of renewable generation most efficiently supported while meeting goals for resilience and determining who pays and who benefits from necessary investments.

2. To what extent does this policy tension exist in NC + why is it relevant to the state?

The challenges outlined in question 1 are relevant to us. However, relative to states with high levels of consumer level renewables, NC has the capacity to move forward with consumer-level assets but is faced with the challenge in short order of adopting a strategy for successfully exploiting significant availability of large, utility scale solar deployment. This scale of deployment is more readily known and amenable to central management than DERS, which in general requires distributed control. However, NC also needs policies that encourage implementation of distributed resource management, so that communities in monopoly territory, as well as large
corporate campuses, and communities in coops can benefit from stable implementations of smaller scale DER. Distributed resource management will be facilitated by the establishment of incentives, such as pricing signals that encourage distributed producers to match load profiles.

3. What policy or regulatory action might be required to address the tradeoffs you see? What entity would need to take the action you've identified?

- We recommend creation of a working group to evaluate:
    - Feasibility of new incentive structures for suppliers, consumers, and technology providers
    - Framework for transparent analysis and decision making
    - Technical framework for real time asset management and situational awareness
    - Alternate cost recovery and/or incentives for utilities and third parties to invest in grid upgrades and renewable sources
    - Interconnection rules to facilitate higher levels of distributed resources

Ultimately the balance between affordability and ensuring grid reliability in the face of increased clean energy adoption will likely come before the North Carolina Utilities Commission (NCUC) as it considers cost recovery for investments made by utilities or requirements for interconnection that involve new grid upgrades or investments needed to manage grid instability. Many states have created incentive structures for utilities or interconnected resources to deliver solutions to the grid instability problems resulting from incompletely managed intermittent generation, so as to enable high levels of renewable generation. While there are no fully established frameworks for assessing the appropriateness of stability solutions, our utility commission could be charged with requesting proposals for solutions and having them evaluated by independent industry professionals.

4. How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

According to the NC Clean Energy Technology Center's The 50 States of Grid Modernization: Q1 2019 Quarterly Report: "Over half of U.S. states are currently examining these regulatory frameworks or actively working to deploy advanced grid technologies. This activity is expected to continue, as states and utilities conduct studies, try new approaches, and learn from one another about how best to achieve the many benefits of a more modern grid."

In terms of incentives to encourage clean energy developers to invest in storage or other technologies to address clean energy intermittency, California Rule 21 is the ruling from the CA PUC that covers distributed energy resources interconnection requirements for utilities including technical standards and tariffs. Each of the IOU's in CA have their own tariff to cover the implementation of Rule 21 in their

territory. The latest updates have included requiring smart inverters and communication standards to better enable the integration of DER's.

5. Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

Beyond the policy or regulatory actions mentioned above, NC should be aware of all the technologies available today to ensure grid reliability in the face of increased clean energy adoption. While this is not an exhaustive list, some current technologies include battery storage, electric vehicles, demand response, energy efficiency, smart inverters, and system-wide grid investments. System-wide grid investments were noted in NC DEQ's 2018 *Energy Policy Council Biennial Report* as "distribution automation, which is the addition of smart switches that enable fault location, isolation, and restoration; new distribution monitoring and data gathering systems (e.g., Supervisor Control and Data Acquisition) (SCADA)); and two-way communications to intelligent energy devices (IED) on the distribution grid." The Biennial Report also noted, "Each new system generates orders of magnitudes of new data that can be analyzed and interpreted."

Upgrades supporting grid-beneficial distributed renewable generation adoption						
Upgrade	Capability facilitated					
	Monitoring and Visibility	Local intelligence/ Automation	Efficiency	Matching load and supply	Increased capacity of solar per unit energy	Low emission electrification
Advanced metering infrastructure	x	x			x	x
Power electronics	x	x	x	x	x	x
Energy storage				x	x	x
EV charging infrastructure				x	x	x
Demand side management tools				x	x	x
Price signal communications				x	x	x

The chart below highlights areas of opportunity that were identified recently in a study by Duke Energy and were deemed most critical to driving innovation and improvement in the integration of DER to the grid

Utility Side Upgrades						
Program	Capabilities Enabled					
	Monitoring & Visibility	Automation	Distributed Intelligence	Voltage Control	Two-way Power Flows	Increase Hosting Capacity
Advanced Metering Infrastructure	X	X			X	
Integrated Volt/VAR Control (IVVC)	X	X	X	X	X	X
Self-Optimizing Grid (SOG)	X	X	X	X	X	X
Power Electronics for Volt/VAR	X	X	X	X	X	X
Distribution Automation	X	X	X	X		
Energy Storage			X	X	X	X
DER Dispatch Enterprise Tool	X	X	X		X	
Enterprise Communications	X	X	X	X	X	
Cyber Security	X	X	X			

NC also has world-class research institutions, which can be leveraged to push for new technological solutions that are increasingly affordable. Private companies in the Research Triangle Park, Charlotte and elsewhere throughout the state can also be consulted for technical solutions to these challenges.

APPENDIX: References

"The Future of Solar Energy: An Interdisciplinary MIT Study," Energy Initiative, Massachusetts Institute of Technology, ISBN (978-0-928008-9-8), 2015, 334 pages.

NC DEQ's 2018 *Energy Policy Council Biennial Report, https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Energy/Energy%20Policy%20Council/2018%20EPC%20Biennial%20Report%20-%20FINAL.pdf*

Peter Fox-Penner, "Smart Power - Climate change, the smart grid, and the future of electric utilities", 2014, Island Press, ISBN 978 -1- 59726-705-2 or -706-9

Feedback from Workshop Discussions 5-22-19

Ideas in the presentation I did not understand:

We need real time data: Who is "we"? Distributed Generators? Devices?
The utility would argue that as the grid operator they are the only ones that need the data
Are we envisioning that e.g. a behind-the-meter solar inverter could bid ancillary services
Explanation of grid instability. What does this mean exactly?
Concept of cost recovery as a problem; Oh I think you meant worry about adequate usage of new generating sources
What's the tension between affordability and grid reliability?
The feasibility of getting the real-time asset management
Examples of incentive structures from other states
What categories of data could be shared with consumers/made public
What distinguishes "grid modernization" between traditional utility investment? What is the core distinction?
Role of NCUC influence
Exactly what grid mod includes
How integrating large scale solar projects is more of an immediate challenge than is DER when it comes to grid mod

Ideas that were missing from the presentation, but should be included:

Is this distribution or transmission grid mod
Addressing the urgency to agree on a policy for grid mod
Dukes proposal of if and to do maintenance, storm hardening and instability Vs. need for greater grid capacity to handle more renewables in Eastern NC to load center in central/western NC
Tension - Grid operation is designed to bring supply to demand. With electrification comes implicit scheduling/storage and the need/opportunity to bring demand to supply. That is flexible demand provides for integration of renewables → Electrification?
Duke does not compete strongly with independent producers in building and operating renewables. Does duke lack opportunity to rate base new renewable investments? Does this affect incentives for the company's technology pathway?
Definition of data availability and what could be used
Policy to require smart metering
Policy to set communication protocols for grid equipment such as smart meters
related to the above, making the grid ready for transportation electrification
What is capacity potential for residential and commercial PV?
Have you explained smart inverters emphasis EQ7 & EQ8
What should/could "working group" for grid mod look like?
Separate docket for Grid Mod at NCUC
What are the key upgrades/investments needed?
What truly counts as grid mod vs. business as usual/necessary for reliability
Better distinction between this group and the interconnection group; What is each group distinctly trying to address between the interconnection issues?
Burden of cost → who bears the brunt
GDPR - Data protection
Community solar
Opportunities to partner with customers (i.e. private sector) on projects that would be beneficial to the grid as well as to that customer (ex. energy storage)
How this is taking into account equity issues, als ratepayer impacts generally

Ideas that emerged from this presentation that may be in tension with my/another group's topic area:

What happens when there is a tension between the grid the utility wants and the grid customers with DER want?
More transparency needed in all utility silos
Duke wants more investment opportunity- why not grid mod to support more clean energy capacity?
Faster interconnection - can we really achieve this faster?
Our entire group was silent on the topic of environmental justice
Fits with "resilience" at the consumer/distribution level
How does "grid modernization" interact with the traditional resource planning process
Interconnection: Another group handles this. Maybe save space and focus elsewhere here?
Transparency
How does duke energy define grid modernization
Interconnection of new assets

Ideas that I am excited about and would like to explore more:

Ideas that I am unexcited about - another working group. There have been many in recent years and duke energy has walked away from what has been
Queue for storage vs solar or creative ways to manage interconnection
Transparency emphasis
Data availability
Increase in residentially produced energy (rooftop solar) clean
What data is available publicly in other states or RTOs that is not available in NC - we should be able to access such data
Working group for grid modernization
New incentive structures (performance based rate?) to encourage grid and 2-tier queue for centralized/decentralized generation
Rhode Island PBR example!
Setting criteria (a rate base?) for evaluating investments in grid mod

Access to data and real time access
Resiliency of grid
Looking at what other states are doing and implementing in where it makes sense (i.e. for data sharing/transparency, interconnection, etc.)

Question: How do we better align utility incentives with desired clean-energy outcomes while protecting ratepayers and maintaining the financial health of utilities?

Nature of the Policy Tension in NC: Utilities are under a legal mandate to provide adequate, reliable and economical utility service. At the same time, utilities must comply with state clean-energy mandates in the Renewable Energy and Energy Efficiency Portfolio Standard (REPS) and H589 Competitive Energy Solutions for NC. Utilities also must comply with environmental mandates such as the Clean Smokestacks Act. The state also has environmental policy objectives, such as to cut carbon emissions pursuant to EO 80. The October 2018 special report on global warming by the Intergovernmental Panel on Climate Change states that limiting global warming to 1.5 degrees Celsius above pre-industrial levels would substantially reduce its destructive impacts, and that to do so global net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45 percent from 2010 levels by 2030, reaching "net zero" around 2050. There is a tension between utilities' incentives and statutory mandate, protecting ratepayers, and clean-energy objectives.

The following matrix identifies elements of the current utility business model that may inhibit progress toward EO 80 and clean energy goals, as well as corresponding potential tools to foster clean energy. The group agrees that the design of any tool affects how and whether it supports clean energy deployment, utilities' financial health, and ratepayers. In other words, the "how" matters. The tools identified are not mutually exclusive. The tools will interact and affect one another's performance, and the efficacy of any single tool can be either strengthened or weakened by other tools implemented, further adding to the importance of how the tools are constructed and implemented. These tools have been used and/or discussed in other jurisdictions and could be explored more in a stakeholder process here. However, due to regional differences, what has worked in another state might not work here; no tool is ready to copy from another jurisdiction and simply "plug and play." The actor tasked with establishing any given tool could vary, and some tools might require more than one actor. The tools are not listed in ranked order. The UBM Group recognizes that utilities continue to see value in maintaining the regulatory compact, commonly understood as the grant of an exclusive monopoly to a utility in exchange for public oversight and the obligation to serve all customers within the service territory at a reasonable price set by the regulator.

We make two main recommendations. First, the state should set a measureable GHG emissions reduction goal for the electric sector that will become enforceable through established processes. Second, the state should select tools to achieve that goal, and within one year from the date that the final Clean Energy Plan is issued, produce a comprehensive plan that clearly defines targets and aligns utility incentives and mandates in order to meet them. Both should be achieved with broad public and stakeholder input. The group identifies the tools listed below as worthy of further investigation, but the list is not exhaustive, and inclusion of a tool here does not imply endorsement by the individuals or organizations that participated in this working group discussion.[1]

[1] While the UBM group's utility participants are unable to endorse all points, recommendations, elements, and tools addressed in this memo, the utility participants recognize that this small group discussion about balancing clean energy outcomes with customer (or member) protections and maintaining the financial health of utilities - including IOU, cooperative and municipal utilities - has been a valuable one and they look forward to continuing this conversation to find areas of alignment among stakeholders. North Carolina's Electric Cooperatives (NCEC) welcome the opportunity to continue working with all stakeholders to develop energy solutions that benefit our state's citizens and communities, including the rural communities served by North Carolina's 26 electric cooperatives. Going forward, NCEC is committed to

Element	Tool
Utilities must maintain their financial health.	Amend Chapter 62 of the N.C. General Statutes to allow NCUC to consider additional objectives such as carbon reduction. Chapter 62 is where the rules governing utilities appear in statutes.
Absence of carbon reduction requirement or price signal outside of EO 80.	Establish a carbon reduction requirement or price signal, e.g., cap and trade or carbon tax or clean energy standard (e.g., zero-emission credits (ZECs)). It should include a clear definition of "clean energy" (e.g., whether to include nuclear, biomass, large hydro, geothermal, renewable natural gas (e.g., from swine facilities, landfills and wastewater treatment plants)).
Better align consumer incentives with clean energy deployment goals	Use innovative rate design to encourage customer behavior that helps achieve clean energy goals, such as "clean peak" generation and storage deployment. E.g., rates that incorporate value of distributed energy resources (VDER), time-varying rates, electric vehicle (EV) rates.
Recovery of most costs (including most fixed costs) through per-kilowatt-hour sales results in incentive to sell more electricity regardless of carbon intensity (the "throughput incentive").	Performance-Based Ratemaking (PBR) (potentially including but not limited to multi-year rate plans (MYRP), and performance incentive mechanisms (PIMs)) Calculator to measure carbon intensity of grid power Beneficial electrification. E.g., more electric-vehicle supply equipment (EVSE), potentially via a Low-Carbon Fuel Standard (LCFS); electric water heaters; heat pumps; etc. Revenue decoupling

balancing affordability, reliability, and the following three values: (1) Creating a low-carbon emissions environment for our state and its citizens through sustainability and continued investment in low- and zero-emissions resources; (2) integrating technology that makes distribution grids more resilient, robust and flexible for an energy future that includes consumers' participation through demand response programs and new energy resources distributed across the grid; and (3) improving efficiency of the overall energy sector by electrifying processes formerly powered by fossil fuels, with electric vehicles being a primary example of this type of beneficial electrification (BE). NCEC's commitment to such a balancing approach necessitates the caveat found in this footnote. By way of example, prompted by NCEC's support for BE and its understanding that BE could result in higher electric sector GHG emissions but reduce statewide GHG emissions, NCEC cannot endorse a recommendation that the State set a GHG emissions reduction goal for the electric sector. NCEC instead believes ongoing discussion among stakeholders is a more appropriate next step.

	Shared savings mechanisms for energy efficiency and demand-side management
IOU ratemaking is backward-looking rather than forward-looking. Traditional cost-of-service, "rate-base, rate-of return" ratemaking results was designed to support large investments in utility-owned infrastructure (the phenomenon of "capital bias") and results in an incentive to do so.	Alternative cost recovery/ratemaking tools such as PBR (potentially including but not limited to MYRP, PIMs) Revenue decoupling Shared savings mechanisms New procurement models. E.g., green tariffs (already exploring with Green Source Advantage (GSA)), competitive solicitations (already exploring with Competitive Procurement of Renewable Energy (CPRE) program), aggregating DERs to provide services (e.g., bring your own device (e.g., batteries, thermostat)))—there is tension re who aggregates, utilities or 3rd parties.
Recovery of large capital investments through general rate cases may result in less timely cost recovery than desired by the utility ("regulatory lag")	PBR (potentially including but not limited to MYRP, PIMs, formula rates)
Inability to recover costs of accelerated retirement of utility assets that are carbon-intensive and more costly for rate-payers	Securitization Accelerated depreciation Just-transition funds (considering both job loss and tax base) Retirement-linked green bonds (IOUs already have this option)

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Daniel Brookshire, NC Sustainable Energy Association
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Jennifer Weiss, Duke University's Nicholas Institute
Michael Youth, NC Electric Cooperatives

Observers:
Layla Cummings, NCUC Public Staff
David Williamson, NCUC Public Staff

Clean Energy Plan
Utility System Planning and Investment Memo

Question

How do we achieve a certain and continuous utility planning and investment process while meeting the criteria that it is flexible, economically efficient, and adaptable, all while maintaining reliable, affordable, safe, equitable, and clean energy?

Summary

Using other states as an example, NC can create a stakeholder engaged electric resource, grid, and system planning process, which is transparent and consistent. Holding a regularly scheduled and regulated process generates trust and certainty for the utility, stakeholders, and State's goals.

Across the country, states are reforming the utility planning process. A larger number of players are joining traditional utilities as collaborative participants in the resource planning and grid investment process. As states pass legislation with the goal of achieving clean energy targets, keeping costs low, and addressing the challenges of a more decentralized and complex grid, resource planning processes must adapt to incorporate input from a diverse group of stakeholders including traditional utilities, ratepayers and their advocates, clean energy advocates, and energy developers.

North Carolina's current path of gradual improvements to a traditional planning process, is not adequate to meet the challenges of integrating deep renewable and distributed energy penetration, which are, in turn, necessary for the state to achieve Executive Order 80's (EO80) economy-wide GHG reduction targets. Reaching the goals set out by EO80 means considering the interaction of the electric sector with other sectors such as the transportation and vehicle electrification shifts which could impact utility planning extensively. Therefore, it is necessary that North Carolina move to a more holistic, iterative, and transparent planning process that incorporates economically non-traditional market solutions, which could lower energy generation costs, all while maintaining a clean, reliable, affordable, equitable, resilient, and secure electricity system.

In North Carolina, two trends run parallel to those developing nationally. First, the current IRP process does not include explicit clean energy goals, with notable legislative exceptions including HB 589 and Clean Smokestacks, which could inhibit the ability of the energy sector to achieve current or future clean energy and environmental goals. Additionally, the current IRP process has little accountability or transparency in its goal-setting and lacks rules governing stakeholder involvement prior to IRP submission, which would provide a forum for constructive discussions on modeling approaches, price forecasts, and scenario development. Therefore, North Carolina's primary long-term energy planning mechanism is currently primarily dictated by the regulated utility. The second tension surrounds the utility's proposed grid modernization proposal, which was rejected by the North Carolina Utilities Commission (NCUC) in 2018, reflecting the need for a collaborative planning process that is inclusive of stakeholder interests.

The central tension driving differing visions of grid modernization is whether to rely, as the regulated utilities' submitted in their long-term plans, on natural gas to replace retiring coal capacity or to shift more quickly toward clean energy as some environmental and ratepayer advocates suggest. Nationally, the electricity generation sector appears to be reaching the "coal crossover" point at which renewables are cheaper than existing coal units in North Carolina[1], raising conflicts between utility concerns of stranded assets and ratepayer concerns over least cost generation. Finally, the regulated utilities' proposed legislative changes to the ratemaking process without a prior stakeholder process once again raises concerns over lack of consensus or public input on potential performance-based ratemaking tools as per national best practice as part of any multi-year ratemaking law.[2]

[1] **The Coal Crossover: Economic Viability of Coal Compared to New Local Solar and Wind Resources**, Vibrant Clean Energy, March 2018.

[2] **State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities,** Grid Modernization Laboratory Consortium, U.S. Department of Energy, July 2017

Addressing the tensions present between multiple parties can be achieved through a better defined and stakeholder-centered utility planning process. An improved planning and investment process could be enabled by the North Carolina General Assembly and overseen by the Utilities Commission. This includes legislation which defines the goals of the planning and investment process, as well as the necessary steps, tools, and costs to develop the process, and what roles the NCUC will play giving explicit authorization where it is currently vague or lacking under existing law. To align North Carolina's process with proven successes in other states, the process should initially include an Integrated Resource Plan (IRP)[3] and Integrated Distribution Plan (IDP)[4], ultimately moving towards an Integrated System Operations Plan (ISOP) approach, which combines the often-separate processes of generation, transmission, distribution, and distributed energy resource planning.

Definitions

IRP - An integrated resource plan is a utility plan for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply-side and demand-side resources over a specified future period.

IDP - A more comprehensive approach to distribution planning using new tools and techniques to accommodate the increasingly complex and diverse grid that incorporates new components such as DER and two-way electrical flows

ISOP - A comprehensive planning process using new tools to integrate generation, load, transmission, and distribution together to more effectively, efficiently, and economically deal with an increasingly diverse set of energy factors.

These regulated planning processes should be transparent, consistent, data-driven, and involve stakeholders' input and feedback throughout the development and goal-setting phases, and where possible in the decision-making phase of the process. The IRP, as it presently exists in NC, does not possess adequate tools or stakeholder input to address the changing landscape around generation, grid modernization, and system planning. In order to address these shortcomings updated and novel IRP, IDP, and ISOP requirements should be developed and defined collaboratively by the utility, stakeholders, and the NCUC to meet North Carolina's goals. This means including stakeholder input in a systematic fashion as the utility thinks about what the process looks like, what tools and data are included, how stakeholders play a role, what the timeline is, and how it will be enforced and enacted.

It is recommended that the processes include regularly scheduled plan submissions (filings) with the NCUC to allow for stakeholder intervention early and throughout the process. These submissions should utilize existing analytical tools as well as newly developed tools which incorporate higher quality data. This includes offering improved data and modeling access for industry and stakeholders, which could come in the form of hosting capacity analysis for example, helping to create market opportunities and investment confidence throughout the process. To achieve the state's clean energy goals, utilities must update planning models and assumptions to allow full quantification of the operational benefits of renewable resources, electric vehicle infrastructure build out, and energy storage. Current modeling techniques fail to account for the suite of operational benefits these resources can bring to bear, undervaluing potential benefits and encouraging utilities to rely on past operational practices instead of exploring innovation in electrical systems operations.

Fortunately, North Carolina can look to states already developing and implementing holistic planning processes, which balance the goals of the state, utilities, and stakeholders. Some prime examples include Minnesota, Nevada, Hawaii, Colorado, Washington, and California.

In 2015 the Minnesota Public Utilities Commission opened an inquiry into distribution planning (docket 15-556), aiming to incorporate distributed energy resources (DER) with the appropriate optimization tools and create a transparent grid leading to an enhanced grid, reduce costs, and a more flexible and DER capable system. Ultimately the multi-year process now requires the regulated utilities (Xcel Energy) to develop DER

[3] **Best Practices in Electric Utility Integrated Resource Planning,** Regulatory Assistance Project & Synapse Energy Economics, June 2013

[4] **Integrated Distribution Planning**, ICF International, August 2016

growth scenarios for 10 years, evaluate non-wire alternatives, detail DER queue status, and file annual updates on their 5 and 10-year distribution investment plans.

Nevada's legislature passed a bill in 2017 (SB 146) to address distributed resources along with their cost, benefits, financial compensation mechanisms, integration, and barriers to adoption. The Public Utilities Commission began the rulemaking process in 2017 (Docket 17-08022) leading to a Distributed Resource Plan proposal. The proposal includes a system load/DER forecast, locational net benefit analysis, hosting capacity analysis, and grid needs assessment, filed every 3 years with the IRP.

Hawaii and its utility have adopted (HB 623) and started the planning/development process for its Integrated Grid Planning (IGP) process in 2019 (Docket 2018-0165), a program which incorporates both distribution and generation planning, similar to an ISOP. The IGP (Figure 1), which will continue to change and grow with feedback from stakeholders, includes a capacity expansion model, a substation load and capacity analysis, hosting capacity analysis, and improved stakeholder input to the 3-year process, which produces a 5 year action plan and a long term pathway to achieve the legislative goals of 100% renewables. (*See Figure 1*)

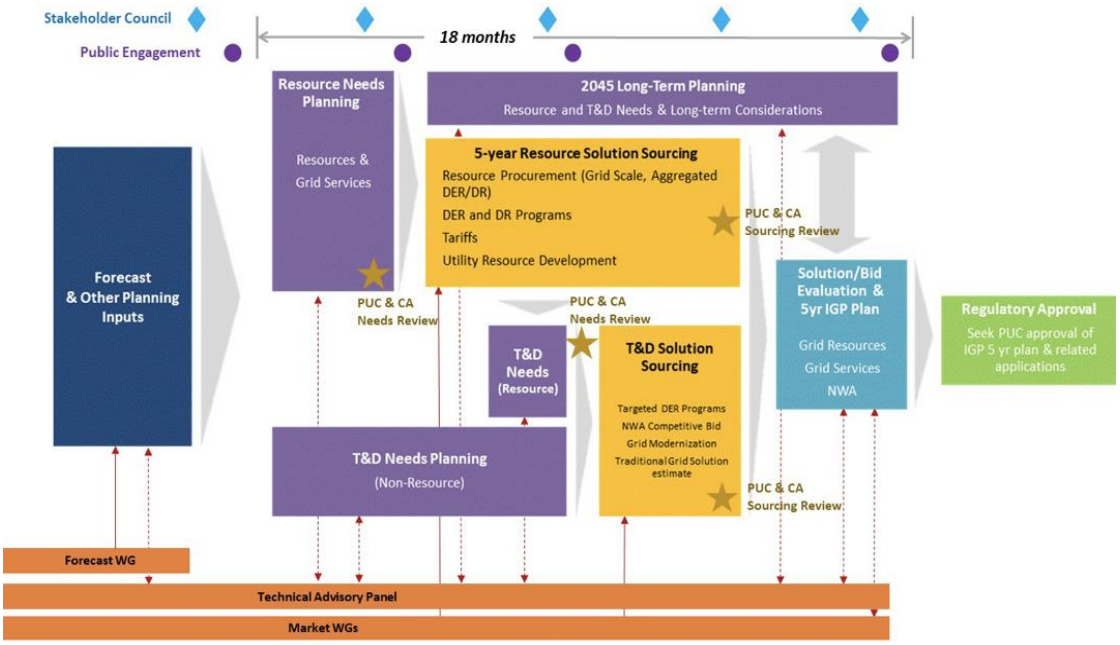

*Figure 1 - Hawaii's Integrated Grid Plan (analogous to ISOP) as an example of the complexity, transparency, and stakeholder engagement (**Integrated Grid Planning Report**, Hawaiian Electric, Maui Electric & Hawai'i Electric Light, March 1, 2018)*

It would be beneficial to invite input from representatives of the cited states on how, moving forward North Carolina can transition to an electric sector system planning process which includes the same level of stakeholder engagement and transparency achieved elsewhere. Duke Energy, the largest regulated electric utility in the NC, having recognized the need for an update has already begun the development of an ISOP, which will include consideration of non-traditional solutions such as DERs and energy storage in Distribution and Transmission. Duke Energy noted in their May 20, 2019 NCUC filing responding to 2018 IRP reply comments that they support a pre-rulemaking stakeholder process to facilitate a common understanding of IDP and ISOP issues. Duke has been actively working on extending modeling capabilities to better address renewables and energy storage, and plans to share more information on these efforts and the overall ISOP vision during the stakeholder process. (*More background on Duke Energy's approach to an ISOP is provided in the addendum*)

A better defined and inclusive resource planning process can ensure that the needs of diverse grid stakeholder group are accounted for and that the electric sector is able to do its part in achieving EO80's economy-wide targets, while putting North Carolina on the path to a low-carbon future in the long-term. This will require stakeholder engagement in the development of the process, and tools and continual involvement throughout the

actual process. North Carolina, its utilities, and stakeholders should look to other states further along in this process to identify best practices and tools to utilize in order to deploy a more advanced planning process effectively and smoothly.

Resources for Further Reading

Integrated System Operation Plan (ISOP)

- "Planning Hawai'i's Grid for Future Generations: Integrated Grid Planning Report", Hawaiian Electric, Maui Electric, Hawai'i' Electric Light, March 1, 2018

Integrated Distribution Plan (IDP)

- "Integrated Distribution Planning", ICF International, Prepared for the Minnesota Public Utilities Commission, August 2016
- "Integrated Distribution Planning Concept Paper: A Proactive Approach for Accommodating High Penetrations of Distributed Generation Resources", Interstate Renewable Energy Council & Sandia National Laboratories, May 2013
- "Integrated Distribution Planning: A Path Forward", GridLab, nd.

Integrated Resource Plan (IRP)

- "Best Practices in Electric Utility Integrated Resource Planning: Examples of State Regulations and Recent Utility Plans", Regulatory Assistance Project & Synapse Energy Economics, June 2013

Addendum
Duke Energy's Ongoing Integrated System Operations Planning (ISOP) Efforts

The following addendum was drafted solely by Duke Energy,
and while approved to be included, is not representative of the group efforts

Duke Energy agrees that the landscape of utility planning is evolving due to declining costs for renewables and storage, customer preferences and policy goals. Duke Energy has connected 2,900 MW of solar in North Carolina, and with House Bill 589, will achieve 7,000 MW by 2025. Duke Energy's utilities in the Carolinas have received over 20,000 solar interconnection requests and connected nearly 17,000 projects since 2006. North Carolina has more distribution connected utility scale solar than any other state. Between 2005 and 2018, Duke Energy reduced CO2 emissions in the Carolinas by 37 percent, and currently projects a 53 percent reduction by 2025. More than half of Duke Energy's generation in the Carolinas now comes from zero-emission sources, including solar, hydro and nuclear.

A more robust approach to distribution planning is necessary, as well as extensive coordination with (generation) resource planning and transmission planning. For this reason, Duke Energy is actively working toward more extensive integration of distribution, generation and transmission planning (ISOP) with a goal of implementation in 2022 IRPs. Duke's ISOP development team has gathered input from other utilities, national labs, EPRI, consultants, and academic groups to inform our vision and work-scope and has been working on extending modeling capabilities to better address renewables and energy storage for the last few years.
Duke also agrees that it is important to get input from customers and other stakeholders as we seek to enhance and further integrate planning processes. We are working toward a stakeholder process for ISOP, as announced at the Grid Modernization stakeholder webinar in April. As we prepare for stakeholder engagement on ISOP, Duke has been reaching out to other utilities with stakeholder engagement processes (HECO, TVA, etc.) to learn from their experience.

The ISOP engagement contemplated so far is focused on gathering input and sharing information about the new ISOP processes, which target integration of MW resource specific aspects of G/T/D planning. Duke has not yet evaluated the implications of transitioning the ongoing planning processes to a full or partial collaborative stakeholder process, and thus is not prepared to take a position in favor or against this recommendation. However, several factors should be considered in any stakeholder process for system planning:

- DEC and DEP Balancing Areas include both NC and SC resources and load obligations, and both states have benefitted from the economies of scale in a combined planning process. Any ISOP-related stakeholder engagement process should include both NC and SC stakeholder representatives to ensure balanced outcomes for customers in both states.
- Utilities hold a unique role as the only stakeholders with a regulatory obligation to serve under NC, SC, and FERC/NERC oversight. These oversight processes ensure a focus on safe, reliable and affordable service and motivate utilities to maintain a balanced perspective to meet changing customer expectations, including environmental considerations. Other stakeholders may focus on a single objective (e.g. environmental or economic). Utilities are inherently technology agnostic, but the "obligation to serve" does drive a high priority on reliability and flexibility of resources. Many other stakeholders do not have this responsibility, and therefore may not place similar value on reliability and flexibility of resources.

Equitable Access & Just Transition to Clean Energy

Achieving climate justice while ensuring equitable access to energy for all North Carolinians

Globally, climate change and the cost of energy threaten the world's most vulnerable populations. In the United States (like across the globe), the most historically marginalized people - people of color and people living in poverty - are and have for decades been disproportionately affected. In North Carolina, there are 1.4 million people who are energy cost-burdened[1], meaning that they live with unaffordable energy bills. Many of these same communities which are burdened with the environmental and health risks associated with the fossil fuel industry also face structural unemployment and underemployment, lacking access to good, quality jobs with benefits and family-sustaining wages.

Though North Carolina's clean energy industry has had an economic impact of $28.2 billion and supported 169,127 jobs annually from 2007-2018[2], many people living in poverty have not seen the benefits of this growth. As consumers of energy, people living in poverty have not benefited financially from clean energy resources, and as workers they have not benefited from access to careers in the renewable energy or energy efficiency industries. For instance, in 2018 fewer than 50% of Solar PV Installers[3] in North Carolina received a "living income standard" for a household with one adult and one child.[4] The health and growth of the renewable energy industry demands a highly skilled and thus well compensated work force.

Equity-focused public policies that improve 1) energy affordability and 2) access to quality jobs in the clean energy economy can help remedy the above problems. Putting vulnerable communities first in North Carolina's transition to a clean energy economy is vital to eliminating the disparity between those who experience an energy burden and those who benefit from the growing clean energy and energy efficiency industries. Below we recommend specific actions to ensure equitable access to energy and good jobs for all North Carolinians.

Policy Recommendations to Address Energy Equity in NC

Need	**Policy Recommendation**	**Decision Maker(s)**	**Action(s) Needed**
Reduce the disproportionate burden communities of color and poor communities bear from polluting facilities and other industrial operations that contribute to climate change, harm air/water quality, and extract resources	Expand DEQ's authority to require the use of Cumulative Impact Mapping & Analysis and an Environmental Justice Impact Analysis in decisions regarding permits and permit renewals.	Legislature DEQ	Legislative action needed to give DEQ this authority DEQ may need to make investments in monitoring ($$ from state budget)
Reduce the disproportionate burden communities of color and poor communities bear from climate impacts	Carbon pricing policy that dramatically reduces carbon emissions and sets up Polluter Pay Funds, with the majority of revenue going back to frontline and vulnerable communities. Green For All: Effective Carbon Pricing Policy	Legislature	Legislative action needed

[1] People are considered "energy burdened" when 6% or more of their income, a disproportionate amount, goes towards energy bills.NREL Low-Income Energy Affordability data. https://openei.org/doe-opendata/dataset/celica-data
[2] RTI International. Economic Impact Analysis of Clean Energy Development in North Carolina —2019 Update
[3] BLS. Occupational Employment and Wages, May 2018, https://www.bls.gov/oes/current/oes472231.htm
[4] NC Justice Center. A Standard Worthy of North Carolina Workers. https://www.ncjustice.org/wp-content/uploads/2019/04/Living-Income-Standard-2019.pdf

	Targeted investment in resilient infrastructure and technical assistance for flood mitigation and climate adaptation/resilience planning in climate-vulnerable and low income communities.	DEQ, Housing Finance Agency, USDA, NCORR	
	Increase funding to the NC Housing Trust Fund.	Legislature	
Make rates/energy costs more equitable and affordable	Implement a Percentage of Income Payment Program combined with a weatherization component - Ohio PIPP / EPP and Maryland examples.	Legislature, NCUC, DEQ, NCCAA	Regulatory change from NCUC based on legislative action
	Include non-energy benefits (NEBs) in cost-effectiveness testing.	NCUC, Legislature	Regulatory change from NCUC; Might require expanding statutory language
	Eliminate or dramatically reduce fixed charges[5]	NCUC	Regulatory change from NCUC
Expand energy efficiency as a tool for resilience and as a way to increase housing quality and economic stability of low income households	Invest additional dollars for low-income home repair, energy efficiency, and weatherization programs (also, see PIPP above), and appliance rental programs, particularly for multifamily housing and mobile homes.	DEQ, Governor, Legislature, NCORR	Additional state funds need to be allocated towards this
	Create project management coordination system for delivery of energy efficiency, urgent repair and weatherization programs.	DEQ	
	Expand tariffed on-bill financing programs for rural cooperatives and municipal utilities by creating, hiring, or facilitating the NC Electric Membership Corp (NCEMC) to be a state-level program administrator.	NCEMC	NCEMC, possible legislative action needed, federal funding (USDA)
Support sustainable economic development in low income and disadvantaged communities	Create a Green Bank & Loan Loss Reserve Fund to make energy efficiency, renewable energy and building repair dollars available to residents, businesses, municipal utilities and institutions such as schools, faith institutions, and local governments. Connecticut & New York examples Encourage Women Minority Owned Business Enterprise (WMBE) contracts and hiring through tax incentives and policy requirements.	DEQ, Dept of Commerce, Third-party administrator	Legislation required, also possibly NCUC authorization
Create long-term jobs with	Prioritize investment and job growth in the	Legislature,	Dept of Commerce

[5] The utility involved in preparing this memo disagreed on eliminating fixed charges as a recommendation, noting concerns about paying for the fixed costs of the system for all customers.

family-sustaining wages and benefits for low income communities	renewable energy industry, such as wind energy, grid infrastructure, and battery storage. Drive up labor standards in the solar industry by prioritizing contractors that provide family-sustaining wages and benefits for utility scale solar contracts, particularly those with any public funding. Expand existing Registered Apprenticeship Programs (RAPs) to create career pathways across the energy sector. Targeted investment in renewables, energy efficiency, home repair, and weatherization training programs through partnerships with schools. Partner with community colleges and K-12 education to create programs about energy efficiency. Successful Strategies from Low Income Solar Policy Guide	DEQ DEQ Commerce, Governor, DEQ DEQ, Commerce, Education	can work on pilot projects with DEQ and IOUs
Support communities and displaced fossil fuel workers where closing plants are located	Develop best practices that guarantee protections for displaced fossil fuel workers, such as early retirement, priority transfer and/or training for comparable positions. Technical assistance for local community from state and utility in planning for community transition where plants are retired	NCUC, Commerce, DEQ DEQ, Commerce, NCUC	

Equitable includes being -

- **Affordable:** All North Carolinians, including those who are low income, can meet their energy needs without being cost-burdened. Energy is not more than 6% of household expenses.
- **Accessible:** There is greater access to the clean energy economy. Emphasis on removing barriers and targeting investments in frontline communities (communities with a disproportionate pollution burden from traditional energy generation), communities dealing with climate impacts, and disadvantaged communities.
- **Reliable and Resilient:** The electric system is resistant to failure for essential services and quick to recover from breakdowns.
- **Clean[6]:** Emissions-free energy generation that contributes the least to pollution or climate change.

A note on inclusion: Many of the policy actions proposed assume (and should require) involvement of affected stakeholders in their planning, development and implementation. Specifically, this process should include communities of color and poor communities, regional, county and municipal governments, non-profit agencies, and affected businesses**.**

This memo was prepared by: *Jacquie Ayala (NC Justice Center), Dale Evarts (NC community member), Tiffany Hartung (The Nature Conservancy), Mike Hughes (Duke Energy), Aiden Graham (AFL-CIO), Rory McIlmoil (Appalachian Voices), Daniel Parkhurst (Clean Air Carolina), Walter Robinson (NC State University), Nicole Spivey (Greensboro Sustainability Council), Alvin Warwick (International Electrical Workers Union), Rachel Weber (Dogwood Alliance))*

[6] Stakeholders preparing this memo disagreed on whether to include existing nuclear generation as a part of the "clean" definition.

Group Work for May 22 Workshop
Due June 14

Grid resiliency enhancements	*How can we strengthen the resilience and flexibility of the grid while ensuring affordability for customers?*

Prepare a memo with the answers to the following questions. The memo should include clear recommendations from the group.

Questions to answer in memo:
1. Briefly describe the nature of this policy tension/question - What is happening?

Our workgroup was tasked with examining how we can strengthen the resilience and flexibility of the grid while ensuring affordability for customers. We understand that the electric grid needs to be resilient in the face of disasters including but not limited to the impact of weather events, cyber and physical attacks, and solar storms. The electric grid also needs to be flexible to address rapid advancements in renewable and DER technology, rapid advancements in grid technology, and changing customer expectations. Because grid flexibility is being dealt with in another workgroup, we focused our efforts on grid resilience.

In discussing grid resilience, it is important to start with a definition of resilience. Generally, the definition of resiliency is the ability to withstand or recover from infrequent yet highly critical major events. There is a difference between reliability and resiliency, with reliability meaning maintenance of energy service in normal day-to-day conditions, but there is a great deal of overlap. In general, both hardening the grid against disasters and providing redundant systems will improve both reliability and resiliency.

Addressing the needs of resiliency calls for investments, which should be determined through cost effectiveness, analysis of data on outages and detailed risk assessments. Just as the insurance industry which has a great deal of experience in valuing the impact of uncertain risks, grid regulators must understand how to assess and prioritize grid investments based on risk assessments and/or CBAs. In addition, there is tension about how investments will be funded.

2. To what extent does this policy tension exist in NC, if so, why is it relevant to the state?

The need to strengthen grid resilience certainly exists in North Carolina, perhaps even more so than in other states across the country. NC has seen significant hurricanes and other major storms for the past several years and utilities currently anticipate in increase in outages because of these major events. The risk of cyber and physical attacks is very real. New grid technology and other investments can improve both reliability and resilience due to these threats. Duke Energy has shared Grid Improvement Plans to strengthen the resilience of the grid, and is exploring the fundamental tension revolving around funding for the investments.

3. What policy or regulatory action might be required to address the tradeoffs you see? What entity would need to take the action you've identified?

Consideration of the appropriately affordable level of grid investment to strengthen the grid will ultimately fall to the NC Utilities Commission (NCUC) or cooperative/municipal utilities. The NCUC could open a proceeding to determine the proper framework for assessing the appropriate level of investment to strengthen the grid, how to measure the investment over time, and appropriate incentives for electric utilities to make those investments in the grid. As part of that framework determination, there needs to be additional work on the meaning of resiliency versus reliability. Until this issue is more fully addressed, utilities nationwide will struggle investing in grid resiliency. There should also be some consideration of co-benefits (such as societal or industry impacts and costs of outages) and not simply a focus on direct cost benefit analyses alone.

4. How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

Many states have annual reporting and/or cost recovery proceedings to monitor and encourage grid investment to address resilience needs. While this workgroup does not take a position in support or opposition to any specific legislation, it is worth noting the existence of Senate Bill 559, which is currently pending before the NC legislature. This enabling legislation would permit the North Carolina Utility Commission (NCUC) to consider using ratemaking tools for utilities to recover costs that could include grid resiliency investments. Those ratemaking tools are already in use by other utility commissions across the country.

5. Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?

1. Update the State Energy Assurance Plan to reflect current conditions.

    1.1. As part of this update, review existing reporting requirements (federal/state/local/etc) to see if there can be some synergies and a concomitant reduction of paperwork.

    1.2. Both cybersecurity and data access are key; data sharing and harmonization of publicly shareable data will help stakeholders make decisions.

2. Develop an active Resilience Planning Resource to assist local governments.

    2.1. The planning resource should be either:

        2.1.1. Staffed by a new full-time state employee (e.g., this is their only job function)

2.1.2. Or Technical Assistance efforts managed by an existing state employee

2.2. Provide resources to support grant development and project execution capabilities and data gathering.

2.3. Carry out community-level resilience analyses to determine the impact of a loss of electrical service to critical infrastructure and vulnerable populations.

2.4. Carry out a benchmarking investigation to determine what communities are leaders in resilience implementation--- and then learn from them…

2.5. Look for best practices for incorporating regional feedback that would support a robust Integrated Resource Plan for NC.

3. The North Carolina State Government should encourage DER and community energy solutions that enhance the regions, potentially balancing the costs of grid enhancements. The North Carolina State Government should pilot micro-grids at appropriate state facilities and should encourage the development of micro-grids to serve other non-state critical infrastructure.

   3.1. Examples of candidate facilities include universities and local schools. Unique regional features or attributes should be included in the planning.

   3.2. Investigate other pilot programs and leverage lessons from other states or countries.

   3.3. Implement pilot programs that can serve as a template for communities to use as templates to address various features and attributes. Conduct workshops to support community adoption of proven templates. Drive faster govt approval processes around verified templates.

4. Develop a system that formalizes how to quantify the human costs (lost productivity, etc.) of power outages.

5. Use defense in depth or a layered grid approach to increase reliability and improve resilience.

A.4 Products from Other Related Efforts

As mentioned in Section 1.4, there were several concurrent stakeholder processes that helped inform the CEP. Work products from these efforts are included in this section. Note that the full report for the Energy Efficiency Roadmap is still being written; the Executive Summary of this report is included here, and will be updated upon final publication of the CEP to reflect the final Energy Efficiency Roadmap report. They are presented as follows:

- Energy Efficiency Roadmap
- Cities Initiative
- Southeast Energy Innovation Collaborative

Executive Summary: North Carolina Energy Efficiency Roadmap

August 13, 2019

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—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.[1]

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

[1] The North Carolina Clean Energy Plan stakeholder process was initiative 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.

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 EE 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 EE 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:

Objective 1: Align interests to create an EE-conducive 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 which are summarized below.

Summary of EE recommendations for North Carolina

Focus Area	Short-Term (1–3 years) Recommendation	Who will need to take action?	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 nonenergy 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	
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 Carolina 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 NC energy consumers.

The North Carolina Cities Initiative

Reducing carbon emissions is becoming increasingly important as North Carolina experiences the tangible impacts of climate change on our economy, our landscape, and our health. Our changing climate is causing more frequent and more intense storms, rising sea levels, higher ambient and soil temperatures, and flooding. There are mitigation efforts we can and should undertake to address the impacts, but Cities across our state are recognizing that we must also tackle the root cause of climate change by taking actions within our control to minimize the human contribution to climate change.

Cities are motivated to reduce their carbon emissions because they see how infrastructure is suffering from being repeatedly battered and flooded during hurricanes. They see how poor air and water quality is triggering health conditions.

Cities also see how transitioning to a clean energy economy can provide a much-needed boost for our state. Clean energy jobs in North Carolina have been growing at nearly at nearly twice the state average and employ veterans at nearly twice the economy-wide rate. The manufacturing industry, especially, shows potential as components of wind turbines and solar panels are constructed here. Cities see how electrifying our vehicles creates opportunity by supporting new business ventures for EV charging stations and other infrastructure and improves air quality.

There are many good reasons to be focused on carbon reduction, and the Cities Initiative serves as a platform to facilitate collaboration and innovation among local governments striving toward this worthy target.

With that in mind, the North Carolina Cities Initiative was launched with the following two goals:

1) Identify and prioritize statewide barriers that localities face in their efforts to reduce GHG emissions;
2) Identify consensus action items that—through collective action—could create opportunities and foster partnerships for localities to achieve faster and deeper GHG reductions.

Planning and Design

The design phase of the initiative, during which a variety of stakeholders and experts were consulted to develop the goals and discuss the implementation approach, was a months-long process.

A range of stakeholders were engaged in the design of the Cities Initiative, which was facilitated by Environmental Defense Fund (EDF). EDF's role was as a convener and facilitator, but all decision making was conducted by local governments, which included mayors and public sustainability staff, associations representing local governments, and other NGOs. The Initiative brought together representatives from the state of North Carolina, including the NC Department of Environmental Quality (NC DEQ) and governor's office, but the work and outcomes during the Cities Initiative were driven by actively engaged representatives from 12 cities and towns, both large and small, across the state.

The extensive planning and design work helped shape an Initiative framework that would meet a real and pressing need for communities in North Carolina. The engagement established from stakeholders and

cities during this pre-work continued as the project kicked off, demonstrating the widespread desire at the state and local level for engagement on the issue of GHG reduction.

Participants

Twelve cities and towns were identified that had defined GHG reduction goals and had demonstrated they were actively working on GHG reduction. These cities and towns were provided as suggestions received from local government associations such as the Metro Mayors Association, for example. Participation, however, was open to any interested city and town.

The invitations to cities who were identified as good candidates went directly to the mayors of the cities, laying out the scope of the project and establishing expectations of engagement.

The following cities participated:

Asheville	Greensboro
Carrboro	Highlands
Cary	Hillsborough
Chapel Hill	Raleigh
Charlotte	Wilmington
Durham	Winston-Salem

Laying the foundation

Before the first in-person meeting, a participant survey was conducted in May 2018 to establish baseline information about the goals, needs and priorities of city leaders. This information was used to design roundtable sessions, the first of which was held in July 2018, and also served as background information on existing efforts and baseline GHG reduction priorities among the cities.

Questions included:

- Do your GHG reduction goals apply to municipal assets or to the entire community?
- Please rank the importance of each sector that is covered by your GHG reduction goals.
- Does your municipality have a dedicated budget for GHG reduction initiatives?
- Do you have existing partnerships to support GHG reduction efforts?
- What are your partnership priorities?
- What steps have you already taken to further your GHG reduction goals?
- What areas of collective action interest you most?

Framework for collaboration

The program consisted of four half-day roundtable meetings hosted in participating communities. The four roundtables were held as follows:

July 2018 – RTP

September 2018 – Greensboro

October 2018 – Charlotte

November 2018 - Durham

During **the first roundtable**, participants received a preview of the results of the survey. These results served as the foundational information on which the initiative work was based and were the starting point for each city and town to build their individual roadmaps for their own GHG goals. DEQ presented their *2005-2017 NC GHG Inventory Report*, which served as useful baseline information about GHG sources and trends, and factors that were impacting those trends.

The majority of time in the first roundtable was spent in facilitated breakout sessions, which helped participants identify the challenges they were facing in reducing GHG emissions.

In the sessions, participants were asked questions to spark conversation that would help identify sectors of interest:

1) What are the things that can help you meet your GHG goals?
2) What are the things that are keeping you from meeting your GHG goals?

During these breakout sessions, participants created "impact effort grids," which were useful tools for filtering through the many ideas identified to determine the opportunities that would provide the largest scale of impact (compared to effort and budget required) with the highest probability of achievement.

The "impact effort grid" exercise led to the prioritization of four overarching focus areas:

- Utility
- Finance
- Transportation
- Energy efficiency

The second roundtable allowed participants to concentrate on specific issues that impact their ability to achieve their GHG reduction goals in the focus areas.

Participants spent time in breakout sessions where all four focus areas were discussed. All roundtable participants had the opportunity to participate in breakouts on all four topics. From that, the cities selected the opportunities that were most important for their respective municipalities.

The question was asked, "Which issues that could be addressed by partnership or barrier removal are top priorities for your City's GHG reduction goal?" During facilitated group discussion and sharing of examples, the following six priority issues emerged:

- Building codes and benchmarking
- Property Assessed Clean Energy (PACE) Program and on-bill financing,
- Data access
- Priority for GHG impact from state-funded programs
- Renewable energy procurement
- Transportation funding allocation

The third roundtable facilitated priority solutions for these six issues. Outside experts, including academics, Duke Energy, NGOs and the Public Staff of the North Carolina Utilities Commission (a consumer advocate), supported this discussion, providing objective advice and technical guidance.

Their role was to provide ideas for solutions, answer questions about how things worked, and share insights about what they've seen work in other states. It was clear that all decision making was still done by the individual cities, and the objective and intent of bringing in the outside experts was solely to provide input to help the cities shape their path forward.

Two breakout sessions were conducted during this roundtable, and experts were assigned to respective sessions. The participants of each session brainstormed about potential solutions that could be considered for the identified focus areas. Additional discussion was held to flesh out the solutions suggested, then the cities themselves prioritized the solutions identified within the session. The outcomes of these breakout sessions were the foundation of discussion for the November roundtable.

The fourth roundtable in November 2018 brought together mayors and staff to review the priority solutions. During the course of facilitated discussion and debate, the group reached consensus on 12 action items:

- Obtain additional locally-controlled transportation revenue
- Adjust State Transportation Improvement Program (STIP) allocations
- Incorporate GHG scoring for state funded projects
- Develop a voluntary carbon credit tracking system
- Aggregate data access at a safe level to allow for program prioritization
- Create a utility billing platform that helps cities and customers understand energy use
- Allow for new renewable energy procurement options
- Increase speed and transparency of the interconnection process
- Address barriers to Commercial Property Assessed Clean Energy (C-PACE) in NC
- Develop a local government supported green energy bank
- Improve energy impact of building codes
- Change makeup of the NC Building Code Council

Consensus Action Items

- Obtain additional locally-controlled transportation revenue
  - Revenue sources could include options such as sales tax and tax increment financing
  - Funds could be used for transportation-related projects that reduce GHG emissions
  - Would require legislative action
- Adjust State Transportation Improvement Program (STIP) allocations
  - Remove cap for transit project funding
  - Reduce or eliminate local matches for projects that reduce GHG emissions
  - Increase the percentage STIP funding that goes to non-highway projects
  - Increase the share of regional STIP funds for regions that reduce GHG emissions
  - Would require legislative action
- Incorporate GHG scoring for state funded projects
  - Various state programs that fund projects by grant or loan are selected based on scoring rubrics.
  - Add GHG impact to project scoring formulas for projects such as:
    - State transportation improvement program
    - Congestion mitigation and air quality
    - Trust funds (Clean Water Management, Parks & Rec, etc.)
    - Water project loans
    - Debt funded projects requiring approval by the Local Government Commission
    - Would require legislative or administrative action
- Develop a voluntary carbon credit tracking system
  - Partner with the state to develop a voluntary carbon tracking system, which would help cities monetize GHG emission reductions
  - Would require administrative action or legislative action
- Aggregate data access at a safe level to allow for program prioritization
  - NC utilities do not provide third parties with access to customer usage data aggregated at a fine level.
  - Propose to aggregate data at a safe level to allow for program prioritization, which could be especially helpful in high energy-burden communities.
  - Would require legislative action, utility commission action, or utility partnership.
- Create a utility billing platform that helps cities and customers understand energy use
  - Duke Energy is developing a new billing system called Customer Connect, which will be installed in 2021-22.
  - Designate cities to serve as beta testers and provide input to Duke on the system's final design.
  - Work with Duke to include on-bill financing.
  - Ask Duke to release an SOP for large campus-style customers to better grasp their energy usage.

        - Duke has committed to rolling out a new billing system and this would be an interim measure.
    - Would require utility partnership.
- Allow for new renewable energy procurement options
    - NC only allows customers to purchase electricity from public utilities currently.
    - Allow for new renewable energy procurement options including:
        - Third party sales
        - Reduce the cost and increase the ease of access of the proposed Green Source Advantage program
    - Expand the utility cost benefit methodology at the utilities commission to include societal and environmental benefits
    - Would require legislative and utilities commission action
    - Would require legislative action, utilities commission action or utility partnership
- Increase speed and transparency of the interconnection process
    - Request a SOP to provide early determinations if interconnection requests are feasible
    - Ask Duke to analyze cities and identify optimal locations for distributed generation based on current grid infrastructure
- Address barriers to Commercial Property Assessed Clean Energy (C-PACE) in NC
    - Address barriers to C-PACE in NC, including:
        - Inability of local governments to delegate administration of C-PACE programs to a statewide or regional entity
        - Inability of using a statewide or regional entity to levy assessments to take on debt for C-PACE programs
    - Would require legislative action
- Develop a local government supported green energy bank
    - Develop a local government-supported state clean energy fund, such as a green energy bank
        - Could fund a variety of energy efficiency efforts, including:
            - PACE
            - On-bill financing
        - Could consist of public and private funds.
    - Would require legislative action and/or partnership
- Improve energy impact of building codes
    - Could include:
        - Get auto-adoption of International Energy Conservation Code (IECC)
        - Allow local jurisdictions to require more than state code
        - Professionalizing energy code inspections
        - Adding option appendices in code that utility could incent
    - Would require legislative or administrative action
- Change makeup of the NC Building Code Council

- Building Code Council is appointed by the Governor, according to General Statute 143-136
- Council representation is outlined in detail according to licensing and specialization criteria
    - Revisit current membership composition to include members with expertise in sustainability, health and safety, local government, and other relevant expertise.
- Would require legislative action.

Impact

The Cities Initiative achieved its initial goal of bringing together North Carolina municipalities to identify barriers and develop consensus action items to enable faster and deeper GHG reductions. It also created powerful connections and relationships with the utility, regulators and other key stakeholders that have the ability to influence the development, adoption and implementation of potential solutions.

Information about the Initiative and its outcomes were presented at the annual meeting of the North Carolina Metro Mayors Association, UNC Clean Tech Summit, and the Appalachian Energy Summit.

In parallel to this Initiative, Duke Energy's proposal was selected through the Rocky Mountain Institute as an opportunity to take a deep dive into one of the Cities Initiative consensus action items in an "eLab accelerator." These intensive sessions have proven to be successful mechanisms by which to explore solutions to core issues. These accelerators assemble "thought leaders and decision makers from across the U.S. electricity sector who focus on collaborative innovation to address critical institutional, regulatory, business, economic, and technical barriers to the economic deployment of distributed resources in the U.S. electricity sector." The team for the eLab accelerator project met during the week of April 29, 2019, and included Environmental Defense Fund, Duke Energy and a subset of the Cities Initiative participants.

Moving Forward

There was broad support for continued work among the participants.

Based on expressed interest by the 12 cities and towns, the State of North Carolina and other local governments, the work of the Cities Initiative continues in spring 2019. The focus of our next phase of work is to develop implementation goals and strategies.

A series of half-day roundtables will be scheduled over the next two years to include the core group of the 12 original cities and any additional local governments who are interested in joining.

Working Group Co-chair Recognition

Working Group 1: Communication, Marketing, Entrepreneurship & Investment
Michael Shore, Tipping Point Renewable Strategies; and **Thad Culley,** Vote Solar

Working Group 2: Metrics, Goals, Research, Education & Workforce
David Kaiser, NC Department of Commerce, Office of Science, Technology & Information; **Lori Collins,** Environmental Programs Consultant, North Carolina department of Environmental Quality; and **Thad Wingo,** BMC Engineering

Working Group 3: Grid Infrastructure & Industry Impacts
John Hardin, NC Department of Commerce, Office of Science, Technology & Information; and **Nick Justice,** Power America

Working Group 4: Policy and Regulation
Dionne DelliGatti, Environmental Defense Fund; and **Jochen Lauterbach,** University of South Carolina

Working Group 5: Collaboration, Consumer Awareness and Access
John Camilleri, Green Energy Corporation; and **Ron Schoff,** Electric Power Research Institute

Working Group 1: Communication & Marketing

Issue Definition: What do we want our state energy "brand" to be and how do we communicate that brand within the state and elsewhere.

Current State
- Positive stories we tell ourselves (Solar, S3, RTP, Universities, EPRI)
- Polarized politics nationally and locally
- The Southeast judged as a whole from outside the region
- Lack of well-articulated cohesive stories.

The Gaps
- No clear/cohesive vision, strategy, goals, and metrics
- No Leaders buy into/share a cohesive, positive energy vision

Working Group 1: Entrepreneurship & Investment

Issue Definition: What are the Region's energy entrepreneurship strengths, how do we build on them, what are the limiting factors and how should those be address.

Current State
- Energy entrepreneurship active in the region – good stories
- Energy "incubators"/university support exist in the region
- Capital constraints
- Regulated utilities' rate structures dampen creativity

The Gaps
- Need study of region's energy entrepreneurship constraints
- Region's energy sectors with competitive advantage not defined
- Need study of how energy pricing can promote innovation

Working Group 2: Metrics & Goals

Issue Definition: Are we all on the same page? Energy Innovation metrics and goals require definition and timeframe

Current State
- Data Exists for:
  - Workforce demographics and stats
  - College/university energy relevant grad stats/connection
  - Capital resource data
  - Energy production, conservation, emission data

The Gaps
- No comprehensive region/state energy plans or federal direction
- No energy asset inventory
- No unified system of measuring/assessing region's energy innovation progress

Working Group 2: Research & Education

Issue Definition: The region's significant cluster of energy research universities and labs lack collaboration and recognition.

Current State
- Nation-leading number of energy research entities in region
- Little leverage of energy research prowess across region
- Little research collaboration with region's many energy companies

The Gaps
- Research entities compete for funding
- Researchers not rewarded/recognized for external collaboration
- Tech transfers/IP rights vary with research entity
- Little communication of energy innovation occurring

Working Group 3: Grid Infrastructure and Impact

Issue Definition: The power grid can be an energy innovation enabler or constraint dependent on its flexibility, capacity and resilience to accept/support new technologies, devices, software, power sources and consumption types and transmit data.

Current State

- Reasonably safe and reliable, but vulnerable
- Reasonably flexible/resilient, but perhaps not for future uses
- Connects current low carbon generation, but what of future?

The Gaps

- Interest/support for evolving grid divided
- Grid data is private/proprietary, making data innovation difficult
- Electric, gas, water & telecom segregated – innovation difficult
- Planning for future difficult, as future uncertain

Working Group 4: Policy and Regulation

Issue Definition: Policy and regulation is made with too short a horizon and does not specifically promote energy innovation or new product service competition/development.

Current State

- Southeast regulated utility rates challenge energy innovation
- Policy and technology leaders not aligned
- Southeast energy policy/regulation does not promote innovation
- No greenhouse gas/carbon/resilience rates to promote innovation

The Gaps

- No clear regional/state energy goals
- Various state energy policies not aligned
- Energy stakeholder diversity causes policy maker polarity
- Industry siloed/focused near term – not promoting innovation

Working Group 5: Regional Energy Sector Collaboration

Issue Definition: Region's energy sector is vibrant, but disorganized resulting in less than merited investment/technology production

Current State

- No broad research/start-up/technology collaboration
- Economic development not connected to innovation
- Stakeholders not aligned behind innovation
- No organized program energy pilot projects/tech transfer

The Gaps

- Energy R&D, new venture creation & technology not aligned
- Investment not focused on innovation leadership opportunities
- Multiple technologies not coordinated to produce solutions
- Stakeholders not aligned w/innovation leadership opportunities

Working Group 5: Consumer Awareness and Access

Issue Definition: Policy drivers diffuse/lacking for customer awareness/access to energy efficiency programs, local generation and resiliency solutions

Current State

- Low cost/highly reliable power dampens innovation need
- Adoption of new technology/EVs increasing, but unpredictable
- No centralized entity promoting energy innovation
- Customer access to solutions limited by wealth

The Gaps

- Region's energy price does not drive consumer demand
- Consumers not well educated in energy solutions
- Consumer demand/desire not well understood
- Urban/Rural divide of demand/ability to pay

Working Group 1

Communication, Marketing, Entrepreneurship & Investment

Solutions Report

Michael Shore, Tipping Point Renewable Strategies
Thad Culley, Vote Solar

Working Group 1: Solution 1

Entrepreneurship

Solution

- Convene Entrepreneurship Task Force
- Include universities, investors, utilities, large energy companies, incubators, and entrepreneurs
- Survey region's energy entrepreneurship ecosystem
- Survey "best practices" of other regions

Outcomes

- Understanding of region's strengths and gaps
- Plan for strengthening regional energy entrepreneurship

Next Steps

- Identify a lead (university?) and members – invite
- Determine survey cost and identify funders

Working Group 1: Solution 2

Branding

Solution
- Leverage the SEIC to identify brand's core components
- Working Group 1 will continue work to develop brand strategy

Outcomes
- A unifying brand crafted for the broad target audience
- A brand ready for dialogue and a plan to communicate it

Next Steps
- Query SEIC delegates

Working Group 2 Solutions Report

Metrics, Goals, Research, Education & Workforce

David Kaiser, NC Department of Commerce, Office of Science, Technology & Information
Lori Collins, Environmental Programs Consultant, North Carolina department of Environmental Quality
Zach Ambrose, Principal, Ambrose Strategy

Working Group 2: Solution 1

Metrics: Common Reporting Tools

Solution
- State-owned buildings follow current practice
- Voluntary reporting encouraged for busiensses
- Further study aggregating data of various tools for broad view

Outcomes
- Increased awareness of trends and drivers
  - Efficiency/Management application/education opportunities
  - Innovation opportunities

Next Steps
- Coordinate with Nicholas Institute EE Roadmap Project
- Evaluate/Explore marketing, incentives and connecting parties

Working Group 2: Solution 2

Need for Price Signal Information

Solution
- Develop price information for new technology commercialization
  - Utility rates reflecting cost of specific grid services
  - Actionable pricing information for evaluating non-wires alternatives, procurement, incentives and regulatory filings

Outcomes
- Encourages new technology for region's energy infrastructure
- New energy innovation and maximum customer value

Next Steps
- Identify lead agency/organization to promote/manage
- Determine and vet price signals possible/desired
- Lead determines implementation, timeline, budget

Working Group 2: Solution 3

JOINT: Energy Industry Inventory/Better Promotion of Assets

Solution
- Define region's energy sectors and assets
- Develop an inventory of region's sectors and assets
- Provide searchable online inventory access
- Compare/promote the assets nationally/globally

Outcomes
- Easy access promotes use/value of assets + attracts
- Create community/foster innovation & partnerships

Next Steps
- Determine lead/responsible parties
- Complete definitions
- Create plan, timeline, budget and identify/secure funding

Working Group 2: Solution 4

Creating Community College/University Collaboration

Solution
- Determine region's energy colleges & universities
- Understand Energy Innovation Processes
  - Identify tech transfer processes & technologies of interest
  - Communicate in forums, directories, etc.
- Promote increased coordination and communication

Outcomes
- Greater knowledge of research promotes greater use and value
- Knowledge & connections promte greater collaboration/innovation

Next Steps
- Determine lead/responsible parties
- Create plan, timeline, budget and identify/secure funding
- Identify/inventory region's energy colleges/universities

Working Group 2: Solution 5

Assessing Energy Workforce Need/Shortage

Solution
- Identify the region's suppliers/supply of energy workforce
- Identify the region's employers/demand for energy workforce
- Calculate the region's shortage/surplus and characteristics

Outcomes
- Support policy decisions regarding energy workforce
- Guide colleges/universities in academic/training offerings

Next Steps
- Determine lead/responsible parties
- Create plan, timeline, budget and identify/secure funding
- Conduct extensive search of workforce data available

Working Group 3 Solutions Report

Grid Infrastructure & Industry Impacts

John Hardin, NC Department of Commerce, Office of Science, Technology & Information
Nick Justice, Power America

Working Group 3: Solution 1

Integrated System Operations Planning (ISOP)

Solution
- Modernize electric grid planning
  - Employ an integrated resources planning algorithm
  - Support process with enabling software

Outcomes
- ISOP will better identify grid value and drive innovation
- Policy makers/regulators will know benefits/costs of decisions
- Consumers will realize optimum value at appropriate price

Next Steps
- Meet with state policy makers/regulators/utilities/stakeholders
  - Identify lead entity; and
  - secure interest/support/funding

Working Group 3: Solution 2

Electric Grid Resiliency and Security

Solution
- Build/maintain/upgrade Region's electric grid
  - Resilience/security supports health, safety & economy

Outcomes
- A more resilience/secure & quicker to heal electric grid
- Region's technology is increasingly employed/showcased
- Innovation opportunities increased

Next Steps
- Promote grid plan with stakeholders
  - Policy makers, regulators, utilities & consumers
- Identify process lead/participants and initiate meetings

Working Group 5 Solutions Report

Collaboration, Consumer Awareness and Access

John Camilleri, Green Energy Corporation
Ron Schoff, Electric Power Research Institute

Working Group 5: Solution 1

Collaboration within the Energy Sector

Solution
- Define the Region's distinct energy sectors/clusters
- Gather detailed information on cluster members
- Identify/study successful clusters for repeatability

Outcomes
- Attract capital through Increased innovation awareness/access
- Communication of common goals to unify clusters
- Increase public/private partnerships
- Innovation impacts energy production, conversation & delivery

Next Steps
- Define team members and sponsors
- Validate recommendations and definitions
- Initiate team and work plan

Working Group 5: Solution 2

Consumer Awareness and Access

Solution

- Develop better understanding of customer needs/want
- Educate customers of energy utilization/greener products
- Develop consumer incentives for greener solutions

Outcomes

- Green solution residential consumer guidelines
- Commercial/industrial engagement incentives
- Green solutions for public housing/schools

Next Steps

- Assign activities to teams
- Verify/validate actions
- Secure recommendation buy on from teams

Working Group 4 Solutions Report

Policy and Regulation

Dionne DelliGatti, Environmental Defense Fund
Jochen Lauterbach, University of South Carolina

Working Group 4: Solution 1

Create a Forum for Energy Leadership and Vision

Solution

- Expand deployment of Region's energy innovation technologies
- Leverage energy innovation leadership for economic development
- Sustain the Region's energy innovation leadership advantage

Outcomes

- An energy innovation leadership vision

Next Steps

- Assess policy/regulatory enablers/barriers to leadership
- Identify/compare various leadership plans for common ground
- Promote innovation leadership value to policy/regulation/plans

A.5 Formally Submitted Comment Letters

As mentioned in section 5, the following organizations submitted formal comments:

- American Federation of Labor and Congress of Industrial Organizations (AFL-CIO)
- Appalachian Voices
- Business Groups *(Ameresco, Appalachian Mountain Brewery, Arjuna Capital, CREE, Ingersoll Rand, Mars Inc., New Beligium Brewing, National Association of Energy Service Companies, Sierra Nevada Brewing Company, Schneider Electric, Unilever)*
- DEQ Environmental Justice Board - Clean and Equitable Transition Subcommittee
- Duke University
- Energy and Environment Innovation Foundation and Rivendell Farms
- Environmental Groups *(Southern Environmental Law Center, Environmental Defense Fund, NRDC, NC Conservation Network, Sierra Club, NC League of Conservation Voters)*
- NC Clean Energy Business Alliance (NCCEBA)
- NC Sustainable Energy Association (NCSEA)
- NC WARN
- Southern Environmental Law Center (SELC)
- UNC School of Law

Their comment letters are presented here.

NC State AFL-CIO Just Transition Memo 7.18.2019

I. Background

With the invention of the telegraph, the telephone, and then the first incandescent lamp, the introduction of electricity in the late 1800s transformed life in the United States and around the world. Public demand for electricity grew and powered innovation. To this day, economic development relies on reliable access to electricity.

In the early years, "the rapid expansion of the electric power and light industry kept demand for labor high. However, employers kept wages low by hiring an untrained workforce. Without proper training, the industry was overrun by individuals with inadequate skills and insufficient knowledge to practice the trade with proper regard for safety – making an already dangerous job more risky."[1]

"Electrical linemen commonly worked 12 hours a day, seven days a week, in all types of climates for about 15 to 20 cents an hour. There was no apprenticeship training, no industry standards and no safety training. In some portions of the country, one out of every two linemen hired would perish. Nationally, the death rate for electrical workers was twice as much as the national average for other industries."[2]

Workers responded to these deplorable conditions by forming organizations like the International Brotherhood of Electrical Workers, coming together to act collectively to increase pay, training, and safety standards across the industry. While power linemen still have one of the ten most dangerous jobs in the country, now, the IBEW runs one of the best apprenticeship programs available, training a highly skilled workforce to lead the industry into the twenty-first century.

II. Just Transition history and definitions

"Just Transition," as it relates to workers and the economy, has multiple definitions depending on the audience and context. In relation to labor and trade unions, the concept has been around since the post WWII era.[3] The first explicit reference to just transition to a carbon-neutral economy is attributed to US trade union leader and former president of the Oil, Chemical, and Atomic Workers Union (since merged with the United Steelworkers), Tony Mazzocchi). Mazzocchi (1993) "pleaded for a 'Superfund for workers' to provide financial support and opportunities for higher education for workers displaced by environmental protection policies."[4]

Many union leaders have been skeptical even that such a transition is possible, citing every prior economic transition in which industry workers have been left to fend for themselves. It is this cynicism, and those past injuries, that have made them reluctant partners in efforts to strategize in the face of the

[1] IBEW History & Structure. http://www.ibew.org/Portals/31/documents/Form%20169%20-%20History%20and%20Structure.pdf
[2] IBEW Local 104 History. https://ibew104.org/about/history/
[3] "Just Transition – Just what is it?" https://www.labor4sustainability.org/files/Just_Transition_Just_What_Is_It.pdf
[4] ILO Just Transition Guidelines. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---actrav/documents/publication/wcms_647648.pdf

climate crisis. However, following the passage of the 2015 Paris Agreement, the AFL-CIO reached for the Agreement's language around "just transition" as a new entry point for their participation in the climate conversation. The AFL-CIO noted that "workers in certain sectors will bear the brunt of transitional job and income loss,"[5] and endorsed the Paris agreement's recognition of "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs."[6] [The AFL-CIO] called for investment in the affected communities and "creating family-supporting jobs like those that will be lost."[7]

The International Labour Organization (ILO), a specialized agency of the United Nations, was charged with developing a framework for implementing this principle. In its 2018 Policy Brief on the subject the ILO states that, "***[t]he idea of just transition should not be an "add-on" to climate policy; it needs to be an integral part of the sustainable development policy framework.*** From a functional point of view just transition has two main dimensions: in terms of "outcomes" (the new employment and social landscape in a decarbonized economy) and of "process" (how we get there). The "outcome" should be decent work for all in an inclusive society with the eradication of poverty. The "process", how we get there, should be based on a managed transition with meaningful social dialogue at all levels to make sure that burden sharing is just and nobody is left behind."[8]

III. NC Context

Throughout history as the economy has changed due to varying factors from trade policy to technological innovation workers have often borne the brunt of these changes. The loss of manufacturing in the textile, tobacco, and furniture industries across NC are prime examples. Poverty and devastation in Appalachia, particularly as the global economy has shifted away from coal, is another case in point.

Across NC thousands of workers and their families stand to be impacted by the coming changes. Counties with fossil fuel facilities could lose millions of dollars from their tax base as coal facilities ramp down, particularly crippling rural counties like Person County where the Roxboro Steam Plant is located. And yet, ***North Carolina can manage this transition differently, by putting worker protections and oversight by those most affected into the state's plans from the beginning.***

To look at it more specifically as it relates to the transition from coal, thirty coal units have been closed across the Carolinas over the last 8 years.[9] Seven coal-fired power plants remain in NC, but according to Duke Energy's new Integrated Resource Plan (IRP) two additional sites are slated to close or ramp down capacity over the next five years. Duke has announced that it plans to retire all its coal facilities by 2050.

[5] "Just Transition – Just what is it?" https://www.labor4sustainability.org/files/Just_Transition_Just_What_Is_It.pdf
[6] UNFCCC "Paris Agreement." https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf
[7] "Just Transition – Just what is it?" https://www.labor4sustainability.org/files/Just_Transition_Just_What_Is_It.pdf
[8] ILO Just Transition Guidelines. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---actrav/documents/publication/wcms_647648.pdf
[9] Duke Energy website. https://sustainabilityreport.duke-energy.com/operations/coal-plant-retirements/

One of Duke's primary strategies to reduce GHG emissions, while maintaining a steady supply of electricity to its customers, has been to transition coal-fired power plants to natural gas combustion-cycle plants. While that means some jobs remain at the site there is typically a reduction in the workforce because it takes fewer employees to run a natural gas facility.

The Lake Julian Plant in Asheville is slated to close next year and to be replaced with a 650-MW natural gas facility and solar installation, a $1.1 billion investment by Duke Energy.[10] As of October 2018, the company acknowledged that once the transition is complete there will be approximately a 60% reduction in the workforce – from around 100 workers down to 40. Allen Steam Station, which is slated to power down three of its five coal units in 2024, similarly employs around 120 people. [11] The company says it expects no layoffs due to natural attrition over the next five years.[12]

There is a common misconception that jobs in the fossil fuel industry are directly transferrable to jobs in the newly growing renewable energy industry. Unfortunately, that is not the case. While it's not a perfect point of comparison because these statistics are not exclusive to coal-fired power plants, according to the NC Department of Commerce there were 1,180 power plant operators in NC in 2018 who made $79,700 (or $38.42 per hour) average wages.[13] Power distributors and dispatchers in NC, of which there were 210 in 2018, made $75,370 (or $36.24 per hour) average wages.[14] More than half of the 490 solar installers in NC in 2018, on the other hand, made less than $15 an hour. The average wage was $33,830 (or $16.27 per hour),[15] less than half their counterparts, and often in a temporary job with no benefits.

To its credit, to date Duke Energy has done right by its employees with past closures. For example, when the Dan River Plant was closed, workers were offered retirement packages and the opportunity to transfer to comparable jobs across Duke's system. Other states and utilities stand to gain from the example that Duke is providing. ***DEQ or NC Commerce should help codify these best practices and share them as recommendations in the state's Clean Energy Plan, Workforce Assessment, and other related documents.***

I. Recommendations

Executive Order 80 charges the State of North Carolina to "support the 2015 Paris Agreement goals and honor the state's commitments to the Unites States Climate Alliance."[16]

[10] https://www.blueridgeoutdoors.com/go-outside/duke-announces-plans-to-close-asheville-coal-plant/
[11] Gaston Gazette. https://www.gastongazette.com/news/20170818/allen-plant-celebrates-60th-anniversary
[12] https://www.bizjournals.com/charlotte/blog/energy/2015/09/duke-energy-to-pay-5-5m-close-three-coal-units-in.html
[13] https://www.bls.gov/oes/current/oes518013.htm#st
[14] https://www.bls.gov/oes/current/oes518012.htm#st
[15] BLS. Occupational Employment and Wages, May 2018, https://www.bls.gov/oes/current/oes472231.htm
[16] Executive Order 80. https://files.nc.gov/ncdeq/climate-change/EO80--NC-s-Commitment-to-Address-Climate-Change---Transition-to-a-Clean-Energy-Economy.pdf

- Like the 2015 Paris Agreement's inclusion of "Just Transition" in its preamble, DEQ should integrate "Just Transition" as a core principle of its Clean Energy Plan, utilizing the ILO's framework for implementation.
- Codify best practices and include as recommended protections for displaced workers in the fossil fuel industry.
- Create a "Just Transition Task Force" to oversee the implementation of EO 80 Recommendations and to outline best practices for displaced workers and communities impacted by coal plant closures and the transition to a renewable energy economy.
    - Provide guaranteed seats for stakeholders within Labor, workers in impacted industries, and residents of communities that stand to lose significant revenue in the tax base from coal plant closures.
- Create a dedicated funding stream for workforce training, bridge funding for displaced and transitioning workers, and other priorities as identified by the "Just Transition Task Force."
- Look to other states, particularly those in the United States Climate Alliance for best practices and models for implementation of EO 80 Recommendations:
    - New York State "Just Transition Task Force," ambitious targets, Solar on Schools and Offshore Wind projects, Project Labor Agreements, and more
    - Washington State's "Energy Strategy Advisory Committee"[17]
    - The "Energy Future Jobs Act," a partnership with the major utilities in Illinois to protect 4,200 jobs, create thousands of clean energy jobs, and provide training by adding $5 million in funding for Registered Apprenticeship Programs to ready the workforce to meet these goals
    - Maine's[18] "Commission on a Just Transition to a Low-Carbon Economy" with dedicated seats for a worker in an impacted industry and a representative from Labor.

[17] SB 5116. http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Session%20Laws/Senate/5116-S2.SL.pdf#page=1 AND https://wecprotects.org/100-clean-electricity-legislation-passes-washington-state-senate-in-historic-vote/

[18] An Act to Create a Green New Deal for Maine http://www.mainelegislature.org/legis/bills/bills_129th/billtexts/HP092401.asp

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July 24, 2019

To: Sushma Masemore
State Energy Director
NC Department of Environmental Quality

From: Rory McIlmoil
Senior Energy Analyst
Appalachian Voices
Rory@AppVoices.org

RE: Comments on North Carolina's Clean Energy Plan

I submit these comments on behalf of Appalachian Voices, a non-profit environmental advocacy organization based in Boone. I myself am also a resident of Deep Gap in Watauga County, and a member-owner of Blue Ridge Energy, an electric cooperative ("co-op") serving more than 60,000 residential properties in western North Carolina.

The purpose of these comments is to stress how important it is to include rural areas, and the electric co-ops that serve them, in any and all planning and implementation of the Clean Energy Plan in accordance with Governor Roy Cooper's Executive Order 80, "North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy."

North Carolina's electric co-ops serve the large majority of rural communities across the state. These communities are characterized by a higher percent of poverty, lower median incomes, and a much higher energy cost burden than more urban and sub-urban communities. To illustrate this we are including a couple of maps with these comments that overlay electric cooperative service areas with county poverty and energy burden levels. For instance, households that fall under 50 percent of the federal poverty line spent as much as 40 percent of their gross household income on home energy costs in 2016, not including transportation, and the worst energy cost burdens are seen in counties served by electric co-ops.

This is a serious issue, one that not only has a negative impact on families, but also on local economies as families are spending hundreds to thousands of dollars a year on energy bills, unnecessarily, rather than spending that money in their communities. Fortunately, this problem can be addressed through expanded investments in energy efficiency and distributed solar.

Unfortunately, as much of the state has seen significant growth in distributed solar and energy efficiency investments, most of that growth has occurred in areas served by Duke Energy, not in communities served by co-ops where the impact and benefits could have an even greater economic and social impact. This results directly from the co-ops have being allowed to do the bare minimum when it comes to clean energy investments.

For instance, the Renewable Energy Portfolio Standard, while it required co-ops and municipal utilities to achieve 10% of their retail sales through renewables and efficiency by 2018, allowed these smaller utilities to effectively opt-out of meeting their requirements through local investments because it allowed them to pay either Duke Energy or GreenCo Solutions (whomever was/is their wholesale power provider) to obtain the needed credits on their behalf from investments being made elsewhere. And most of the co-ops chose to take that route rather than invest in their members and communities. Then, House Bill 589 (passed in 2017) effectively exempted co-ops and muni's, at their request, once again leaving rural communities out of the clean energy boom and associated benefits being experienced in much of the rest of the state.

More directly, co-ops across the state have set rate structures that reduce people's ability to control their electric bill, while rendering household investments in energy efficiency and rooftop solar less cost-effective. For instance, the average monthly fixed charge imposed by co-ops across the state is around $25 per month, with the range being between $15 and $35. My own co-op, Blue Ridge Energy, imposes a monthly fixed "basic facilities fee" of just over $24. This means that before families served by Blue Ridge even turn on the lights, they will pay $300 a year on their electric bill.

By comparison, after strong opposition from consumer and low-income advocates, Duke Energy's fixed charge was increased to $14 a month just last year in North Carolina, while in South Carolina regulators recognized the impact that high fixed charges have on low- and fixed-income ratepayers and recently limited the fee increase to less than $12/month. For low- and fixed-income households, such high fixed charges only enhance the burden of energy costs they experience. And because higher fixed charges are associated with keeping rates lower, such rate structures effectively devalue the cost-saving benefits of investing in home energy efficiency improvements.

At the same time, co-ops are imposing unjust, punitive net metering policies that erode, or completely eliminate the cost-effectiveness of household investments in rooftop solar. Using Blue Ridge Energy as an example, their net metering rate lowers the credit residents get for their own solar generation to six cents per kilowatt-hour, while tacking on an additional $29/month onto the fixed charge, bringing that charge to a minimum of $53 per month. Under this rate, unless a home is using vast amounts of energy and installs a large, expensive system, nobody can save money by investing in solar.

The same is true for members of co-ops that purchase their electricity from the North Carolina Electric Membership Corporation (NCEMC), as the rate structure the co-ops pay to NCEMC -- a declining block rate structure -- results in the co-op's "avoided cost" being less than 3 cents per kilowatt-hour, or far less than the retail rate the members pay to purchase electricity from the co-op. This is what many of those co-ops end up setting

as their solar energy credit for net-metered households, which again significantly reduces the value and cost-effectiveness of household investments in rooftop solar.

If Duke Energy were to propose such rate structures there would be a level of public opposition like we've never seen. But co-ops, despite maintaining their monopoly status, have been effectively de-regulated by the state under the false assumption that their policies and practices are being regulated by their members. This allows electric co-ops to set whatever rates they want without any public oversight or accountability.

Further, while making it harder for families to invest in efficiency and solar, electric co-ops have by and large ignored the need for energy efficiency investments in their communities, especially among low-income households. They have done this by leaving billions of dollars in low-cost capital on the table that the US Department of Agriculture has made available to rural utilities since 2014. The available programs include the Energy Efficiency and Conservation Loan Program, which offers billions of dollars a year in treasury-rate loan guarantees that co-ops could use to invest in efficiency, conservation and renewables for their members, and the newer Rural Energy Savings Program, which offers zero-interest financing in the amount of $100 million this year alone for co-ops to implement on-bill energy efficiency finance programs, solar financing programs and other beneficial clean energy investments. To date, only one co-op out of twenty-six in the state, Roanoke Electric Cooperative, has used either of these programs for facilitating direct investments in home energy efficiency or solar.

The end result of all of this is that energy cost burdens have persisted in NC's rural communities, and those communities have largely been left out of benefitting from the energy savings, jobs, and economic development that the rest of North Carolina has experienced due to expanded investment in renewables and energy efficiency.

We call on Governor Cooper and state government agencies to work hard to ensure that rural areas in North Carolina are at the center of the Clean Energy Plan. If equity is a central focus of the plan, it can't just be a plan for Duke Energy customers, for urban areas, and for the affluent. But to achieve that goal, we need to address the significant barriers to expanding clean energy opportunities for rural and low-income communities.

Any new policies or plans must require compliance by electric co-ops and municipal utilities. It must address inequitable and harmful rate structures being imposed by co-ops. It must address the lack of regulation of, and lack of transparency by co-ops. And it must commit a substantial amount of dedicated resources and administrative support associated with the Plan's implementation to rural communities. Otherwise, it won't be a plan for all North Carolinians.

Thank you for your consideration,

Rory McIlmoil
Senior Energy Analyst
Appalachian Voices

April 2, 2019

Governor Roy Cooper
20301 Mail Service Center
Raleigh, NC 27699

House Speaker Tim Moore
16 W. Jones Street, Rm 2304
Raleigh, NC 27601

Senator Phil Berger
16 W. Jones Street, Rm 2007
Raleigh, NC 27601

Dear Governor Cooper, Speaker Moore and Senator Berger:

As major employers and energy consumers across North Carolina, we write to express our strong support for the advancement of bold clean energy and clean transportation policies for our state. We applaud the progress made to date to promote the deployment of clean energy resources in North Carolina, including previous legislation enacted by the N.C. General Assembly and the recent targets outlined in Executive Order #80, and we strongly encourage you to continue this progress. By enacting strong policies and programs to spur investments in clean energy, clean transportation, and emissions reductions, North Carolina has an opportunity to build upon past successes while continuing to grow the economy for many years to come.

We must work together to ensure North Carolina remains at the forefront of the transition to a clean energy economy. Lawmakers should increase the state's commitment to renewable energy, energy efficiency, electric vehicles, energy storage, and other innovative technologies and high-tech manufacturing products involved with a 21st Century electric grid, while creating a more competitive market in which these technologies can grow. Thanks to past leadership of legislators, North Carolina was an early leader in the Southeast in embracing clean energy technologies, and the economy has benefitted as a result. In order to maintain the state's regional and national leadership position and competitive advantage in the new energy economy, more must be done to attract clean energy investment. As such, we respectfully provide the following recommendations:

Use Energy More Efficiently and Eliminate Waste

The Tar Heel State is missing out on opportunities to reduce electric energy use and eliminate waste across the state.[1] Energy efficiency programs and investments are the lowest-cost energy resources available, with new technologies delivering greater savings than ever before.[2] However, North Carolina's utility energy efficiency investment and performance remains well below the national average, missing opportunities to save money for business, residents, and state and local government.[3]

As large energy users, we are making major investments in energy efficiency because it helps us cut waste, save money, and quickly gain a return on our investment. In many ways, North Carolina's large energy users are setting an example for utilities, government, and other businesses on the value of energy efficiency investments. North Carolina should consider strengthening and extending its utility energy efficiency investment requirements and consider addressing utility compensation structures so that electric utilities have more incentive to invest in efficiency programs. North Carolina can also more responsibly utilize taxpayer dollars by increasing energy efficiency targets for state-owned buildings to establish a 40% energy savings goal by 2025. This goal, recommended by the N.C.

Energy Policy Council (in 2016 and 2018) and outlined in Executive Order #80, would build on the state's previous 30% energy savings goal by 2015, which delivered $1 billion in cost savings for taxpayers.[4]

Increase Customer Access to Renewable Energy

Various policy barriers make it difficult for large energy users and residential customers to invest in renewable energy in North Carolina. Renewable energy is one of the lowest-cost energy resources available.[5] Procuring renewable energy allows businesses and educational institutions to save money, lock in long-term prices, and protect against the volatility of fuel prices. This is why more than 162 companies have committed to power 100% of their operations with renewable energy—including 37 companies with operations in North Carolina[6]—and why more than 14,000 megawatts of corporate renewable energy deals have been announced across the United States since 2015.[7]

North Carolina should provide more competitive options for customers to access in-state renewable energy. Increasing competition in the energy marketplace would allow businesses to access low-cost renewable energy options. Offering more choice and competition for renewable energy would help North Carolina attract private investments while helping businesses and other large energy users save money, attract talent, and stay competitive.

Accelerate the Deployment of Electric Vehicles

Electric vehicles (EVs) and other clean energy technologies are rapidly declining in price and are providing important cost savings for businesses, consumers and government entities. Cleaner, more efficient vehicles can help to lower emissions and allow businesses to dramatically reduce fuel and maintenance expenses in our company fleets. North Carolina should promote policies and programs that accelerate the deployment of clean transportation options and EV charging infrastructure. The 80,000 zero-emission vehicles (ZEV) target and the "lead-by-example" ZEV directive included in Executive Order #80 are important steps in the right direction for North Carolina. Additional initiatives such as the Advanced Clean Cars program would set important market signals that encourage the availability and sale of EVs and low-emission vehicles. The national Volkswagen Settlement, and North Carolina's expected $92 million allocation, also provides a key opportunity to scale up EV charging infrastructure in communities across our state.[8]

Promote the Development of Energy Storage

Along with energy efficiency, demand response and electric vehicles, the deployment of energy storage technologies can help to facilitate the integration of additional renewable energy resources while creating a more resilient, reliable, and responsive electric grid. North Carolina can capture the many benefits for ratepayers—and establish itself as a regional and national leader—by putting into place the right policies, programs and goals that will allow these innovative technologies to thrive. Enabling a competitive environment for energy storage and encouraging collaboration with large customers can be helpful in achieving low-cost solutions while learning how to successfully integrate these key technologies.

In conclusion, we encourage North Carolina lawmakers to implement strong policies that spur adoption of renewable energy, energy efficiency, electric vehicles, and energy storage for customers and ratepayers. Lawmakers should also ensure that utilities' programs, regulations and business models are better aligned with customers' needs. North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (REPS) and the federal Public Utility Regulatory Policies Act (PURPA) were key drivers for innovation and growth of the state's clean energy economy over the last decade; now lawmakers must provide the next generation of policies that will enable this economic growth to continue.

Additional clean energy and clean transportation policies will attract new investments, encourage innovation, save ratepayers money, appeal to forward-thinking businesses, create local jobs, and help North Carolina stay competitive with neighboring states.[9] We look forward to working with you to grow North Carolina's low-carbon, clean energy economy in 2019.

Thank you for your consideration.

Sincerely,

Ameresco, Inc.
Appalachian Mountain Brewery
Arjuna Capital
Cree, Inc.
Ingersoll Rand
Mars Incorporated
National Association of Energy Service Companies (NAESCO)
New Belgium Brewing
Schneider Electric
Sierra Nevada Brewing Co.
Unilever

CC: Secretary Michael S. Regan, N.C. Department of Environmental Quality
Secretary Anthony M. Copeland, N.C. Department of Commerce
North Carolina Utilities Commission
North Carolina Public Staff

For more information, please contact Brianna Esteves at esteves@ceres.org.

More information about the company signatories:

Ameresco, Inc. helps shape the future of energy use in the United States and abroad. A leading independent provider of comprehensive energy efficiency and renewable energy solutions, its capabilities range from upgrades to facility's energy infrastructure to the development, construction and operation of renewable energy plants combined with tailored financial solutions. Ameresco works with customers on both sides of the meter to reduce operating expenses, upgrade and maintain facilities, stabilize energy costs, improve occupancy comfort levels, increase energy reliability and enhance the environment. Founded in 2000, Ameresco has a deep history in public-sector energy projects, with numerous federal and local government, public housing and military contracts. Ameresco has offices in Charlotte, North Carolina.

Appalachian Mountain Brewery brews great tasting, award winning beers and ciders at its brewery and tasting room in Boone, North Carolina. AMB's mission is to sustainably brew high quality beer, support local non-profits and help its community prosper. AMB understands how important the ecology and environment are to the people of the High Country and employs cutting-edge and tried-and-true technologies like solar energy to protect our natural environment.

Arjuna Capital is a one-stop shop for creating a high-impact investment portfolio across markets and asset classes—from public to private, domestic to foreign, equity to debt. Based in Durham, North Carolina, Arjuna strives to offer the most diverse, sustainable, profitable and high-impact investments available, to build and preserve clients' wealth, and to influence sustainable change through enlightened engagement in the capital markets**.**

Cree, Inc. is a market-leading innovator of semiconductors, lighting-class LEDs and lighting products. Cree is uniquely positioned to innovate new ways in which lighting will serve as a platform for emerging technologies and capabilities that will enrich lives, improve society and safeguard our planet. Cree's Wolfspeed segment stands alone as the premier provider of the most field-tested SiC and GaN Power and RF solutions in the world. Cree's LED product families include LED chips, components, indoor and outdoor commercial lighting, as well as consumer LED bulbs. Founded in North Carolina, Cree has its headquarters, primary research and development operations, and manufacturing facilities in Durham.

Ingersoll Rand plc (NYSE:IR) is a diversified industrial manufacturer creating comfortable, sustainable and efficient environments that advance the quality of life across the globe. Its market-leading brands—including Club Car, Ingersoll Rand, Thermo King, Trane—work together to heat, cool and automate homes and buildings; enhance commercial and industrial productivity; keep transported food and perishables safe and fresh; and deliver fun, efficient and reliable transportation solutions. Ingersoll Rand's North America Headquarters and Corporate Center are located in Davidson, North Carolina.

Mars, Incorporated is a private, family-owned company headquartered in McLean, Virginia, USA, with annual net sales of more than $35 billion. Mars' portfolio of brands offers quality and value to consumers around the world and includes PEDIGREE®, WHISKAS®, M&M'S®, SNICKERS®, MARS®, EXTRA®, ORBIT®, UNCLE BEN'S® and many more. Mars set a goal to achieve 100% renewable energy for our operations by 2040, and set a science-based target to cut carbon emissions across our value chain 27% by 2025 and 67% by 2050. In North Carolina, Mars operates 62 veterinary clinics throughout the state and a petcare factory in Henderson, employing over 1300 people.

The **National Association of Energy Service Companies (NAESCO)** represents nearly 350 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. NAESCO represents every facet of the energy services industry. Our combined industries account for 360,000 American jobs in more than 7,000 facilities covering every state. Our industry produces $106 billion shipments of electrical equipment and medical imaging technologies per year with $36 billion exports.

New Belgium Brewing, makers of Fat Tire Amber Ale and a host of Belgian-inspired beers in Asheville, North Carolina and Fort Collins, Colorado, is consistently recognized as a great place to work and a sustainable business. New Belgium's core value to honor the environment is lived out in part through an internal energy tax to help fund sustainable business practices as well as on site solar and biogas energy generation.

Schneider Electric is leading the digital transformation of energy management and automation in homes, buildings, data centers, infrastructure and industries. With a global presence in over 100 countries, Schneider is the undisputable leader in Power Management and Automation Systems. Schneider believes that great people and partners make for a great company and that our commitment to Innovation, Diversity and Sustainability ensures that Life Is On everywhere, for everyone and at every moment.

Sierra Nevada Brewing Co is a pioneer in the craft beer industry and also a recognized leader in sustainable operations. The company is home to the largest solar installation in craft beer and continues to invest in clean and renewable energy by using biogas from onsite wastewater treatment to fuel microturbines and purchasing renewable energy via NC GreenPower. With breweries in Chico, CA and Mills River, NC, Sierra Nevada is committed to crafting the highest quality beers in the most responsible way.

Unilever employs 315 people at its personal care product manufacturing facility in Raeford, North Carolina. On any given day, Unilever products are used by 2.5 billion people to feel good, look good and get more out of life. Great products from the company's range of more than 400 brands such as Lipton, Knorr, Dove, Axe, Hellmann's and Ben and Jerry's give Unilever a unique place in the lives of people all over the world. Unilever is working to ensure that its products play a part in helping fulfill its purpose as a business – making sustainable living commonplace. Unilever has announced intentions to go carbon positive in its operations by 2030 and supports the production of more zero carbon renewable energy than needed for its own operations. This reflects the company's ambition to play a leadership role in the transition to a zero carbon economy.

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[1] The American Council for an Energy-Efficient Economy ranked North Carolina 26th in their 2018 State Energy Efficiency Scorecard (October 2018) and awarded North Carolina 3 out of 20 possible points for utility energy efficiency programs. See https://database.aceee.org/state/north-carolina.

[2] For example, in a recent analysis on the cost of saved energy by state, energy efficiency in North Carolina was reported to have cost ~$0.021/kWh. In addition, new efficiency technologies that leverage advanced analytics and the internet of things are delivering greater energy and cost savings than ever before. (See: Ian Hoffman, Charles A. Goldman, Sean Murphy, Natalie Mims Frick, Greg Leventis and Lisa Schwartz, Electricity Markets and Policy Group, Lawrence Berkeley National Laboratory, "The Cost of Saving Electricity Through Energy Efficiency Programs Funded by Utility Customers: 2009–2015," June 2018, https://emp.lbl.gov/publications/cost-saving-electricity-through). In comparison, the avoided cost of energy at the distribution level is $0.0249-$0.0378/kWh. This value does not include additional avoided capacity costs which would be an additional benefit of energy efficiency investment. See: DEP Exhibit 1 Duke Energy Progress, LLC Proposed Purchased Power Schedule PP, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=334e040d-f667-4bdf-bb9d-4b88b986755e.

[3] For example, according to the 2018 State of Efficiency Scorecard issued by the American Council for an Energy-Efficiency Economy, North Carolina ranked 34th in the country for its utility energy efficiency programs and policies. See: https://aceee.org/sites/default/files/publications/researchreports/u1808.pdf.

[4] According to the North Carolina Department of Environmental Quality's 2015 report, "State buildings in N.C. have reduced energy costs by almost $1 billion since 2003" (See: https://deq.nc.gov/press-release/state-buildings-nc-have-reduced-energy-costs-almost-1-billion-2003). By adopting a 40% by 2025 goal, taxpayers would see another $2 billion in savings—money that could be reinvested in government services, lower taxes, or additional energy prices (See: N.C. Energy Policy Council. "Energy Policy Council Report." March 2016. https://ncdenr.s3.amazonaws.com/s3fs-public/documents/files/Energy%20Policy%20Council%20Report%20March%202016.pdf.)

[5] According to Lazard's 2018 Levelized Cost of Energy Analysis–Version 12.0, unsubsidized wind and utility-scale solar became cost-competitive with conventional energy generation several years ago, and alternative energy technologies continue to decline in cost. See https://www.lazard.com/media/450773/lazards-levelized-cost-of-energy-version-120-vfinal.pdf.

[6] Businesses with operations in North Carolina that have committed to 100% renewable energy include: ABInBev, AkzoNobel, Amazon, Apple, AXA, Bank of America, Biogen, Facebook, Fifth Third Bank, Google, H&M, Hewlett Packard Enterprise, IKEA, Infosys, Iron Mountain, Mars Incorporated, Merck, Microsoft, Morgan Stanley, Nestlé, Nike, Pearson, Procter & Gamble, PVH Corp., Royal DSM, Ricoh, Schneider Electric, SGS, Starbucks, TD Bank, T-Mobile, UBS, Unilever, VF Corporation, Walmart, Wells Fargo, and Workday.

[7] According to the Rocky Mountain Institute's Business Renewables Center, more than 14.31 gigawatts of corporate renewable energy deals have been announced since the start of 2015. This includes more than 6.53 gigawatts of corporate renewable energy deals announced in 2018 alone. See http://businessrenewables.org/corporate-transactions.

[8] Terms of the VW Settlement allows states to utilize up to 15% of their settlement funding for EV charging infrastructure. For more information, see: https://deq.nc.gov/about/divisions/air-quality/motor-vehicles-and-air-quality/volkswagen-settlement.

[9] Neighboring states such as Virginia are moving forward at full speed on clean energy technologies. For example, the 2018 Virginia Energy Plan, released in October 2018, outlines a vision to build out offshore wind resources, increase the deployment of onshore renewables, and develop a comprehensive transportation electrification action plan. See https://www.governor.virginia.gov/media/governorvirginiagov/secretary-of-commerce-and-trade/2018-Virginia-Energy-Plan.pdf.

Comment from DEQ Environmental Justice - Clean and Equitable Transition Subcommittee

Creating greater opportunities for historically under-utilized businesses to grow and prosper through enhanced local government contracting and procurement is necessary to generate greater equity and shared prosperity (Brichi, 2004; Edelman and Azemati, 2017; Robinson, 2017).

Regarding necessary equity considerations, the DEQ Clean Energy Plan, especially in the Customer Choice and Economic Development bucket, must not only include recommendations for workforce development but also business development. For business development, the plan should stipulate that the State will develop strategies to ensure that the clean energy supply chain is inclusive and equitable, that is, creates contracting and procurement opportunities for historically underutilized businesses (i.e., MBEs, DBEs, WBEs, and veteran- and LGBTQ-owned enterprises). Research shows that these types of businesses are far more likely to employ minority workers than majority-owned businesses.

In both the public and private sectors, supplier diversity is increasingly becoming a necessity for success based on market-driven factors rather than simple contracting and procurement government-mandates. (Shah & Ram, 2006; ConnXus, 2017; Lazarus, 2017; Johnson, 2018). While continuing to acknowledge and striving to comply with anti-discrimination laws enacted roughly four decades ago (AAAEO, 2019), public and private sector entities are increasingly recognizing how disruptive demographic trends are dramatically transforming the world of contracting and procurement and, in the process, making supplier development a strategic imperative rather than just a compliance issue (D&B Supply Management Solutions, 2009; LePage, 2014; Lohrentz, 2016; Rutherford, 2016; Suarez, 2016a; Rimmer, 2017; Zerp, 2018; LISC Los Angeles, 2018; Hussain, 2019; Vazquez & Frankel, 2017; Weissman, 2017; Fairchild and Rose, 2018; Fulkerson, 2018). More specifically, organizations that embrace supplier development as a strategic imperative recognize that the innovative capacity of small diverse suppliers, who typically are more flexible, agile, and driven to succeed than large firms, can boost their performance, reduce the cost of goods and services, and drive continued business growth in an increasingly diverse marketplace (GEP, 2019). Many of these small firms are owned by people of color, women, and/or members of the LGBT community (Vazquez & Frankel, 2017; Suarez, 2019a; Rimmer, 2017; Suarez, 2019a).

The fact that there is overlap between those communities which have historically been under-utilized for supply-side investment and those which are disproportionately impacted by climate change, mean that the intentional inclusion of these communities (communities of color, low income communities) must be a part of any plan to promote increased utilization of clean energy in an inclusive way.

Dear Sushma:

Many thanks to your staff for meeting with us last week during this very busy time in your work on the Clean Energy Plan. We appreciate the difficult task for DEQ and its partner agencies to translate EO80 into plans and actions that can be implemented. Here are our comments for the Clean Energy Plan pertaining to natural gas and methane, which your colleagues asked us to put it into writing when we met.

The world's scientists, in the form of the Intergovernmental Panel on Climate Change (IPCC), tell us that we need to achieve net zero carbon dioxide emissions by 2050 in order to have a substantial chance of keeping warming to a safe level. I was a Coordinating Lead Author on the panel's Special Report that reached that conclusion. [1,2]

However, this reduction will be much more difficult for developing nations, so advanced countries like the U.S., that have more economic and technological capacity and are responsible for a much greater contribution to historic and current emissions, need to take the lead and get to net zero earlier, around 2040.

Unless carbon capture and sequestration technology quickly becomes very cheap (and James Hansen estimates the cost at $2-4 trillion/year) [3] and associated hurdles such as storage and pipeline siting are surmounted, there is no way new natural gas is compatible with the IPCC target.

As the state's chief supplier of electric power, Duke Energy, however, plans to build the equivalent of 20 new gas-burning power plants in North Carolina, the useful life of which would extend beyond 2050.

Unless the Clean Energy Plan can envision a future without new gas, it will not be a plan that protects North Carolina from the serious impacts of climate change as the governor intends.

This is true, obviously, even if we consider only the CO2 emissions from burning natural gas, since "net zero before 2050" does not allow for the addition of new CO2 sources now.

And yet the effect of natural gas is even worse than that. It is composed mostly of methane, a greenhouse gas with a much stronger climate impact than carbon dioxide. Gas (methane) leaks and is intentionally vented unburned during natural gas operations (drilling, storage, transport and distribution). Unfortunately, it is not possible to use natural gas without emitting methane. And if enough methane is released (as little as 1-2 per cent in fracking, processing and transporting it), natural gas is worse (potentially much worse) for the climate than coal.

Given that CO2 emissions from natural gas alone make it incompatible with the IPCC target, we should not need to quantify methane leakage, yet knowing the leak rate allows us to give a much more complete analysis of the real societal footprint of gas usage. My research in this area leads to the following conclusions:

- Methane is often compared to CO2 in terms of “global warming potential” (GWP). This means a multiplier is used to determine the relative climate impact of the two gases. There is no single multiplier that can fully compare these gases over all timescales. Because methane remains in the atmosphere for a much shorter period than CO2, the GWP for fossil methane is 86 times that of CO2 over a 20-year period but “only” 34 times the GWP of CO2 when measured over a 100-year period. [4] Robert Howarth at Cornell estimates that 4.1% of gas is emitted as unburned methane and (using a GWP of 86 and no other social cost) calculates that gas has a worse climate impact than coal if more than 2.7% is emitted unburned. [5]

- Because of the debate over which GWP to use, I instead compare methane to CO2 based on their relative overall effect on society at large. Methane is a precursor to ozone, so causes air quality issues and the associated health impacts. When you take these costs into account (using a 3% discount rate), methane does $3,700/ton in damages compared to CO2’s ~$70/ton, giving methane 50 times the societal impact of CO2. These numbers are in the process of being refined and are certain to go up as additional evidence comes in about the damaging health effects of ozone exposure. Our most recent analyses indicate that every million tons of methane emitted is associated with 500 deaths, which includes 30 in the US and about 1 in North Carolina. With about 330 Mt of methane emitted due to human activities every year (worldwide), methane emissions thus lead to ~10,000 premature deaths annually in the US and several hundred in NC. [6]

- I calculate that the societal damages due to climate change and air pollution raise the true cost of electricity generated using gas from the market cost of 4.5 cents per kWh (according to the US Dept. of Energy for 2018) to 12.2 cents per kWh. [6] That makes it more than double the cost of solar or onshore wind, based again on US DoE statistics.

- Methane has been the largest contributor to the worldwide failure to keep on an emissions trajectory consistent with a 2C global warming target, causing 90% of the departure from such a trajectory that we have seen since 2000. [7]

If we understand correctly, the recommendations in the Clean Energy Plan will be based on modeling that includes only emissions from combustion, in other words from the power plant itself. But the bulk of methane emissions from natural gas occur upstream of the power plant.

A plan that does not account for this is not a plan compatible with meeting the IPCC target and paints a dismal picture of our future. DEQ will have missed an opportunity to halt Duke’s gas buildout, North Carolina will show a reduction that meets the governor’s EO80 target (though not the IPCC target), and total emissions will rise because North Carolina has created a market for the gas being fracked in West Virginia and Pennsylvania. Methane will be emitted from those wells, from the Atlantic Coast Pipeline, and from storage tanks and compressor stations along the way, without our state taking any responsibility for it.

This is a global problem and our state has a role to play in its solution; but in expanding the use of fracked natural gas in the state, North Carolinians will be basking in a false sense of accomplishment and security that hides our contributions to irreversible warming.

Economic trends alone may be enough to reverse Duke's plans for new gas in North Carolina. With the levelized cost of natural gas now running around 4-4.5 cents/kWh, [8] the City of Los Angeles is about to sign a solar PPA at 1.997 cents/kWh for a facility that will also include battery storage (with electricity from the batteries priced at only 1.3 cents/kWh) and is expected to supply ~7% of the city's needs. [9]

If Duke Energy does succeed in building new gas plants, these plants are very likely to end up as stranded assets, exacerbating the already thorny problem of unrecovered debt that is preventing the utility from closing coal plants ahead of schedule. We have compiled a short sample of recent publications illustrating the extreme financial and climate risks associated with new natural gas. [10]

However, with the climate urgency we are facing, we feel that NC needs a Clean Energy Plan that does more than simply trust that market forces will provide the outcome that we really need.

If you do not have time to model the above factors in the Clean Energy Plan, you should find a way to at least acknowledge them, laying down a marker for caution and further study. For example, you could include a section on "Necessary Targets Beyond EO80" that acknowledges:

- that, in order to meet the IPCC's 2030 and 2050 targets, ongoing economic trends and research on the impacts of methane strongly suggest that new gas plants may present an unnecessary risk to the climate and to the health of North Carolinians

- the need for future regulatory impact assessments (RIAs) of policies adopted from these recommendations, which will have to account for methane impacts, including its social costs, and the rapid changes in levelized cost of energy from different sources that increasingly favor renewables with storage and are likely to continue to shift in that direction

- that the fracked gas fueling NC gas plants releases enough greenhouse gases in its extraction and transport to make it as bad or worse for the climate than coal.

Duke Energy's plan is not only inconsistent with meeting IPCC targets. It is inconsistent with a target of reducing greenhouse gas emissions at all. What appears to be a complete failure of the Clean Energy Plan to account for methane emissions goes counter to the "carbon reduction" goal that stakeholders have identified as being by far their top value for the Plan. [11]

Instead, we feel strongly that the Clean Energy Plan should recommend:

- a permanent moratorium on new gas infrastructure in the state

- a requirement that the investor-owned utilities account for the social cost of emissions, including in-state and upstream methane, in their Integrated Resource Plans so that decision makers have a more accurate picture of the costs and impacts of natural gas

Thank you again for the hard work you and your team are doing. Please let us know how we can be of assistance to you in completing this important task and giving North Carolina a Clean Energy Plan that truly rises to the challenges of the crisis in which we find ourselves.

Sincerely,

Drew Shindell, Nicholas Professor of Earth Sciences, Duke University

In collaboration with
Dale Evarts, former Director, Climate, International and Multimedia Group, US EPA
Kathy Kaufman, former Regulatory Analyst, Air Economics Group, US EPA
Jim Warren, Executive Director, NC WARN
Sally Robertson, Solar Projects Coordinator, NC WARN

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Customer access to renewables; customer access to renewable natural gas: *How can we give customers choices with respect to their [natural gas energy] source while maintaining affordability, reliability, and fairness for all customers?*

What is happening and what is the policy tension?

First, North Carolina has the potential to produce an incredible amount of biogas (also referred to as biomethane) thanks in large part to leading the nation in pork and poultry production,[1] the waste from which can replace enough natural gas to achieve an estimated 2M MTCO2e reductions annually, which is based on an estimated 39.9M MMBtu/year of biomethane produced.[2] What may be more extraordinary about biogas is that it can be used to generate electricity – either on site or by directing its use to highly efficient natural gas-fired combined cycle plants; it can be used as an alternative to fossil-derived natural gas in all of the ways residential, commercial and industrial customers use natural gas and it can be used in the form of compressed natural gas as a transportation fuel or used to create electricity to run electric vehicles.[3] And, as a fuel source that is available around-the-clock, it avoids issues of intermittency that sometimes thwart the proliferation of more traditional renewables. Finally, when biogas is captured and used to produce renewable energy, it not only replaces the use of a conventional fuel, as do other renewables, but it also cancels emissions that would occur from the decomposition of the organic waste from which biogas is produced.[4]

Despite these benefits, biogas remains vastly underutilized in NC. One big reason is that the glut of cheap natural gas – thanks to the fracking boom – keeps the price of natural gas artificially low, making it difficult for renewable natural gas to compete. Use of RNG thus far has occurred in North Carolina thanks to incentives created by the Renewable Energy and Energy Efficiency Portfolio Standard's swine (and to a lesser extent) poultry set-asides, which require North Carolina's electric utilities to generate 0.20% of their electricity from swine waste[5] and 900,000 MWh from poultry waste,[6] and payments for

[1] RNG is derived from biomethane produced through the breakdown of organic waste. Major sources of organic waste in North Carolina include swine and poultry waste, dairy waste, waste water treatment plants, landfills and crop residues.

[2] NC ranks second in pork production and in the top five with respect to poultry production.

[3] In addition to using RNG to produce electricity, RNG can be used in every way that conventional natural gas is used: as a renewable transportation fuel in the form of compressed natural gas, to produce steam for heating and cooling systems, to run hot water heaters.

[4] Biomethane is created when organic waste is broken down in anaerobic environments and can be used in a variety of forms to replace fossil-derived fuels, such as renewable natural gas, compressed natural gas and liquefied natural gas. Raw forms of biogas can operate electric generators with very little processing of the gas (i.e., dehumidification and pressurization), providing a source of fuel for natural gas-powered generators, which could prove particularly crucial in rural areas and on farms in the case of power outages associated with extreme weather events.

[5] Biogas captured by anaerobically digesting swine waste is purified into RNG, injected into the natural gas pipeline, and nominated by the electric utility to one of its natural gas power plants. Alternatively, biogas can produce electricity on-farm and be interconnected to the power grid. In these ways, RNG serves as a renewable source of electricity.

[6] Because North Carolina is one of the biggest producers of both pork and poultry, the NCGA included set asides for the production of electricity from their waste streams in the 2007 Renewable Energy and Energy Efficiency

carbon offsets from the avoidance of the GHGs that would have been emitted if the waste were left to decompose. The economics of project development are changing somewhat because of federal and state mandates that have created new markets – and justifiable returns for biogas producers –for renewable and low carbon fuels, with some of the highest prices being paid for biogas derived from livestock. However, state policy and practices are not designed nor are they adapting to the biogas opportunity in ways that allow producers to get their gas to these markets, which will ultimately make RNG accessible to North Carolina customers. They could, however and if properly implemented, help RNG achieve economic comity with fossil-derived natural gas, just as efforts to spur solar in NC led to solar's dramatic price reduction and NC's standing as one of the top solar producers in the nation.

Omitting RNG from the renewables discussion while also limiting RNG to electricity production misses significant and uniquely North Carolinian opportunities to achieve its climate goals. Biogas is one of the unique renewables that can displace a fossil fuel while canceling out unmitigated emissions by producing it, run 24-7, be used as a transportation fuel, while serving an additional utility sector (i.e., natural gas). Biogas' contribution to NC's climate goals is also significant considering that natural gas accounts for 27.2 MMTCO2e or almost 23% of NC's GHG emissions.[7] Natural gas-fired generation accounts for 30% of the state's electricity.[89] Finally, federal and state mandates for renewable transportation fuels is making it possible for producers of biogas to receive lucrative returns on their gas.

The tension therefore is in finding ways to accelerate the capture and use of biogas so that customers can receive a greater percentage of their electricity from RNG, meet a greater percentage of their natural gas needs from RNG, and/or use biogas as an alternative vehicle fuel. Incentives to produce biogas do exist through state and federal mandates plus the REPS and carbon payments, but the hurdles often outweigh those incentives.

To do this the state must take steps to appreciate biogas' significance and help biogas reach customers, primarily by creating regulatory and physical pathways for its collection and distribution to end users. In addition, there must be a way to address concerns related to biogas development that affect ongoing issues related to social and environmental justice, particularly with respect to swine and poultry operations. There is an opportunity for biogas to anchor overall improved waste management,

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Portfolio Standard (REPS). North Carolina is the only state to include animal waste in its REPS. A summary of the NC REPS can be found here: https://programs.dsireusa.org/system/program/detail/2660.

[7] See Table 2-3: CO2Emissions by Fossil Fuel Typefor North Carolina and U.S., 2005-2016, North Carolina Greenhouse Gas Inventory (1990 – 2030), North Carolina Department of Environmental QualityDivision of Air QualityJanuary 2019, available at https://files.nc.gov/ncdeq/climate-change/ghg-inventory/GHG-Inventory-Report-FINAL.pdf.

[8] https://files.nc.gov/ncdeq/climate-change/ghg-inventory/GHG-Inventory-Report-FINAL.pdf

[9] Since 2005, emissions from coal combustion have dropped by 55% while emissions from natural gas have almost doubled during this same period. https://files.nc.gov/ncdeq/climate-change/ghg-inventory/GHG-Inventory-Report-FINAL.pdf.

producing a host of environmental, societal and economic co-benefits especially in areas directly surrounding such operations.[10]

What policy or regulatory action might be required to address the tradeoffs you see? What entity would need to take the action you've identified? This answer also responds to "Are there ways you think NC should consider responding to this tension? What entity would need to take the action you've identified?"

Currently, federal and state mandates for RNG in the form of transportation fuel are creating extremely lucrative incentives for biomethane, but it is difficult for developers to get this gas to these markets. Moreover, the NC REPS has created a de facto incentive for swine and poultry biogas through the swine and poultry set asides, which requires NC utilities to generate a subpercentage of their renewable portfolio from swine and poultry waste, but compliance with the mandate remains elusive for utilities, while compliance with through other means, particularly solar, has soared, which has resulted in reduced solar prices and greater customer access.

High-level recommendations for increasing biogas' use – and enjoying the GHG benefits of doing so - include:

1. Determine the extent and location of available biogas/biomethane resources in the state across all organic waste resources to determine the percentage of NC's GHG reductions can be met with biomethane.

Note: RTI International is leading an analysis between Itself, Duke University and East Carolina University to measure available biomethane and the probabilities, based on technical and economic factors, for its development. The analysis will include determining the climate, environmental, societal, and economic effects of the use of biogas and will recommend policy measures to accelerate biomethane development, and the best uses for the gas (ie, transportation fuel, RNG/pipeline, on-site energy generation).

The analysis was recommended by the NC Energy Policy Council in its 2018 report and has been funded by Duke Energy via the REPS annual provisions for renewable research funding. The analysis is expected to be completed by June 2020.

2. Facilitate RNG transport to end users and buyers to accelerate development / accelerate GHG reductions from in-state biomethane sources.

The primary way to achieve #2 is through cooperation from local distribution companies (LDCs) and the NC Utilities Commission, which have been hesitant to give RNG access to pipelines because of concerns that RNG doesn't meet the same standards as conventional natural gas. (Analysis conducted by Duke

[10] Arguably, biogas development relates to the category of "Equitable access and just transition to clean energy". Regarding the question "*How can we ensure energy affordability and environmental justice while maintaining just and reasonable rates for all customers?",* biogas development, if properly carried out, could spur long sought-after improvements to overall animal waste management. If biogas developers could better access lucrative markets, then proceeds from the sale of gas could be used to help producers pay for additional control technologies and/or practices. In addition, through coordination with programs such as agricultural cost share (e.g., Environmental Quality Incentives Program; State Agricultural Cost Share) while payments for nutrient management could be established specifically so as to be paired with biogas development projects, which would make it possible for equipment and processes to be added to a basic digester project while adding little capital costs, thereby protecting consumers from a higher price for biogas and thus ensuring affordability and reasonable rates while enhancing environmental protections and community concerns.

University and presented to the NCUC of biogas currently being produced by an in-state swine waste anaerobic digester showed that the biomethane was equal or superior in quality as to all constituents while concerns related to thermal value can be easily remedied with cooperation from the LDC). They are also concerned that accepting RNG that will ultimately move to buyers outside the state will subject them to FERC jurisdiction, even though such arrangements can be permitted without opening the LDCs up to federal oversight). Bias regarding RNG's quality plus unfounded concerns regarding risk of FERC's oversight encroaching into state activities of LDCs has impeded the rate at which projects can be developed because developers have a great deal of difficulty securing a place to inject RNG so that their gas can be delivered to buyers. This is occurring despite the existence of technology, financing and resources to carry out projects and despite NC being sought after for biomethane, particularly biomethane derived from agricultural sources.

3. Create technical support services for biomethane development, particularly for suppliers who own the waste but are not engaged in biomethane production for their primary income.

Currently there is no centralized entity that can answer questions or provide guidance and expertise to those interested in pursuing biomethane development. At the very least, there should be staff dedicated to biomethane development within an appropriate existing executive agency and ways to collaborate with the NC Department of Agriculture and municipal leaders should be prioritized.

At best, a stakeholder group or commission empowered to oversee biogas development and related issues, such as access to pipelines, RNG standards and testing, social equity and environmental justice issues particularly related to animal waste management (which affects acceleration of biogas production), additional waste management measurers to reduce nutrients and pollutants such as ammonia associated with waste generated particularly from large feeding operations (which are significant drivers of the state's economy, particularly in rural areas), and addressing regulatory, legal and economic barriers while setting reasonable standards for development and maintenance and operation.

Such an entity would need to be comprised of experts in biomethane development and related issues and be dedicated to creating a strategy for biogas development and strategy implementation, at the collective and individual project levels. All of these steps combined would work to ease project development, reduce costs, and ultimately increase access to RNG for end users. More than anything, a cohesive strategy - and a way to efficiently and effectively oversee its implementation - must be put into place.

How are people in other places responding to this tension? What are the most innovative and promising solutions? Do they seem feasible in NC?

Biogas producers need outlets for their gas that pay them enough to make projects economically viable and they need ways to easily move the gas to those outlets. Mandates that create a price signal for RNG, such as the EPA-managed renewable fuel standard and California's Low Carbon Fuel Standard, entice project development (create the outlet or market) while cooperative regulatory structures and company policies that facilitate rather than make RNG injection harder versus conventional natural gas injection and transport must be put in place, which occurs by changing regulators' attitudes toward RNG and requiring companies to accept and transport the gas, which may require legislation or something akin to a renewable gas standard or renewable fuel standard. At bottom, RNG must be considered at least equal to natural gas and preferably superior to conventional natural gas and distribution companies must be helped to understand how they can accept RNG while improving their service to customers. Now, it appears that RNG is considered to be a detriment, therefore barriers and hurdles are raised.

ENERGY & ENVIRONMENT
INNOVATION FOUNDATION, LLC

RIVENDELL FARMS
OF THE CAROLINAS

June 24, 2019

TO: Lori Collins, NC DEQ

FROM: Chris Hardin, P.E.

SUBJECT: Technical Resources and a Few Key Points for Solar Energy on North Carolina Farms

As discussed, Rivendell Farms of the Carolinas (RFC), a 501 c (3) local food and farm support organization, and the Energy & Environment Innovation Foundation, LLC (EEIF) have compiled a list of technical resources and a few key points that we think should be added to the items that are being considered for the North Carolina Clean Energy Plan. In offering these technical resources and key points, we think it is important to identify any potential bias, preferences and a few items that may influence our ideas and opinions. These include the following:

1. **Responsible Farmland and Forest Management:** As we have researched numerous technical articles and spent time listening to farmers and citizens located in rural areas of the United States we have come to appreciate that our agriculture and food production systems are under stress. At the same time a high percentage of the solar energy production facilities (i.e. typically greater than 70 percent) are being located on farmland. There is a corresponding disconnect and/or potential problem are where land development and new neighborhoods in suburban or transition urban areas have little regard for established forests that absorb a high percentage of carbon emissions near cities and urban areas.
2. **Unplanned Farmland Management and Food Production Needs:** It has been interesting to observe that frequently farmers and those who produce our food are almost never consulted when it comes to the use of farmland for solar energy production facilities. Individual landowners have exclusive rights to the use of their land, but frequently the impact to the remaining farm areas is not considered. People located in urban areas tend to be more concerned about climate change, then farmers and food production specialist who regularly influenced with variations in rainfall, drought and other environmental impacts. See article by Scientific America on Farmers and Climate Change.
3. **Low Values of Farmland Leases for Solar Energy, and Unclear Liability for Decommissioning:** Frequently the return on investment (ROI) to the farmers offering their land for solar energy facilities is less than 15 percent of the profit that is earned each year from the sale of the electricity produced. The going rate of $600 to $800 per acre per year is very low relative to the income provided to the solar developer. This relatively low ROI is a concern: especially when responsibility for decommissioning -- if the solar facility fails or is damaged, or if the solar developer goes bankrupt – is frequently handled by the farmer or landowner.
4. **All Things in Moderation:** As a farmer that has utilized and appreciated the value of producing solar power on our farm, it seems that the best and most sustainable solar power facilities that preserve the farmland and provide good value to the farmer are: a) spaced out sufficiently to allow dual use of the farmland, and to preserve the farming tax credit, b) often owned and/or co-owned by the farmer or land owner, so that the value and usefulness of the farmland is maintained, and c) provided to a farmer and/or landowner that has read and understood the financial and legal implications of having small to medium-sized solar energy production on their property.

5. **Avoiding Reliance on Energy Models and Competing Estimate is Important** Since the Clean Energy Plan Workshop No. 5 was held on May 22, 2019 we had a opportunity to review the findings and conclusions of several of the models that were presented. Several of these models questioned or corrected the information in the IRP developed by Duke Energy. To be honest many of these models seemed to be based on "best case" scenarios and/or confused peak versus average production from renewable energy. We noticed that several of the models relied heavily on energy imports from neighboring states that would effectively transfer our carbon producing problems to other states. At the same time there were several good ideas and key points identified in the models, but as mentioned by Sushma Masemore at the Workshop No. 5 it is important to recognize that all analytical models have "errors" and bias that must be taken into consideration.

It seems important to note that several respected agriculture and solar energy experts have expressed the same key points in various articles and technical resources included on NC State University's web page of technical resources on solar energy and land use**. Our concern as energy and environmental professionals that also work in farming is that the farmers and rural electric cooperatives seem to have limited input and influence on North Carolinas Clean Energy Plan.** It would be great to see the North Carolina Agriculture Department and NC State professionals a little more directly involved in the Clean Energy Plan development process.

Technical Resources and Precedent Setting Projects:

We found that some of the best and most useful technical resources for promoting a balanced and/or common sense use of solar power were available from NC State University.

https://craven.ces.ncsu.edu/considerations-for-transferring-agricultural-land-to-solar-panel-energy-production/

Some of the best ways to increase renewable, solar energy at the source, and/or to decrease the need for more electric power are provided in the following link.

https://energy.ces.ncsu.edu/incentives-rebates-and-programs/

Listening to what most farmers think about climate change is important. Suggestion: Change the debate about "climate change" to consider the best and most efficient way to use land and protect the environment.

https://www.scientificamerican.com/article/what-do-farmers-think-about-climate-change/

https://www.agweb.com/article/study-farmers-and-scientists-divided-over-climate-change-university-news-release/

https://journals.ametsoc.org/doi/full/10.1175/WCAS-D-16-0110.1

https://www.nytimes.com/2017/01/28/business/energy-environment/navigating-climate-change-in-americas-heartland.html

Practical ways to increase the implementation and use of solar energy on farms. Suggestion: North Carolina really needs more farmers to install solar energy production facilities to meet its clean energy goals. How about a land use and solar energy benefits education and incentive program?

https://content.ces.ncsu.edu/threshold-issues-for-landowner-solar-leasing

It may be good to get input form Dr. Herbert Eckerlin of NC State and Gus Simmons about farm-based power.

N.C. State University professor Herbert Eckerlin says the sunny stories of solar energy's economic benefits are wildly exaggerated, while the higher costs and technological challenges are deliberately downplayed.

"Due to solar power, the cost of electricity is going to increase for industry and residential" customers, hindering job creation, said Eckerlin, who described himself to the council as "a strong proponent of solar and renewable energy."

Eckerlin, a former official with Dominion Power in Virginia, designed and built the NCSU Solar House on the N.C. State campus, founded the North Carolina Solar Center, and is a member and former treasurer of the North Carolina Sustainable Energy Association, the statewide marketing arm of the renewable industry.

https://www.carolinajournal.com/news-article/n-c-state-prof-casts-shadows-on-solar-meeting/

Property taxes for solar production facilities on farms are something that needs to be addressed. Farmers can and will lose their agriculture tax credit if a high density solar energy production facility is installed on their land.

https://nccleantech.ncsu.edu/wp-content/uploads/2018/10/Balancing-Ag-and-Solar-final-version-update.pdf

https://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2015/06/Property-Taxes-and-Solar-PV-Systems-Policies-Practices-and-Issues.pdf

Several excellent, middle ground and win-win projects: Parking lots and agriculture solar production projects.

https://energynews.us/2017/08/28/southeast/farmers-experts-solar-and-agriculture-complementary-not-competing-in-north-carolina/

https://www.sunraisedfarms.com/home

https://news.energysage.com/solar-canopy-installations-bring-shade-clean-energy-parking-lot/

Community based solar with NC Electric Cooperatives – We need to do a LOT more of these solar projects.

https://www.ncelectriccooperatives.com/innovation/community-solar/

https://www.ncelectriccooperatives.com/energy-innovation/solar-storage/

Summary and Conclusions:

EEIF and Rivendell Farms of the Carolinas recommend a few key items going forward:

- **Conduct a combined farmland use and solar/renewable energy storage GIS mapping study** to optimize the use and sustainability of farms, forests and solar production in North Carolina. EEIF and Rivendell Farms can work with the NC DEQ, NC State and possibly UNC Charlotte on this project.
- **Get key stakeholders in the NC Department of Agriculture and key agricultural counties involved** in the Clean Energy Plan development process. Consider changing the conversation to best valuable and a sustainable approach to land use and environmental protection.
- **Promote and provide financial incentives for the work of the North Carolina Electric Cooperatives** to build several large community-based solar projects. They know how to negotiate with Duke Energy and can develop polices that keep the grid resilient, keep corporate profits in check, and reduce carbon emissions.
- **Expand and increase the meetings of the North Carolina Energy Policy Council** so that it acts more like the South Carolina Energy Office. Include more agricultural and rural counties on the NC Energy Office of Policy Council. North Carolinas Energy Office and upgraded Energy Policy Council could address a lot of problems and streamline the Clean Energy Plan process. **BTW – I can assist with these key topics.**
- **Find better and lower cost ways to pay for coal ash cleanups.** It may be reasonable to include some of the issues with the coal ash cleanup conflict between Duke Energy and the NC DEQ under a new and upgraded NC Energy Office. Less conflicts means expending more effort on working together, and discovering more cost effective energy decisions for the citizens of North Carolina. Right now we are headed for very expensive coal ash cleanups that will limit investment in solar power and renewable energy.

July 31, 2019

Dear Secretary Regan,

Thank you for your leadership on climate action. Executive Order 80's Clean Energy Plan is an important step in accelerating North Carolina's progress toward a clean, just energy system. In support of your efforts, the undersigned submit the following policy options for your consideration to ensure that the recommendations of the Clean Energy Plan are immediately actionable and put North Carolina on a path for a just transition to deep decarbonization.

As the 2018 Special Report on Global Warming by the Intergovernmental Panel on Climate Change showed last fall, the world will need to achieve decarbonization on the order of halving carbon emissions from 2017 levels by 2030 and achieving carbon neutrality by 2050 in order to even attempt to keep warming below 1.5 degrees Celsius.[1] We emphasize our support for the following tools which, having arisen out of the Clean Energy Plan process under EO80, offer the best hope of achieving those goals:

1. Recommend **additional carbon emission reduction goals from the electrical use sector** of 67% from 2005 levels by 2030, 85% by 2040, and carbon neutrality by 2050.[2]

2. Establish a **declining carbon emissions cap** to incentivize flexible and cost-effective reduction opportunities, starting no later than 2021. Such a cap should achieve reduction consistent with meeting the statewide 2025 goals, and be protective enough to put the state on track for complete

[1] IPCC. "Summary for Policymakers of IPCC Special Report on Global Warming of 1.5 °C Approved by Governments." https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

[2] The 2018 IPCC report recommendation that emissions must be reduced 49% from 2017 levels, or 25.774 MMT CO2e, equal to 32.47% of North Carolina's 2005 electricity use emissions.

decarbonization by mid-century. North Carolina should design the policy to allow for emission allowance trading and explore participation in the Regional Greenhouse Gas Initiative.

3. Recommend the adoption of **Performance Based Ratemaking** using metrics that incentivize regulated utilities to reduce greenhouse gas emissions.

4. Recommend the establishment of a stand-alone **energy efficiency resource standard** that ramps up to 2.0% of retail sales in new energy efficiency savings annually by 2030.

We look forward to working with other stakeholders and the Administration on the finalization and implementation of the Clean Energy Plan in the months to come.

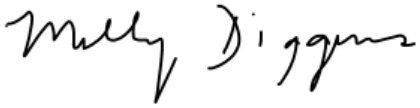
Sincerely,

Derb Carter, Southern Environmental Law Center

Hawley Truax, Environmental Defense Fund

Luis Martinez, Natural Resources Defense Council

Brian Buzby, North Carolina Conservation Network



Molly Diggins, Sierra Club North Carolina

Carrie Clark, NC League of Conservation Voters

NCCEBA
REPRESENTING CLEAN ENERGY BUSINESSES

July 26, 2019

Secretary Michael Regan
North Carolina Department of Environmental Quality
217 West Jones Street
Raleigh, NC 27603

RE: Utility and Regulatory Reform Needed to Transition to a Clean Energy Economy

Dear Secretary Regan:

The North Carolina Clean Energy Business Alliance (NCCEBA) believes it is in the best interest of North Carolina's ratepayers and the climate to create a new energy policy that empowers market forces to drive innovation, clean energy, and lower costs. North Carolina has a unique position in the nacent energy transition because renewables are now the lowest cost source for electricity and we are a national leader. In addition, Duke Energy is the number one CO2 emitter of green house gases and operates both the most coal generation and the least economic coal power in the United States. Our collective efforts can clean up our energy and make our state more economically competitive and ultimately carbon neutral.

As you know, independent power producers and buyers now represented by NCCEBA have worked in good faith worked with Duke Energy over the last 10 years to advance the transition to clean energy. Our initial success has brought $12 billion in investment and

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$10 million annualy in new property taxes to rural NC and 6% of the electricity sold in NC is now solar generated. With that success has come increasing push back from North Carolina's incumbent utilities.

Over the past five years, NCCEBA has been involved in long and difficult negotiations with Duke Energy that have at times have resulted in agreements to work together. However, each time we think we have made progress, Duke has walked away from the agreements and instead pressed harder against renewables in all forums: Through the General Assembly, Utilities Commission, and advertising, to maintain control, fight changes and mislead the public. Duke Energy's track record demonstrates that significant utility reform is essential to making the transition to clean energy in NC.

Vertically integrated electric utility monopolies served North Carolina well in the mid-20th century, but this model is now a liability to customers, taxpayers, and to our state's long term economic and environmental health. Current utility incentives (rate making and approved return on capital) were appropriate for building centralized generation and the electric grid. In the current, rapidly changing market these dated incentives lead to expensive and oversized generation, cumbersome regulations, and shifting costs as well as risks to customers by rewarding monopolies for spending as much capital as possible.

NCCEBA's Proposed Guiding Principles for Utility Reform

1. Create a competitive market for generation.
2. Reducing carbon must be added to lowest cost standards for the NC Public Staff and NC Utilities Commission in approving generation additions and retirements
3. Respond to Customer demand for clean energy.
4. All forms of compensation and transparent electric system data should give price signals that foster open markets and innovation

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NCCEBA's Proposed Short Term Policy Priorities for Utility Reform (1-2 years)

(Significant implementation by the NCUC with direction from the Governor)

1. Wholesale Competition
   Move to competition in the wholesale energy markets in steps beginning with a study and establishing best practices for managed wholesale energy competition.

2. Planning & Price Signals
   a. Rates - The NCUC should study and encourage dynamic pricing (time of use, real time or peak pricing) to create more efficient markets, spur energy efficiency and encourage energy storage.
   b. Integrated Resource Planning – Make the planning process transparent and open to all parties. Give the NCUC its own resources to model and evaluate proposals. Evaluate and reward performance and recognize the difficulty of making long lived, 30 plus year decisions in this era of rapidly changing technology and pricing.
   c. Contract Standards – NCUC should approve standard, long term, financeable contracts to encourage private investment.
   d. Grid Modernization – The grid should support and not limit the addition of clean resources especially in eastern NC and increase reliability.

3. Encourage Decentralized, Clean Energy Options for EV Charging and Energy Storage and Prohibit Control by Incumbent Utilities
   a. Electric vehicles fueled by coal energy will hurt rather than help meet North Carolina's carbon reduction goals. Existing solar sites are well distributed throughout NC and can provide EV charging. Currently, Interconnection red tape imposed by monopoly utilities make this very difficult.
   b. Many private companies want to provide EV charging at no cost or risk to rate payers.

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4. Performance Based Rate Making - Change rate making criteria from "revenue model/return on capital" to rates set for efficient operations and accomplishing energy policy goals such as the folliwing:
    a. Add many more distributed energy resources (DERs). Offer Duke Energy increased return for utilization of existing infrastructure (substations, lines, transformers, voltage regulation systems etc.). This could mitgate the pass through/no profit disincentive that is presently causing Duke to limit privately owned generation and investment. This incentive could also take the form of additional grid investments that resulted in more DER interconnections and an improved "Grid Forward" plan.
    b. Add storage to new and existing DER power plants. This would provide energy when the grid needs it using private investment and less risk and offset the need for spinning reserves and future capital investment. Storage additions require reasonable compensation and interconnection rules.
    c. Improve grid management to make the grid bi-directional and able to integrate many more DERs instead of new charges such as the proposed 'solar integration charge'.
    d. Increase interconnection of DERs and reducing the time. Timely and cost-effective review of interconnection and completion of interconnection when facility is complete.
    e. Focus distribution and transmission upgrades to integrate more DERs and facilitate energy movement from clean energy resource rich eastern NC and offshore to the load centers of piedmont and western NC.
    f. Add compensation for new grid services such as peak shaving, voltage regulation, VAR supply, demand side management.

5. Code of Conduct & Independent Resources for Utilities and Regulators

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As private investment in the grid/generation increases there needs to be a set of principles regulating how all parties compete and address conflict of interest issues to ensure a fair and open market. Currently, this is not in NCUC purview and so much is done on good faith. Duke Energy is often not a good faith partner.

For utilities, this code should include:

a. Much more access to information (less use of confidentiality by utilities) and transparency
b. Good faith effort to work with customers (including buyers and producers)
c. Non-discriminatory approach to all customers.
d. Non-disclosure of proprietary info of customers.
e. Arms length relationship with affiliates, no preferential treatment

For regulators, this code should include:

a. Revolving door regulations prohibiting members and staff of the NC Utilities Commission and the NC Public Staff from going to work for a utility or any businesses they have been regulating for at least two years.
b. Gift Laws: The same rules on accepting gifts as the NC General Assembly.

Long Term Reforms (3-5 years)

(Implementation by the General Assembly and the Governor)

1. Market Competition for Generation - Open the NC wholesale generation market to competition to spur private investments, reliability, innovation and lower prices. This change would leave grid ownership, investments and operations and maintenance with a monopoly and could create a new NC competitive generation company of Duke Energy's current generation assets.
2. Transmission Open Access aka a Regional Transmission Organization (RTO) - Provide unbiased, impartially regulated access to the transmission system preferably multi state.

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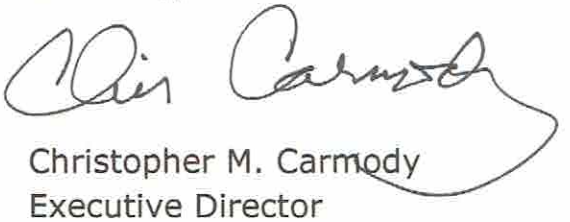
3. Consumer Choice - Consider giving electric and natural gas customers consumer choice of their electric and/or gas providers.

NCCEBA recognizes that changing energy policy and utility reform is a complex process that will only take place from actions and laws made by the Governor and the General Assembly. We fully support your administration's work on reforming energy policy Executive Order 80 and have participated in the stakeholder meetings and at multiple venues at the General Assembly and the North Carolina Utilities Commission.

While the conversation on utility reform is just beginning, we believe 2019-2020 needs to immediately work on providing a bridge to a greatly reformed electric energy market. Our state cannot stand still, and must make some short term decisions about investment and energy policy now.

Our members are grateful for the Governor's leadership and stand ready to support a transition to a clean, economically competitive energy economy.

Sincerely,



Christopher M. Carmody
Executive Director

Cc: Sushma Masemore, Deputy Assistant Secretary for Env. & State Energy Director
Ken Eudy, Senior Advisor
Jeremy Tarr, Policy Advisor for Environment, Energy, and Transportation

811 Ninth Street, Suite 120-158 // Durham, NC // 27705

NC SUSTAINABLE
ENERGY ASSOCIATION

August 6, 2019

Sushma Masemore
Deputy Assistant Secretary for Environment & State Energy Director
N.C. Department of Environmental Quality
217 West Jones Street
Raleigh, NC 27603

Dear Deputy Secretary Masemore,

The North Carolina Sustainable Energy Association (NCSEA) appreciates the Department of Environmental Quality's good work on the development of the North Carolina Clean Energy Plan (CEP). Executive Order 80 (EO 80) provides an avenue for North Carolina to take a necessary step forward to implement modern and sustainable policies in the best interest of this state.

The evidence shows that affordable energy bills for North Carolinians will require a cleaner and more universally accessible energy system. Unfortunately, there are long-held barriers to this transition intrinsic to North Carolina's energy policy. NCSEA believes that the best chance to implement clean energy is through comprehensive regulatory reform, which will realign value propositions for the utilities, the state's administrative offices, stakeholders, and North Carolinians. This sort of regulatory reform requires both immediate and long-term changes in order to be successful.

The regulated utility business model serving North Carolinians is falling further behind the state's potential for delivering clean, affordable, and accessible electricity. In fact, this business model no longer delivers least cost electricity. NCSEA believes the following options will align the interests of regulated utilities serving North Carolina, their diverse ratepayers, and businesses offering affordable options and services to both utilities and consumers.

These reforms reach beyond just a cleaner energy portfolio in the future. Without meaningful reforms to utility incentives, regulations, and business models, we fear that North Carolina may squander its opportunity to maintain nationally competitive electricity rates and more affordable bills for all consumers. The stakes in meeting this challenge are high. RTI International recently conducted an independent analysis that found clean energy investments in North Carolina had a total economic impact of $28.2 billion from 2007 to 2018. These clean energy investments have made significant contributions to those local economies and tax base. NCSEA recently examined tax records in 50 counties across the state and found that the properties with solar facilities paid almost $10.6 million in property taxes in the year after development compared to $513 thousand in the year prior; a nearly 2,000 percent increase. In fact, NCSEA is happy provide many more data points which outline how clean energy has already and will continue to enable North Carolina to avoid paying billions of dollars in costs associated with traditional generation sources. The economic case is coming clear.

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Last year, NCSEA convened a cross section of stakeholders to identify emerging issues, challenges, and opportunities across the energy landscape in North Carolina. That group aligned on the following principles to inform a shared energy vision for North Carolina:

1. Urgently establish an energy system that enables a healthy and sustainable environment and quality of life for current and future generations.
2. North Carolina's energy system should be sufficiently flexible to accommodate evolving energy trends, technologies and practices.
3. Ensure that energy system planning is transparent, comprehensive, and integrated.
4. Citizens and stakeholders have a voice and influence over energy decisions.
5. Ensure clean energy is accessible and affordable for all North Carolinians.
6. Ensure North Carolina's energy economy promotes economic prosperity for all.

In short, the barriers are systemic. The solutions need to be systemic and encompass the energy vision for North Carolina. To that end, NCSEA offers the following recommendations for the North Carolina CEP.

NCSEA has concluded that the CEP should prioritize at least two fundamental recommendations: (1) reforming the North Carolina energy business model and (2) reforming the North Carolina energy planning process.

1. Reform North Carolina's Energy Business Model

NCSEA believes that the utility business model must be reformed to allow for the utilities' respective business models to align with the clean energy interests in the state. This can be achieved starting with two initial steps.

a. *Electric Decoupling*

Decoupling is a regulatory mechanism that can work to make a utility indifferent financially whether sales of electricity are rising or falling. Simply put – decoupling takes the financial incentive of selling more electricity out of the electric utility's business model. NCSEA believes it is in North Carolina's interest to decouple the regulated electric utilities in this state, which North Carolina has already done with its natural gas utility. Nationally, as of 2018, 32 states utilize decoupling for their utilities, including 17 states which specifically decouple electric utility sales. NCSEA believes the initial step toward meaningful reform is removing the financial incentives in the electric utility business model which are counterintuitive to increased clean, resilient, affordable energy and reducing carbon costs statewide.

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b. *Performance-Based Regulation*

If the first step towards a clean energy future is untangling energy sales from the utility business model, then the second step is incenting clean energy measures. The Synapse Study, provided as part of an alternative scenario to Duke's integrated resource plan (IRP) process in the most recent IRP docket and outlined more fully below, proves that clean energy is the least cost option. What are the roadblocks to that least-cost clean energy pathway? The long-held barriers intrinsic to the utility business model which reward outdated investments tied to coal or natural gas generation.

NCSEA believes that a utility that provides least-cost, resilient, clean energy should be rewarded accordingly. Therefore, we propose that the CEP specifically allow for a new performance-based regulation subplan wherein the stakeholders in this state will come together to determine performance goals for the state's utilities, including (but not limited to) clean energy performance goals. To be clear - NCSEA is not requesting for the abolishment of cost-of-service based ratemaking, but rather a simple enhancement to the structure to reflect current needs and goals. NCSEA believes the utilities should seek to implement clean energy pathways wherever possible and adding the financial incentive will increase the likelihood of those pathways being created.

2. **Reform North Carolina's Energy Planning**

The existing energy planning paradigm is no longer meeting the needs of North Carolinians as shown in the utilities' recent IRPs. Unfortunately, these IRPs reflect the intentions of utilities that seem to still be planning for the electricity system of the past. North Carolina needs comprehensive reform for this process.

As an example of how clean energy can be utilized for the least cost option while also modernizing the utility planning process to incorporate clean and resilient energy - in contrast to the Duke Energy IRPs, NCSEA worked with Synapse Energy Economics to create a 15-year "Clean Energy Scenario" for the Duke Energy utilities in North Carolina that is almost 30% less costly to operate, produces roughly 30% less greenhouse gas (GHG) emissions while being more than twice as clean through renewables, storage, and efficiency than the energy portfolio outlined in the Duke Energy IRPs. While the Synapse Study provided a better alternative scenario to consider, the IRP process as currently implemented does not reward the utilities for progressive clean energy plans or for integrated distribution planning nor does it hold the utilities accountable for failing to hit benchmarks.

The current IRP rules and processes in North Carolina have resulted in IRPs that undervalue the clean energy and cost saving opportunities of distributed energy resources (DERs). NCSEA believes that integrated distribution planning (IDP) is a critical, and currently missing component of North Carolina's traditional IRP process and should be integrated into the CEP.

3. **"Low Hanging Fruit"**

NCSEA's prescriptive changes are systemic and will take time and considerable effort to enact, though we believe that such comprehensive reform is necessary to kickstart North Carolina's clean energy landscape. NCSEA, however, also believes a number of the current proposals in the EO 80 stakeholder group are worthwhile short-term goals to enhance current programs and, if implemented correctly, could also be incorporated into the regulatory reform outlined above:

- NCSEA supports the expansion of the solar rebate program and believes that rebates could be expanded to solar+storage projects which provide further benefits to the grid.
- NCSEA supports the proposal to start a "Green Bank" or revolving fund to allow for non-profits and government entities to utilize clean energy assets and technologies which are not feasible in the current market structure.
- NCSEA supports Distributed Energy Resources and accountability with regard to grid modernization to incorporate new clean energy assets on the grid.

Additionally, NCSEA is supportive of a large amount of the other proposals that have come through the EO 80 stakeholder process. At this point, however, we think it is in North Carolina's best interests to begin the process of comprehensive reform as outlined above. This will materially change the North Carolina energy structure to reflect not only customer needs and requirements through aligning the interests of the utilities, the customers, and the state as a whole.

Sincerely,

Ivan Urlaub
Executive Director
North Carolina Sustainable Energy Association

CC: Michael Regan, Secretary
North Carolina Department of Environmental Quality

4800 Six Forks Rd., Suite 300 | Raleigh, NC 27609 | 919-832-7601 | energync.org

July 31, 2019

Sushma Masemore, P.E.
Deputy Assistant Secretary for Environment
State Energy Director
N.C. Department of Environmental Quality
sushma.masemore@ncdenr.gov

Dear Sushma:

Thank you for the extensive opportunities to contribute to the state's Clean Energy Plan (CEP). In particular, we appreciate that you are open to receiving input outside of the stakeholder process, and we would like to take the opportunity to provide some.

The undersigned participants in the stakeholder process are all involved with NC WARN's Clean Path 2025 work which, as you know, asserts that fossil fuels can be swiftly replaced in the NC electricity sector with local solar, energy storage, and ramped-up energy efficiency and demand response programs.

We are disappointed that the stakeholder process did not directly address this analysis that we provided to you,[1] and we hope that the conclusions drawn therein will at least lend support to your efforts to make ambitious recommendations in the CEP.

Here are some basic principles that we hold and hope that the CEP will advance:

1) The climate situation is an emergency, and any plan to address an emergency should do what is needed, not merely what has been deemed possible in non-emergency times.
2) Climate scientists should define what is needed.
3) When you are stuck in a hole, the first thing to do is stop digging.

Policy implications of the above principles

<u>The emissions reduction target must be based in science</u>

Stakeholder processes should be open to all, but the final word on policy needs to come from those who have the expertise required and do not have a financial interest in the outcome.

The world's scientists, in the form of the Intergovernmental Panel on Climate Change, have already told us that we must reduce emissions 45% by 2030 and 100% by 2050 to stay below a safe level of 1.5 degrees C of warming.[2] The emissions that must be reduced include emissions of methane, including emissions from production and compressors used along pipelines. Anything less does not address the problem. No stakeholder process can change that.

Crucially, the final selection of means for achieving any target must be determined by experts with detailed knowledge of utility operations but no financial stake in the outcome. The input of the utilities

[1] Powers, B. *North Carolina Clean Path 2025: Achieving an Economical Clean Energy Future*, NC WARN, August 2017, https://www.ncwarn.org/wp-content/uploads/NC-CLEAN-PATH-2025-FINAL-8-9-17.pdf.
[2] IPCC, *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, October 2018, https://www.ipcc.ch/sr15/.

should not be weighed more heavily than that of other stakeholders. In the process of implementation by the NC Utilities Commission (NCUC), the utilities will have an opportunity to intervene and make suggestions on the details of each program.

New natural gas infrastructure is incompatible with climate goals

Although E080 only specifies a 2025 emissions reduction goal (40% below 2005 levels), if the CEP wants to meaningfully address climate risk, it must look forward to 2050, and must provide a pathway for NC to get to zero net emissions by 2050. We cannot get there if we build gas plants in the 2020s that have a useful life of 30 years or more. For this reason, and additional reasons detailed below, the CEP should recommend placing a permanent moratorium on new gas-fired power plants, strengthening our state's renewable energy portfolio standard (REPS), and ratcheting the REPS up over time.

New gas would exacerbate the problem of uneconomic stranded assets

There is too much economic risk associated with a commitment to new gas infrastructure. A recent op-ed in *Forbes* warns that "falling renewables and storage costs may render [natural gas assets] uneconomic within a few years" and concludes: "New natural gas is extremely risky in this context, and regulators would be wise to question its prudence."[3]

Instead, we must figure out a plan to decommission existing fossil fuel plants and make a big shift to renewables, storage and demand reduction, since existing plants already put us over safe climate limits, as reported in a forthcoming paper in *Nature*.[4]

Utility planning should account for the changing economics of natural gas vs. renewable energy

Chapter 62 of the North Carolina Public Utilities Act mandates that the NCUC require utility service that is "least-cost" for all customers, and that rates should include long-term management of energy resources to avoid "wasteful, uneconomic and inefficient uses of energy." Specifically, it says the policy of the state should be:

> (3) To promote adequate, reliable and economical utility service to all of the citizens and residents of the State;
>
> (3a) ...to require energy planning and fixing of rates in a manner to result in the least cost mix of generation and demand-reduction measures which is achievable, including consideration of appropriate rewards to utilities for efficiency and conservation which decrease utility bills;
>
> (4) To provide just and reasonable rates and charges for public utility services... consistent with long-term management and conservation of energy resources by avoiding wasteful, uneconomic and inefficient uses of energy;

[3] O'Boyle, M. "Cheap Clean Energy Makes New Natural Gas A Risky Bet Utility Regulators Should Avoid," *Forbes*, July 10, 2019, https://www.forbes.com/sites/energyinnovation/2019/07/10/utility-regulators-should-avoid-risky-bets-on-new-natural-gas/.

[4] Leahy, S. "We have too many fossil-fuel power plants to meet climate goals," *National Geographic*, July 1, 2019, https://www.nationalgeographic.com/environment/2019/07/ we-have-too-many-fossil-fuel-power-plants-to-meet-climate-goals/ (with link to pre-publication PDF of Tong, D. et al., "Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target," *Nature,* forthcoming).

(4a) To assure that facilities necessary to meet future growth can be financed by the utilities operating in this State on terms which are reasonable and fair to both the customers and existing investors of such utilities…

The CEP must explicitly address these requirements in light of disruption in the energy landscape. Already two different in-depth independent analyses have separately concluded that plans including significant renewable energy – NOT new natural gas construction – would provide least-cost energy to NC customers statewide.[5] Duke Energy acknowledges that modeling for its Integrated Resource Plan (IRP) currently does not fully incorporate the value of renewable and distributed energy and energy storage.[6] This is unacceptable. The only way to meet the mandate that utility service be "least-cost" for all customers is for the NCUC to require Duke's IRP to fully consider renewable and distributed energy and energy storage resources.

Requiring Duke Energy to move more quickly toward the energy of the 21st century also will decrease the likelihood that its natural gas plants will become uneconomic stranded assets, which is likely to happen sooner than Duke Energy may claim. As Rocky Mountain Institute (RMI) notes: "the *new-build* costs of clean energy portfolios are falling quickly, and likely to beat just the *operating* costs of efficient gas-fired power plants within the next two decades."[7]

In addition, with regard to natural gas peaker plants, Bloomberg New Energy Finance projects that solar combined with storage will be less expensive than gas peakers throughout the US by 2023, as illustrated by the graph below.[8]

Other states are showing that moving more rapidly toward renewable generation is not only a necessity for retaining a livable climate, but is also an economic and employment boon. States around the country -- including Virginia -- are questioning the need for new natural gas infrastructure and finding that renewable energy and storage are more economic in the long term.[9]

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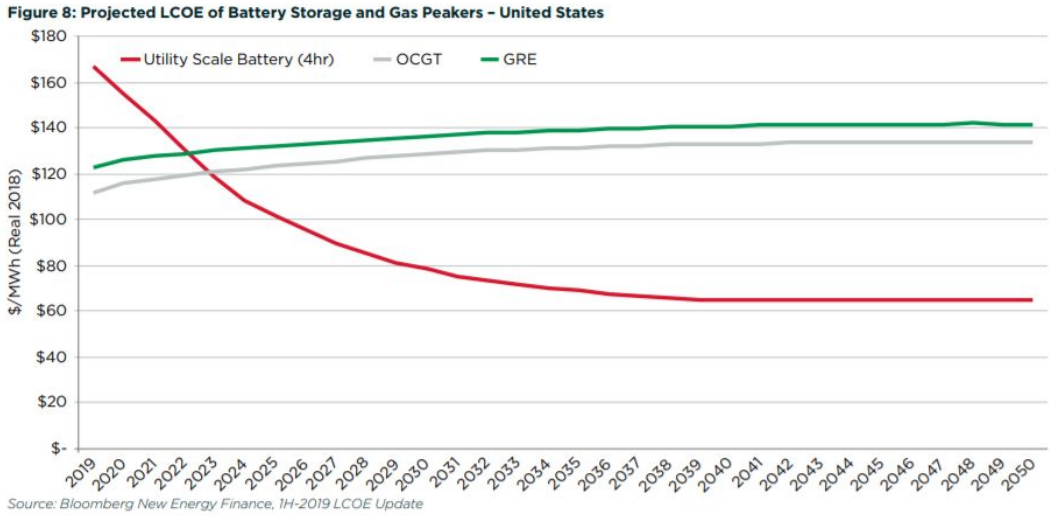
[5] Powers, *Op. cit.*, and Attachment 1 to NCSEA's Initial Comments on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Integrated Resource Plans, Docket E-100 Sub 157, March 7, 2019, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=891ac0cc-7aa9-4835-aed2-b15e9b5713e6, Attachment 1.

[6] NCSEA's Initial Comments on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Integrated Resource Plans, Docket E-100 Sub 157, March 7, 2019, p. 7, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=891ac0cc-7aa9-4835-aed2-b15e9b5713e6 .

[7] Dyson, M., et al. *The Economics of Clean Energy Portfolios*, Rocky Mountain Institute, 2018, https://rmi.org/insight/the-economics-of-clean-energy-portfolios/ and Roberts, D., "Clean energy is catching up to natural gas," *Vox*, Oct. 26, 2018, https://www.vox.com/energy-and-environment/2018/7/13/17551878/natural-gas-markets-renewable-energy.

[8] Stockman, L., et al. Burning the Gas "Bridge Fuel" Myth: Why Gas is Not Clean, Cheap, or Necessary," Oil Change International, May 2019, http://priceofoil.org/content/uploads/2019/05/gasBridgeMyth_web-FINAL.pdf (original behind paywall here: https://about.bnef.com/new-energy-outlook/).

[9] Saha, D. "Natural Gas Beat Coal in the US. Will Renewables and Storage Soon Beat Natural Gas?," World Resources Institute, July 8, 2019, https://www.wri.org/blog/2019/07/natural-gas-beat-coal-us-will-renewables-and-storage-soon-beat-natural-gas.



Significant effort has been devoted to assessing the clean energy pathways for NC. Both the North Carolina Clean Path 2025[10] and Synapse[11] plans reveal substantial cost advantages to transitioning from fossil fuel-based generation to solar with storage. And, whereas utilities are insistent that integration of renewable power on the grid will require extensive investment in the grid and in backup fossil fuel generation, the Clean Path 2025 plan concludes that far higher levels of renewables, when accompanied by affordable amounts of storage and (now, almost standard) smart inverters, can be incorporated reliably with modest upgrades in electronics.[12]

Energy efficiency and demand response programs, if properly implemented, are low-hanging fruit for rapid reduction of both electricity consumption and peak demand

The CEP should include some easily and quickly achievable goals that can generate emissions reductions and bolster stakeholder confidence that their work was not in vain. Apart from new renewable generation and storage, the obvious candidates are energy efficiency (EE) and demand response (DR).

The stakeholder process has yielded a chorus of voices in favor of implementing substantial EE programs. The Energy Efficiency Roadmap[13] includes a suggested target of 10% by 2030 for regions serviced by investor owned utilities (IOUs), which represents a substantial EE commitment, and is paired with a comparably sized demand response recommendation. However, increasing the EE savings rate from 0.62% per year to 2% per year could reduce our electricity consumption by 20% in ten years through replacement of high-emission equipment, as required by our climate situation.[14] A number of other states

[10] Powers, B. *Op cit.,* pp. 64-75.
[11] Wilson, R, et al, *North Carolina's Clean Energy Future: An Alternative to Duke's Integrated Resource Plan,* Synapse Energy Economics for NC Sustainable Energy Association, March 2019. https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=891ac0cc-7aa9-4835-aed2-b15e9b5713e6
[12] Powers, B. *Op cit.*, pp. 64-75.
[13] Clean Energy Plan, Supporting Basis Part IV
[14] Powers, B. *Op. cit.*, p. 76.

including Massachusetts[15] and Rhode Island[16] have committed already to annual consumption reductions from EE measures of 2% or more.

Both building and equipment EE upgrades not only are effective at reducing consumption, but also are well understood to pay for themselves. The primary barriers to implementing EE with high participation are capital access, lack of consumer knowledge, and lack of motivation. The stakeholder process has identified numerous approaches to facilitating capital access and the EE Roadmap has honed in on mechanisms for supplying capital that build on existing infrastructure or have been implemented already elsewhere.[17] A key component is the implementation of on-bill financing, which allows customers to cover costs out of energy savings and facilitates equitable access to building and equipment upgrades. Utilities are well equipped to facilitate EE by providing knowledgeable, case-specific, solution selection and implementation.[18] Programs that pass significant savings back to consumers are key to improving consumer motivation.

Energy efficiency-driven consumption reductions have the potential not only to reduce overall electricity consumption by 20% in 10 years, but also to reduce both summer and winter peak demand by 30-35%.[19] These large reduction potentials follow from the dominance of cooling and heating in seasonal loads. If indeed North Carolina is now a winter peak state, as stated by the dominant electric utility,[20] then an appropriate place to begin the EE campaign is with replacement of inefficient electric heating systems.[21]

To accomplish a substantial EE savings rate, however, the CEP must establish a path for addressing the broadly identified issue of utility motivation. The EE Roadmap calls for an energy efficiency resource standard (EERS), which, like a renewable energy portfolio standard (REPS) with a mandatory EE component, would address utility reluctance to reduce consumption by establishing a mandate. However, the CEP needs to call for an aggressive EE savings rate, such as the above-mentioned 2% annual increment. Pending legislative action enabling implementation of an EERS, the CEP needs to direct the NCUC to implement a savings-funded EE payment mechanism and to promote all possible mechanisms for rapidly enabling access to capital.

Importantly, to stem the drive toward more fossil fuel infrastructure, we must pay attention not only to overall consumption, but also to mechanisms specifically addressing demand peaks. Demand response has been identified by the Federal Energy Regulatory Commission as having a particularly high potential to reduce peak load in the Southeast.[22] In North Carolina, where both air conditioning and electric heating contribute substantially to seasonal peak load and current levels of demand response are low, inexpensive HVAC control is identified as offering a 15 to 20% reduction in both summer and winter peak

[15] Massachusetts 2019-2021 Energy Efficiency Plan Term Sheet, http://ma-eeac.org/wordpress/wp-content/uploads/Term-Sheet-10-19-18-Final.pdf.
[16] ACEEE 2016 Scorecard, Rhode Island, http://database.aceee.org/state/rhode-island.
[17] Clean Energy Plan, Supporting Basis Part IV
[18] Fox-Penner, P. *Smart Power: Climate Change, The Smart Grid, and the Future of Electric Utilities*, Island Press, 2014, pp. 152-153.
[19] Powers, B. *Op cit.,* p. 77.
[20] Duke Energy Carolinas, 2018 Integrated Resource Plan, p.8, accessed July 29, 2019, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=aa9862b5-5e31-4b3f-bb26-c8a12c85c658.
[21] Powers, B. *Op cit.,* p.76.
[22] FERC, *A National Assessment of Demand Response Potential*, June 2009, https://ferc.gov/legal/staff-reports/06-09-demand-response.pdf.

loads if implemented to achieve a high participation rate.[23] High participation is achievable through opt-out programs that provide *compensation at a level reflective of the costs of peak generation*.[24]

The Clean Path 2025 report shows that compensation reflective of new peak generation savings are an order of magnitude larger than credits currently provided by the utilities.[25] Proper compensation enables high participation without requiring critical peak or dynamic pricing. Given that solar with storage has less potential to reduce winter net peak loads than summer net peak loads, the Clean Path plan identifies emergency heat strip control as the most appropriate high-impact initial DR program. Given that Duke Energy has not yet implemented an emergency heat strip program in Duke Energy Carolinas (DEC) territory at all, despite the existence of an ongoing program in Duke Energy Progress territory, a properly compensated heat strip program in DEC territory would be an appropriate requirement for the NCUC to impose immediately.

Overall, these plans provide achievable, clean energy solutions that can be rapidly deployed.

Barriers to demand- and supply-side solutions must be removed

What are the barriers to implementing these solutions now? Currently, the barriers derive from practices and institutions designed to meet historic rather than contemporary goals. Specifically, existing practices and institutions were designed for a power system that assigned large benefits to generating power in very large power plants and as such, required a mechanism to ensure that significant capital could be raised at low rates. In the prior context, good planning did not require consideration of a broad and evolving set of options. In the new environment, where widely-distributed, appropriately integrated, renewable sources offer economical solutions, existing practices and institutions will not naturally produce plans that lead to either clean or least-cost solutions.

As others in our process and problem-solvers in other states have pointed out, a utility that generates profits largely from return on capital investment and from throughput cannot produce a least-cost solution when the least-cost solution is to increase efficiency and use fuel-free sources whose infrastructure has rapid payback and many ways of being funded. Hence the route to low-cost, clean solutions requires a new utility structure or aggressive mandates and new incentives that reward performance in lieu of spending. Prior incarnations of performance incentives have not been sufficiently comprehensive to overcome utility disinterest in foregoing rate-base and throughput growth.

While the process of reworking utility incentives may seem daunting, any choice to postpone it must be weighed against the price. Given the dominant utility's proclivity to double down on fossil fuels, both the environmental and economic costs of postponing redesign of the incentive system necessarily will be high. Furthermore, effort saved by not developing appropriate incentives will be spent many times over in needless games of cat and mouse over plans and utility-inspired legislative proposals designed to meet priorities that are not in the interests of North Carolina citizens.

One of the biggest barriers is access to electric grid performance data

Overall, the properties of low-cost clean solutions are understood. However, their efficient implementation requires tailoring at the local level. Proper placement of solar sources, storage and other equipment will be accomplished through extensive use of usage data and of capacity and performance data for the

[23] Ibid., p.150.
[24] Powers, B. *Op cit.,* p.87.
[25] Ibid.

electric grid at several scales. If our utilities were incentivized to produce the most efficient, clean solutions, these solutions could be rapidly deployed.

If we leave our utilities with their current incentives, detailed solutions will need to be identified and implemented by others. A barrier to this latter approach is the perception by utilities that they not only own the grid, but also all associated data. Data sharing primarily is allowed in conjunction with special projects (such as collaborations funded by the American Recovery & Reinvestment Act[26]), under non-disclosure agreements (between utilities and large users evaluating programs), and where required by federal[27] or regional authorities, unless it isn't.[28] Thus, until the power providers' incentives are fully aligned with the interests of North Carolina citizens, we will need not only aggressive renewable energy portfolio standards and a functional interconnection process, but also extensive data transparency mandates.

North Carolina potential and economic, environmental, and justice benefits

Meanwhile, renewable energy and energy efficiency already are providing -- and, with the right policy drivers, can continue to provide in the future -- far more employment and economic benefits to our state than continued reliance on fossil fuel energy.[29] North Carolina even has among the best offshore wind potential on the East Coast,[30] development of which has the potential to create, according to one analysis, 56,000 new jobs.[31]

In addition, it does not make sense for the economic analysis of electricity generation to completely ignore the calculation of health benefits from the reduced burden of nitrogen oxides (NOx) emissions on NC citizens living and working near fossil fuel infrastructure. NOx emissions are precursors to atmospheric formation of ozone (and sometimes also to particulate matter), which exacerbates asthma and contributes to pulmonary and heart disease.[32].The NCUC should require Duke Energy to account for these health effects in its IRP analyses.

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[26] *Technology Performance Report: Duke Energy Notrees Wind Storage Demonstration Project, 2015 Final Report*, p. 1-5 for reference to DOE-Duke Energy negotiated terms and conditions; Appendix B for Inventory of Data Sources

[27] For example, Environmental Protection Agency, North American Electric Reliability Council, Federal Energy Regulatory Commission.

[28] Sorg, Lisa, *We tried to get Duke Energy's secret flood maps. We were stonewalled.* NC Policy Watch, 2017, http://www.ncpolicywatch.com/2017/09/21/tried-get-duke-energys-secret-flood-maps-stonewalled/, identifies unavailable coal basin flood zone maps required by EPA Coal Combustion Residuals Disposal Rule.

[29] Jones, J. "2019 Economic Impact Analysis of Clean Energy Development in North Carolina," news release, NCSEA, May 24, 2019, https://energync.org/2019-economic-impact-analysis-of-clean-energy-development-in-north-carolina/ and NCSEA, *Clean Energy by the Numbers*, https://energync.org/clean-energy-numbers/.

[30] Musial, W., et al. 2016 *Offshore Wind Energy Resource Assessment for the United States, National Renewable Energy Laboratory*, September 2016, see especially pp.34-35, https://www.nrel.gov/docs/fy16osti/66599.pdf.

[31] Robertson, N., "Offshore drilling would bring jobs to NC," *News & Observer*, March 1, 2019, https://www.newsobserver.com/opinion/article226992819.html.

[32] *Regulatory Impact Analysis of the Final Revisions to the National Ambient Air Quality Standards for Ground-Level Ozone*, Environmental Protection Agency, September 2015, chapter 6, https://www.epa.gov/naaqs/regulatory-impact-analysis-final-revisions-national-ambient-air-quality-standards-ground-level.

Although it is more difficult to quantify in dollars, it is important to consider the disproportionate impact of fossil fuel infrastructure, which is usually sited closest to low-income communities, including communities of color. Therefore the health burden of living in proximity to coal plants and coal ash ponds is borne by the most economically vulnerable citizens of our state.[33]

Finally, in its IRP as well as its forthcoming net metering study, the NCUC also should require Duke Energy to account for the economic benefit that net metering can provide both to the utility and to ratepayers.[34]

Conclusion

What shall be the process for making these changes?

We think the CEP should contain a timeline for implementing the different recommendations. In addition, for each recommendation, next steps should be listed, as well as which parties can take the next steps. By this, we mean not only which state entity has the authority to implement the action. We mean that the state should identify other stakeholders who can help to push for the recommended actions and/or help provide research and analysis to facilitate the actions.

We are all in this together and we hope we and other stakeholders have demonstrated that we are willing to be more than passive participants in solving this problem. If a subset of stakeholders is identified to advance each recommendation in the CEP, our progress will be quicker.

A requirement for inclusion in this implementers' team, however, should be a show of good faith. If a potential stakeholder is identified as creating obstacles, that stakeholder should commit to removing them before being allowed to participate. In many, many ways, Duke Energy has stood in the way of clean energy progress in NC. Duke's outsized influence on state policy must end. The corporation should not be allowed to participate in state policymaking until it has committed to removing obstacles for which it alone is responsible: lack of data access, lethargic interconnection process, opposition to third-party PPAs, unusable design of Green Source Advantage and community solar programs, limits on leasing and rebates, refusal to offer on-bill financing, and more.

Thank you for your attention. We look forward to seeing the draft and thank you for all your hard work in completing it.

Best regards,
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[33] It is worth noting that analogous arguments have been made against renewable energy incentive programs that claim that the economic "burden" of those programs should not be borne by customers who are not participating. Counter to that point is the argument that the health burden of living in proximity to coal plants and coal ash ponds is also borne by some customers but not others.
[34] Muro, M. and D. Saha. *Rooftop solar: net metering is a net benefit*, Brookings Institution, May 23, 2016, https://www.brookings.edu/research/rooftop-solar-net-metering-is-a-net-benefit/.

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July 23, 2019

VIA E-MAIL AND U.S. MAIL

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Re: Role of Forest-Derived Biomass in North Carolina's Clean Energy Plan – Stakeholder Input

Dear Ms. Masemore,

On behalf of the undersigned environmental, health, and justice NGOs, as well as ecologists and climate scientists, and itself, the Southern Environmental Law Center respectfully submits this letter concerning the role of forest-derived biomass in the North Carolina Department of Environmental Quality's forthcoming draft Clean Energy Plan. In particular, the undersigned urge the Department to exclude the use of forest-derived biomass from the Clean Energy Plan.[1]

According to the Clean Energy Plan Workshop 5, the Department has decided to incorporate a definition of "clean energy" that is consistent with Executive Order 80:

> Per EO80, 'clean' energy resources include solar, energy efficiency, battery storage, wind, efficient electrification, and other zero emitting technology options capable of quickly decarbonizing the power sector and modernizing the electric power sector.[2]

As clarified by the Department, biomass does not fall within this definition of "clean energy," as

[1] Although the Department has grouped together biomass and biogas, this letter is focused solely on the role of forest-derived biomass in the Clean Energy Plan.
[2] N.C. Dep't of Envtl. Quality, *Clean Energy Plan Workshop #5*, at slide 9 (June 26, 2019), https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/CEP-Combined-Workshop-5-powerpoint.pdf.

it is not a "zero emitting technolog[y]."[3] Instead, it appears the Department intends to treat biomass as a "lower-carbon alternative[]" to traditional fuels when the biomass is sourced using "environmentally sustainable management practices."[4] According to the Department, "those [sourcing] practices that minimize environmental harm . . . [and are] lower carbon . . . [will be] considered an alternative for the short term."[5] While we appreciate the Department's acknowledgment that biomass is not a form of clean energy, the reference to the use of biomass, in particular forest-derived biomass, as a lower-carbon alternative is deeply concerning. Moreover, the Department's discussion of the role of biomass, especially as it relates to sourcing and "sustainable" management practices, appears to be based on several fundamental misunderstandings about the climate and environmental impacts of forest-derived biomass.

As discussed in more detail below, the use of forest-derived biomass will not reduce carbon emissions during the timeframes relevant for avoiding the worst consequences of climate change, regardless of the sourcing and management practices; degrades North Carolina's forests and runs counter to Executive Order 80's goals towards resiliency; harms the health and wellbeing of local communities; and is prohibitively expensive. Accordingly, the undersigned urge the Department to exclude forest-derived biomass from use under the Clean Energy Plan by (1) retaining the above definition of "clean energy" that only includes zero-emitting technologies, and (2) removing any provisions, implications, or ambiguities that would allow forest-derived biomass to be used as some "alternative" or "low carbon" energy source.

I. Regardless of sourcing practices, forest-derived biomass is inconsistent with North Carolina's climate goals.

As leading scientists have made clear, a Clean Energy Plan that paves the way for any expansion of domestic, forest-derived biomass power generation or fuel production would be deeply flawed and pose a serious threat to the state's climate goals.[6] Burning wood (or forest biomass of any type) immediately adds CO_2 to the atmosphere, even if the wood displaces coal, the most carbon intensive fuel. Forest regrowth may eventually remove that CO_2 from the atmosphere, but regrowth takes time; regrowth is not certain; and even if regrowth eventually occurs, it does not reverse the additional heat trapped by the extra atmospheric CO_2 concentrations that result from burning forest-derived biomass.

The forests and communities of North Carolina have already born and continue to bear the consequences that unsound bioenergy policies have on forests. Since 2010, the wood pellet

[3] N.C. Dep't of Envtl. Quality, *Video of Facilitated Workshop 5*, at 3:57 (June 26, 2019), *available at* https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-12.
[4] *Id.* at 3:57-4:13.
[5] *Id.* at 7:25-8:55.
[6] *See* Letter from 800 Scientists, to the European Parliament re: Forest Biomass (updated Jan. 14, 2018), http://www.pfpi.net/wp-content/uploads/2018/04/UPDATE-800-signatures_Scientist-Letter-on-EU-Forest-Biomass.pdf (Attachment 1); Letter from Scientists, to EPA Acting Administrator Wheeler (Oct. 31, 2018) (Attachment 2); Letter from Scientists, to North Carolina Governor Roy Cooper (Nov. 15, 2017) (Attachment 3); Norman L. Christensen & William H. Schlesinger, *N.C. Forests are Under Assault; Gov. Cooper Should Help*, Chartlotte Observer (Nov. 14, 2017), https://www.charlotteobserver.com/opinion/op-ed/article184561713.html (Attachment 4).

biomass industry has expanded dramatically, fueled by misguided subsidies in the European Union—In just 8 years, U.S. wood pellet exports increased tenfold and in 2018, the Southern U.S. exported over 6 million tons of wood pellets.[7] Favorable political environments, compounded by long histories of industrial logging operations, have allowed companies like Enviva, the world's largest wood pellet producer, to rapidly expand despite community opposition, lawsuits, air quality permit violations, and years of on-the-ground investigations that counter their claims of sustainability.[8]

North Carolina's climate leaders have a significant opportunity to set the record straight, and it is critical that the Department does not make the same policy mistakes that European governments have made about biomass energy. If new policies in the U.S.—such as North Carolina's Clean Energy Plan—support biomass as a low carbon energy source, it would encourage the growth of a damaging domestic industry and divert critical support for truly clean energy sources.

a. Forest biomass cannot reduce emissions compared with fossil fuels within timeframes relevant for avoiding the worst consequences of climate change, regardless of the biomass sourcing and feedstock.

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[7] *See* Forisk, *Wood Bioenergy Update and North American Wood Pellet Exports: Q2 2019* (May 14, 2019), https://forisk.com/blog/2019/05/14/wood-bioenergy-update-and-north-american-wood-pellet-exports-q2-2019/ (U.S. exported over 6 million tons in 2018); Wood Res. Int'l LLC, *Wood Pellet Exports from the U.S. and Canada to Europe Reached 1.6 Million Tons in 2010, A Doubling of Shipments in Just Two Years* (May 16, 2011), https://news.cision.com/wood-resources-international-llc-company/r/wood-pellet-exports-from-the-us-and-canada-to-europe-reached-1-6-million-tons-in-2010--a-doubling-of-shipments-in-just-two-years,c9122985 (U.S. exported at 600,000 tons in 2010).

[8] *See, e.g.*, Chris Berendt, *Enviva Grievances Aired*, The Sampson Independent (July 17, 2019), https://www.clintonnc.com/news/41023/enviva-grievances-aired (opposition to Enviva Sampson wood pellet facility) (Attachment 5); Dogwood Alliance, Natural Resources Defense Council, & Southern Environmental Law Center, *Global Markets for Biomass Energy are Devastating U.S. Forests* (2019), https://www.southernenvironment.org/uploads/publications/9965_NRDC_2019_Booklet_05_EM_-_WEB_VERSION.PDF (eight years of on-the-ground investigations into destructive wood pellet sourcing practices); Southern Environmental Law Center, *Clean Air Carolina Challenges Air Permit for Enviva Hamlet Expansion in Richmond County* (Feb. 13, 2019), https://www.southernenvironment.org/news-and-press/press-releases/clean-air-carolina-challenges-air-permit-for-enviva-hamlet-expansion-in-richmond-county (legal challenge to Enviva Hamlet air quality permit modification); Charlie McGee, *As Manufacturers Build in Low-Income Communities, NC Residents Struggle to Fight Back*, The Daily Tar Heel (Apr. 17, 2018), https://www.dailytarheel.com/article/2018/04/enviva-plant (opposition to Enviva Hamlet wood pellet facility) (Attachment 6); Environmental Integrity Project, *Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act* (Apr. 26, 2018), https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf (analyzing Clean Air Act violations for all wood pellet manufacturing facilities in the U.S.); Gavin Stone, *Enviva Opposition Continues as Work Begins on Plant*, Richmond County Daily Journal (Sept. 11, 2017), https://www.yourdailyjournal.com/news/75692/enviva-opposition-continues-as-work-begins-on-plant (opposition to Enviva Hamlet wood pellet facility) (Attachment 7); Southern Environmental Law Center, *Citizens Group Challenges State Air Permit for Major Polluter Issued Without Public Notice or Community Input* (May 8, 2017), https://www.southernenvironment.org/news-and-press/press-releases/citizens-group-challenges-state-air-permit-for-major-polluter-issued-withou (legal challenge to Enviva Hamlet's original air quality permit); *Groups to Gov: Permit for Wood Pellet Plant Doesn't Pass Smell Test*, Public News Service (July 20, 2017), https://www.publicnewsservice.org/2017-07-20/environmental-justice/groups-to-gov-permit-for-wood-pellet-plant-doesnt-pass-smell-test/a58598-1 (petition opposing Enviva Hamlet wood pellet facility with over 10,000 signatures and over 50 organizations) (Attachment 8); Wayne Faulkner, *Opposition to Wood Pellet Facility Gathers Steam*, Star News Online (June 30, 2014), https://www.starnewsonline.com/article/NC/20140630/News/605043312/WM/ (opposition to wood pellet storage dome in Port of Wilmington) (Attachment 9).

When forest biomass is burned for electricity, it immediately emits CO_2 to the atmosphere at levels higher than coal or natural gas per unit of energy.[9] It is well established in the scientific literature that the net emissions from this combustion (the emissions after factoring regrowth and/or avoided decay) persist in the atmosphere for time periods ranging from many years to centuries.[10] The length of this carbon impact depends on the feedstock used and the fossil fuel displaced, among other factors. In the case of whole trees and other large diameter materials, it can take anywhere from 40 years to several centuries for forest regrowth and the associated

[9] According to the US EPA, "[B]iomass firing in and of itself does not reduce emissions of CO_2 emitted from that source. Specifically, when measuring stack emissions, combustion of biomass emits more mass of emissions per Btu than that from combustion of fossil fuels, thereby increasing CO_2 emissions at the source." U.S. Environmental Protection Agency, *Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations*, 84 Fed. Reg. 32,520 (July 8, 2019) ("Affordable Clean Energy Rule"), https://www.govinfo.gov/content/pkg/FR-2019-07-08/pdf/2019-13507.pdf.

[10] *See, e.g.*, John D. Sterman et al., *Does Replacing Coal with Wood Lower CO_2 Emissions? Dynamic Lifecycle Analysis of Wood Bioenergy*, 13 Envt'l Res. Letters (2018), http://iopscience.iop.org/article/10.1088/1748-9326/aaa512/meta; Mary S. Booth, *Not Carbon Neutral: Assessing the Net Emissions Impact of Residues Burned for Bioenergy* (Feb. 2018), http://iopscience.iop.org/article/10.1088/1748-9326/aaac88/meta; Duncan Brack, Chatham House, *Woody Biomass for Power and Heat: Impacts on the Global Climate* (2017), https://www.chathamhouse.org/publication/woody-biomass-power-and-heat-impacts-global-climate; European Academies Science Advisory Council, *Multi-Functionality and Sustainability in the European Union's Forests* (2017), https://easac.eu/fileadmin/PDF_s/reports_statements/Forests/EASAC_Forests_web_complete.pdf; UK Department of Energy & Climate Change, *Life Cycle Impacts of Biomass Electricity in 2020* (July 2014), www.gov.uk/government/uploads/system/uploads/attachment_data/file/349024/BEAC_Report_290814.pdf; *see also, e.g.*, Pierre Bernier et al., *Using Ecosystem CO_2 Measurements to Estimate the Timing and Magnitude of Greenhouse Gas Mitigation Potential of Forest Bioenergy*, GCB Bioenergy (Jan. 2013), https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1757-1707.2012.01197.x; Bjart Holtsmark, *Harvesting in Boreal Forests and the Biofuel Carbon Debt*, Climate Change (May, 2012), https://link.springer.com/article/10.1007/s10584-011-0222-6; Jerome Laganière et al., *Range and Uncertainties in Estimating Delays in Greenhouse Gas Mitigation Potential of Forest Bioenergy Sourced from Canadian Forests*, GCB Bioenergy (Feb. 2017), https://onlinelibrary.wiley.com/doi/abs/10.1111/gcbb.12327; Jon McKechnie et al., *Forest Bioenergy or Forest Carbon? Assessing Trade-Offs in Greenhouse Gas Mitigation with Wood-Based Fuels*, Environ. Sci. Tech. (Jan. 2011), http://www.pfpi.net/wp-content/uploads/2011/05/McKechnie-et-al-EST-2010.pdf; K. Pingoud et al., *Global Warming Potential Factors and Warming Payback Time as Climate Indicators of Forest Biomass Use,* Mitigation & Adaptation Strategies for Global Change (Apr. 2012), https://link.springer.com/article/10.1007%2Fs11027-011-9331-9; Michael Ter-Mikaelian et al., *Carbon Debt Repayment or Carbon Sequestration Parity? Lessons from a Forest Bioenergy Case Study in Ontario, Canada*, GCB Bioenergy (July 2015), https://onlinelibrary.wiley.com/doi/abs/10.1111/gcbb.12198; Giuliana Zanchi et al., *Is Woody Bioenergy Carbon Neutral? A Comparative Assessment of Emissions from Consumption of Woody Bioenergy and Fossil Fuel*, GCB Bioenergy, (Nov. 2012), https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1757-1707.2011.01149.x.

Moreover, even under optimistic assumptions, converting natural forests to fast-growing managed plantations still leads to carbon-debt repayment times of many decades. *See* John D. Sterman et al., *Reply to Comment on 'Does Replacing Coal with Wood Lower CO_2 Emissions? Dynamic Lifecycle Analysis of Wood Bioenergy*, 13 Envtl. Res. Letters (Dec. 18, 2018), https://iopscience.iop.org/article/10.1088/1748-9326/aaf354/pdf; *see also* Spatial Informatics Group, LLC, *The Carbon Impacts of UK Electricity Produced by Burning Wood Pellets from Drax's Three U.S. Mills* (May 27, 2019), https://www.southernenvironment.org/uploads/publications/2019-05-27_Drax_emissions_-_SIG_report_Phase_II.PDF (concluding that burning wood pellets from Drax's three U.S. mills, sourced predominately from pine plantation thinnings, increases carbon pollution in the atmosphere for well over 40 years).

carbon sequestration just to reach net emissions parity[11] with fossil fuels (the actual timing depends in large part on whether biomass combustion is compared to the coal combustion or natural gas combustion).[12] In a power-generating scenario that uses forestry residues that would otherwise decay and release their carbon, the payback period can be shorter because it is tied to the decomposition rate of that material and its size, but still is typically on the order of decades.[13]

The United Nations Intergovernmental Panel on Climate Change (IPCC) report on limiting global temperature rise to 1.5°C presses governments around the world to take "rapid, far-reaching and unprecedented changes in all aspects of society" to dramatically and rapidly cut greenhouse gas emissions.[14] This means quickly transitioning to truly clean, carbon-free energy and massively scaling up forest protection. Forest-derived biomass will increase atmospheric CO_2 and thus worsen warming in the most critical period for climate action.

While forest-derived biomass energy may be "renewable" over the long-term—and the industry has long benefitted from its "renewable" title—it is not a low-carbon source of energy like solar panels. Using the same amount of land area, solar panels produce up to 80 times as much electricity as wood burning with no emissions at all.[15] Furthermore, fossil fuel emissions associated with producing wood pellets (harvesting, chipping, drying, pelletizing and transporting) are equivalent to 20-25% of direct emissions.[16]

b. Forest-derived biomass degrades North Carolina forests and runs counter to Executive Order 80's resiliency goals.

Biomass demand from European countries has already put intense pressure on North Carolina's forests, and green lighting domestic biomass power through favorable or ambiguous treatment in the Clean Energy Plan would further add to the burden on our state's forests. Currently, Enviva owns and operates four wood pellet facilities in the state, as well as a Virginia facility near the

[11] Net emissions parity is achieved when the sum of carbon in the regenerating stand and the GHG benefits of displacing fossil fuel reaches the amount of carbon in the forest stand if it had remained unharvested. *See* Ter-Mikaelian, *supra* note 10.

[12] Biomass Energy Resource Center, Forest Guild, & Spatial Informatics Group, LLC, *Biomass Supply and Carbon Accounting for Southeastern Forests* (Feb. 2012), www.biomasscenter.org/images/stories/SE_Carbon_Study_FINAL_2-6-12.pdf; John Hagan, The Manomet Center for Conservation Sciences, *Biomass Energy Recalibrated* (Jan. 2012), http://www.inference.org.uk/sustainable/images/Manomet%20Biomass%20Article%202012%5B1%5D.pdf; Stephen R. Mitchell et al., *Carbon Debt and Carbon Sequestration Parity in Forest Bioenergy Production*, 4 GCB Bioenergy 818-827 (2012), https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1757-1707.2012.01173.x.

[13] Booth, *supra* note 10; Anna Repo et al., *Sustainability of Forest Bioenergy in Europe: Land-Use-Related Carbon Dioxide Emissions of Forest Harvest Residues*, 7 GCB Bioenergy 877-887 (2015), https://onlinelibrary.wiley.com/doi/epdf/10.1111/gcbb.12179; Anna Repo et al., *Can We Produce Carbon and Climate Neutral Forest Bioenergy?*, 7 GCB Bioenergy 253-262 (2015), https://onlinelibrary.wiley.com/doi/epdf/10.1111/gcbb.12134; UK Department of Energy & Climate Change, *supra* note 10.

[14] UN Environment, *Rapid and Unprecedented Action Required to Stay Within 1.5ºC Says UN's Intergovernmental Panel on Climate Change* (Oct 8, 2018), https://www.unenvironment.org/news-and-stories/press-release/rapid-and-unprecedented-action-required-stay-within-15oc-says-uns.

[15] Letter from Scientists, to U.S. Senate re: Carbon Neutrality of Forest Biomass (Feb. 26, 2016), https://www.caryinstitute.org/newsroom/letter-senate-carbon-neutrality-forest-biomass (Attachment 10).

[16] *Id.*

North Carolina border. Combined, the five existing facilities have an annual production capacity of approximately 2.42 million metric tons of wood pellets. Meeting this production capacity requires logging, conservatively, approximately 160 acres of forest each day.[17] Recent reports backed up by industry data, have documented that Enviva sources whole trees from native and natural hardwood forests, in the Mid-Atlantic Coastal Ecoregion, which are ecologically important and sensitive ecosystems.[18]

Forest-derived biomass increases the degradation of our forests, emitting forest carbon into the atmosphere and contributing to climate change instead of keeping it in living, productive forests that provide multiple benefits of water and wetland protection, flood control, soil protection, wildlife habitat, improved air quality, and recreational benefits for hunters and all who enjoy being in the great outdoors.

c. Forest-derived biomass sourced using "sustainable management practices" is not a lower-carbon alternative as suggested in the Department's public statements.

North Carolina must reject "sustainable forestry" as a proxy for carbon benefits of forest-derived feedstocks, whether residues, slash, low-grade wood, or whole trees. "Sustainability," however defined, is not a measure of carbon impacts. The concept or designation says very little, if anything, about the amount of CO_2 emitted by a given biomass source or the net effect of those emissions on atmospheric CO_2 concentrations over time. Further, harvesting wood for energy worsens climate change immediately, and the harms it causes persist for centuries, even if the wood is harvested "sustainably."

Below we assess two commonly cited instances in which sustainability is erroneously equated with carbon benefits. The Department must reject these and all such assertions that attempt to equate sustainable practices with carbon benefits.

i. Best management practices (BMPs), forest certifications, and other "sustainable forestry" regimes

Sustainable forestry is based on ecological and management considerations, not carbon accounting. Even if considerations of forest growth and removals were included, sustainability criteria will fail to fully account for changes in carbon emissions and cannot be justified scientifically as a proxy for carbon accounting.

According to a recent summary in the *Journal of Forestry*:

> *An assumption that bioenergy harvesting in forests managed on a sustained yield (also called sustainable yield) basis does not create a carbon deficit is one of the*

[17] Dogwood Alliance, *Destroying Southern Forests for International Export* (2017), https://www.dogwoodalliance.org/wp-content/uploads/2017/08/Acres-of-Pellets-Fact-Sheet.pdf.

[18] Justin Scheck & Ianthe Jeanne Dugan, *Europe's Green Fuel Search Turns to America's Forests*, The Wall Street Journal (May 27, 2013), https://www.wsj.com/articles/SB10001424127887324082604578485491298208114 (Attachment 11); Dogwood Alliance, Natural Resources Defense Council, & Southern Environmental Law Center, *Global Markets for Biomass Energy are Devastating U.S. Forests*, *supra* note 8.

> *most common errors in forest bioenergy accounting . . . . Stating that sustained yield management is carbon neutral is incorrect.*[19]

As such, an established "sustainable forestry" certification regime or best management practice, while plausibly beneficial for ecosystems and wildlife protection, cannot be treated as providing evidence that biomass harvested for energy production is carbon beneficial.

ii. Reference point accounting

Reference point accounting monitors carbon stocks over time across some pre-defined region, independent of the specific activities (logging, burning, emissions, etc.) that take place within that region. Under this approach, biomass harvested in regions where overall forest stocks are increasing is deemed carbon beneficial.

Such logic is erroneous. The climate damage from burning wood is not mitigated simply because the bioenergy harvest or power plant is located in a region where forest stocks are increasing—namely where growth exceeds removals. Changes in regional carbon stocks alone simply cannot detect or quantify the carbon emissions from sourcing an individual biomass-burning facility.

The simplest way to understand this logical flaw is to imagine a biomass-burning electric-generating unit (EGU) sited in a region where overall forest stocks are increasing, then that same EGU using the same feedstocks sited in a region where overall stocks are decreasing. Under the reference point accounting approach, the EGU in the first scenario would be considered to have zero stack emissions, but not in the latter. Such an accounting method fails a basic test of logical consistency. It also decouples carbon emissions outcomes from the single most impactful factor: the EGUs' choice of what biomass feedstocks to burn for bioenergy production.

Reference point accounting was roundly rejected by the U.S. EPA's own Scientific Advisory Board in its first assessment of the agency's Framework for Biogenic CO_2 Emissions, and its position has not changed since then:

> *The choice of a fixed reference . . . implies that forest biomass emissions could be granted an exemption simply because the location of a stationary facility is in an area where forest stocks are increasing. The reference point estimate of net emissions or net sequestration does not indicate, or estimate, the difference in greenhouse gas emissions (the actual carbon gains and losses) over time that stem from biomass use. As a result, [it] fails to capture the causal connection between forest biomass growth and harvesting and atmospheric impacts and thus may incorrectly assess net CO_2 emissions of a facility's use of a biogenic feedstock.*[20]

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[19] Ter-Mikaelian et al., *The Burning Question: Does Forest Bioenergy Reduce Carbon Emissions? A Review of Common Misconceptions About Forest Accounting*, 113 J. Forestry 57-68 (Nov. 27, 2014), https://academic.oup.com/jof/article/113/1/57/4599732.

[20] U.S. Environmental Protection Agency, Scientific Advisory Board, Biogenic Carbon Emissions Panel, *Review of EPA's Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources* (Sept. 2011) (Attachment 12).

A recent report by the Chatham House, a distinguished UK think tank with a history of independent and rigorous research, reached the same conclusion:

> *It is often argued that biomass emissions should be considered to be zero at the point of combustion because carbon has been absorbed during the growth of the trees, either because the timber is harvested from a sustainably managed forest, or because forest area as a whole is increasing (at least in Europe and North America).*
>
> *These arguments are not credible. They ignore what happens to the wood after it is harvested (emissions will be different if the wood is burnt or made into products) and the carbon sequestration forgone from harvesting the trees that if left unharvested would have continued to grow and absorb carbon.*[21]

In order to determine the actual carbon impacts of biomass harvest and use, regional forest stocks under the scenario *with* bioenergy harvests should be compared to the baseline of ongoing forest management *without* biomass use. This method—which is entirely different from merely claiming that growth exceeds removals (and falsely attributing carbon benefits)—is the only way to determine carbon impacts or benefits.

II. Forest-derived biomass is not "clean" and poses a threat to North Carolina's communities.

Expansion of domestic biomass power will necessitate significant increases in the production of forest-derived biomass, from which communities in North Carolina already suffer health and quality of life impacts solely from demand abroad. Communities in North Carolina that live near wood pellet facilities directly suffer three-fold from wood pellet production. First, as wood pellet plants source within a 50-100 mile radius, the communities experience higher rates of tree loss leading to lower air and water quality and increased risk of flooding. Second, wood pellet production plants until recently have skirted Clean Air Act requirements, freely emitting dangerous pollutants into the communities. Third, and finally, these communities sit in the coastal plain of Southern states and are under direct threat from climate change to which wood pellet production and consumption contribute.

Wood pellet manufacturing emits harmful particulate matter, volatile organic compounds (VOCs) that create smog, and other hazardous pollutants. A shocking pattern of air quality violations have been documented in the wood pellet industry throughout the South, particularly at Enviva's North Carolina facilities.[22] In 2018, Enviva's North Carolina plants were the largest emitters of VOCs and hazardous air pollutants in the industry, emitting five to six times the level of hazardous air pollutants as comparable facilities.[23] These emissions disproportionately harm

[21] Brack, *supra* note 10.
[22] Environmental Integrity Project, *Dirty Deception*, *supra* note 8.
[23] *Id.*

communities of color and low-income communities, such as the communities of Dobbins Heights and Hamlet, who are already burdened by other polluting industries.[24]

The company's wood pellet mills are located in areas that already endure some of the highest logging rates in the world, with surrounding communities suffering high poverty rates and facing the threat of flooding from climate change. Despite promises, Enviva has yet to jumpstart the local economies in North Carolina where they have facilities, where county-level poverty rates have increased or remained stagnant since Enviva began operating.[25]

Finally, biomass combustion would further harm the health of communities who would live near biomass power stations. In the UK, where the utility Drax Power Station has converted coal stations to burn biomass, these conversions increase levels of dangerous small particles by over 135%, the equivalent of 3 million new diesel cars on the road.[26] In a 2016 letter, organizations such as the American Lung Association, Physicians for Social Responsibility, and the American Academy of Pediatrics detailed their opposition to the use of biomass for electricity production on the basis that biomass power results in dangerous emissions of particulate matter, nitrous oxides, carbon monoxide, and carcinogens such as benzene and formaldehyde. They write that "burning biomass creates air pollution that causes a sweeping array of health harms, from asthma attacks to cancer to heart attacks, resulting in emergency room visits, hospitalizations, and premature deaths."[27] Simply put, biomass power is not a "clean" energy source.

III. Forest-derived biomass is an uneconomic energy source.

One of the Department's guiding principles for the development of the Clean Energy Plan is that North Carolina's clean energy future must be affordable. Biomass power is prohibitively expensive and a poor investment for North Carolina. In the UK, the largest user of biomass for energy, bioenergy relies on expensive subsidies (over £800m in 2016 rising to over £1bn per year by 2020)—scarce taxpayer resources that could support cheaper, truly clean energy technologies and demand reduction. These subsidies support inefficient facilities that are likely to become stranded assets, while truly low-carbon solar and wind resources are already cheaper and have a significant scope for further cost reduction.[28]

Closer to home, our neighbors in the U.S. South have found biomass power to be a costly burden on ratepayers and taxpayers. For example, in Virginia, electricity from power plants that burn

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[24] Stefan Koester & Sam Davis, *Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States*, 11 Envtl. Justice 64–70 (2018), https://www.liebertpub.com/doi/10.1089/env.2017.0025.

[25] Lisa Sorg, *Half-Truths and Sometimes No Truth At All: Public Debates Pollution Limits at Enviva's Wood Pellet Plant in Hamlet*, N.C. Policy Watch (Nov. 9, 2018), http://www.ncpolicywatch.com/2018/11/09/half-truths-and-sometimes-no-truth-at-all-public-debates-pollution-limits-at-envivas-wood-pellet-plant-in-hamlet/ (Attachment 13).

[26] Biofuel Watch UK, *Briefing: Drax's Coal-to-Biomass Conversion Increases Emissions of Dangerous Small Particles* (Aug. 11, 2017), https://www.biofuelwatch.org.uk/2017/briefing-draxs-coal-to-biomass-conversion-increases-levels-of-dangerous-small-particles/.

[27] Letter from Health Organizations, to Senators/Representatives re: Biomass Power (2016), https://www.lung.org/assets/documents/advocacy-archive/health-organizations-letter-biomass.pdf (Attachment 14).

[28] Natural Resources Defense Council, *Issue Brief: Money to Burn II - Solar and Wind Can Reliably Supply the United Kingdom's New Electricity Needs More Cost-Effectively than Biomass* (Sept. 2017), https://www.nrdc.org/sites/default/files/money-to-burn-ii-uk-biomass-ib.pdf.

biomass is significantly more expensive that clean energy alternatives like wind, solar, and energy efficiency.[29] Other biomass plants in the U.S.—such as in Gainesville, Florida and Austin, Texas—are sitting idle or have been purchased back by the government to get out of long-term contracts because of high costs.[30]

IV. Conclusion

To meet the goals set out by Executive Order 80—and to meet our planetary needs to avoid a climate crisis—the North Carolina Clean Energy Plan must be truly clean. Forest-derived biomass power does not belong in North Carolina's clean energy future, and now the Department has the opportunity to guide clear policies and decision-making on this issue. Now more than ever, we need standing, diverse, healthy forests to store carbon, protect us from flooding and storms, and provide us with clean air and water. Forests draw enormous amounts of carbon out of the atmosphere and store it in trees and soil. Any expansion of biomass combustion and the wood pellet industry in North Carolina will increase greenhouse gas emissions, drive increases in logging and conversion of natural forests to tree plantations, impede our state's resilience to flooding and storms, and harm communities' health—all which undermines North Carolina's commitment and responsibility to act on climate change. Accordingly, the undersigned organizations and scientists urge the Department to exclude the use of forest-derived biomass from the Department's Clean Energy Plan.

CC:
Governor Roy Cooper
Secretary Michael Regan, Department of Environmental Quality
Michael Abraczinskas, Division of Air Quality
Jeremy Tarr, Office of the Governor
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Respectfully submitted,

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[29] Natural Resources Defense Council, *Issue Brief: Up in Smoke – How Dominion's Investments in Biomass Electricity Lost Big* (May 2018), https://www.nrdc.org/sites/default/files/dominion-investments-biomass-electricity-ib.pdf.

[30] Andrew Caplan, *City Owns GREC After $754M Deal*, The Gainesville Sun (Nov. 7, 2017), https://www.gainesville.com/news/20171107/city-owns-grec-after-754m-deal (Attachment 15); Elizabeth Pagano, *Austin Energy Buys Biomass Plant for $460M*, Austin Monitor (Apr. 19, 2019), https://www.austinmonitor.com/stories/2019/04/austin-energy-buys-biomass-plant-for-460m/ (Attachment 16).

On behalf of the following organizations and scientists:

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Simon Levin, Professor of Ecology and Evolutionary Biology, Princeton University

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Stuart Pimm, Doris Duke Chair of Conservation, Duke University

Walter Bock, Professor of Biological Sciences, Columbia University

William H. Schlesinger, Dean Emeritus, Nicholas School of the Environment, Duke University

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July 30, 2019

Via email

Sushma Masemore
Deputy Assistant Secretary for Environment & State Energy Director
N.C. Department of Environmental Quality
217 West Jones Street
Raleigh, NC 27603
seo.publiccomments@ncdenr.gov

Re: Comments Regarding the Inclusion of Swine Waste-to-Energy in the State Clean Energy Plan

Dear Ms. Masemore,

The undersigned organizations offer these comments to the N.C. Department of Environmental Quality ("DEQ" or "agency") opposing the inclusion of biogas[1] that is the product of swine waste-to-energy projects that fail to meet environmental performance criteria[2] necessary to address longstanding environmental, public health, and racial equity concerns about swine waste management in the N.C. Clean Energy Plan ("CEP" or "the Plan"). Thank you for the opportunity to offer these public comments.

DEQ has articulated a vision for an energy system that is "clean, equitable, modern, resilient, and efficient; in addition to being safe, affordable, and reliable."[3] In describing specific components of the CEP, DEQ suggested that renewable biogas—which inaccurately describes,

[1] Biomethane is also under consideration for inclusion in the CEP. For the purposes of this letter, "biogas" refers to both biogas and biomethane and is specific to swine waste-to-energy.

[2] State law currently prohibits the construction of new industrial swine operations or the modification of existing industrial swine operations unless the new or modified operations meet environmental performance standards. *See* N.C. Gen. Stat. § 143-215.10I(b). These standards require operations to eliminate the following: discharges of waste to surface water through direct discharges or through groundwater, atmospheric emission of ammonia, emissions of odors, the release of disease causing vectors and pathogens, and nutrient and heavy metal contamination of soil and groundwater. *Id.* Anaerobic digesters on their own do not meet these environmental performance standards. *See, e.g.*, Dr. C.M. Williams, Presentation: Technology Options for Capturing Greenhouse Gases and Destroying Pathogens in the AFO/CAFO Waste Stream (Oct. 27-28, 2016) https://ehs.duke.edu/2016/wp-content/uploads/sites/3/2016/09/Williams.pdf (describing several technologies that meet the environmental performance standards and noting that anaerobic digestion, on its own, does not meet the performance standards).

[3] N.C. Dep't of Envt'l Quality, North Carolina Clean Energy Plan Workshop 5 Presentation at 9 (June 26, 2019) https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/CEP-Combined-Workshop-5-powerpoint.pdf (listing the vision, pathway, and definition of clean energy).

but may be interpreted to include swine waste-to-energy—may be part of the CEP if it is a "lower carbon alternative" that is recovered with "environmentally sustainable management practices."[4] Biogas does not fit within the State's articulated vision for the CEP because it is neither clean nor equitable nor resilient. Moreover, biogas is not a "lower carbon alternative" that is recovered with "environmentally sustainable management practices." To the contrary, the most widely-used biogas technology relies on the primitive lagoon and sprayfield waste management system at industrial hog operations, which has a devastating impact on the environment and public health for communities living nearby and downstream from industrial hog operations. In this letter, we highlight ways in which biogas production is inconsistent with DEQ's vision for the CEP and detail the ways in which it intensifies environmental harms.

Indeed, while we appreciate Governor Cooper's efforts to respond to the challenges presented by climate change, we urge the State to address these challenges by encouraging investment in clean energy technology that addresses—rather than exacerbates—environmental and public health harms. Growth in biogas production has the potential to further entrench the use of the outdated lagoon and sprayfield system as a mainstay of North Carolina agriculture—a system that exacerbates environmental, civil rights and public health harms. For all of the reasons discussed below, the State should exclude biogas from the CEP where inadequate environmental protections are in place to address the myriad problems identified with the lagoon and sprayfield system.

I. The Lagoon and Sprayfield System Harms Communities and the Environment

The lagoon and sprayfield waste management system is a system whereby hog feces and urine are stored in often unlined pits and the liquid waste is subsequently sprayed onto nearby cropland. This waste management system pollutes our streams, waterways, and the ecosystems that rely on them; harms the public health of communities that live nearby or downstream of industrial hog operations; and creates noxious odors that impact the livelihoods of people living near these operations, with a disproportionate racial impact on Native Americans, Latinx, and African Americans.[5] The primary means of producing biogas at industrial hog operations is the installation of anaerobic digesters over hog waste lagoons.[6]

[4] N.C. Dep't of Envt'l Quality, Clean Energy Plan Stakeholder Workshop 5 Overview of Clean Energy Plan Vision and Guiding Structure video, https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-12 (last visited July 25, 2019) [hereinafter CEP Workshop 5 video).

[5] Letter from Lilian Dorka, Director of External Civil Rights Compliance with U.S. Envt'l Protection Agency, to William Ross, Acting Secretary of N.C. DEQ (Jan. 12, 2017), https://www.epa.gov/sites/production/files/2018-05/documents/letter_of_concern_to_william_g_ross_nc_deq_re_admin_complaint_11r-14-r4_.pdf (expressing "deep concern about the possibility that African Americans, Latinos, and Native Americans

The lagoon and sprayfield waste management system fails to meet statutory environmental performance standards required for all new or modified industrial hog operations in the State; these performance standards require facilities to eliminate air and water pollution, noxious odors, and other harmful impacts of this waste management system.[7] Liquid swine waste can intrude into groundwater via cracks in lined lagoons, or by seeping directly through unlined lagoons.[8] When lagoon wastewater is sprayed on agricultural fields, over-application or improper techniques can result in nutrient-laden swine waste discharging directly into nearby streams and rivers.[9] Once hog waste infiltrates surface or groundwater, the large amounts of nitrogen and phosphorus contained in the waste can wreak ecological havoc and cause harmful algal blooms; fish kills; acidification of soils and aquatic ecosystems; heavy metal accumulation in sediments, aquatic life, and plant and animal tissue; excessive salt buildup; eutrophication of rivers and estuaries; and consequent species and ecological community changes.[10]

The human impacts of the lagoon and sprayfield waste management system are similarly devastating. A 2018 study published in the North Carolina Medical Journal found that residents who live near industrial hog operations that use the lagoon and sprayfield system have higher death rates from causes such as anemia, kidney disease, tuberculosis and low birth weight than residents who live further away from such operations.[11] The study also found higher rates of low birth weight and infant hospitalization among residents who live near industrial hog operations.[12] Duke researchers noted that these impacts are not the cause of multiple demographic, behavioral, or socioeconomic factors present, but rather are "due to the additional impact of multiple industrial hog facilities located in this area."[13] Other research found that the same heavy metal and salt accumulation that affects wildlife can cause cancer, hair loss, liver dysfunction, and anemia.[14] Ammonia emissions from lagoons cause eye irritation and are partially responsible for

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have been subjected to discrimination as a result of the NC DEQ's" permitting system for industrial hog operations).

[6] *See, e.g.*, *AgSTAR: Livestock Anaerobic Digester Database*, EPA (Jan. 2019), https://www.epa.gov/agstar/livestock-anaerobic-digester-database (noting that of the 10 voluntarily reported biogas projects in North Carolina, six use covered lagoon technology).

[7] *See* N.C. Gen. Stat. § 143-215.10I(b).

[8] *See* Robbin Marks, *Cesspools of Shame: How Factory Farm Lagoons and Sprayfields Threaten Environmental and Public Health*, NAT. RESOURCE DEF. COUNCIL 33 (2001), https://www.nrdc.org/sites/default/files/cesspools.pdf.; *see also* Steve Wing, *Environmental Injustice in North Carolina's Hog Industry*, 108 ENV'T HEALTH PERSP. 225, 225 (2000). (noting that this is a particular problem in eastern North Carolina, where a high water table allows for easy groundwater intrusion).

[9] Marks, *supra* note 8, at 29.

[10] *Id.*

[11] Julia Kravchenko et al., *Mortality and Health Outcomes in North Carolina Communities Located in Close Proximity to Hog Concentrated Animal Feeding Operations*, 79 N.C. MED. J. 278 (2018).

[12] *Id*.

[13] *Id*.

[14] Marks, *supra* note 8, at 32–33.

noxious smell.[15] Gaseous hydrogen sulfide also causes eye irritation, in addition to irritation of the nose and throat, as well as loss of consciousness, seizures, and even death.[16] Airborne particulate matter and swine waste effluent are associated with respiratory ailments.[17] Near constant exposure to pollution and odors are linked to mental health impacts, such as greater levels of self-reported depression and anxiety among residents living near these facilities.[18] As this dizzying (and uncomprehensive) list of ecological and human impacts indicates, swine waste lagoons and sprayfield techniques are inherently unsustainable.

II. Biogas Does Not Fit DEQ's Vision for a Clean Energy Future

DEQ's comments at the fifth CEP Stakeholder Workshop indicated that biogas will be considered a "lower carbon alternative" to traditional generation resources "when recovered via environmentally sustainable management practices," which are practices that "minimize environmental harm and creates (sic) a lower carbon [alternative]."[19] However, biogas production should not be conflated with sustainable environmental management practices. To the contrary, biogas production is *counter* to such practices. While biogas production may reduce methane emissions from industrial hog operations, this alone does not render the technology sustainable or clean.

Research has yielded several pertinent insights about swine waste biogas that render it ineligible for inclusion in the CEP. Biogas production does not reduce the volume or management of manure or waste that is created and stored,[20] and thereby, cannot remedy many of the harms associated with lagoon and sprayfield practices discussed above. Biogas production has also been found to increase ammonia emissions by 46 percent compared to conventional farms without biogas production technologies.[21]

The climate benefits from capping hog waste lagoons are far from certain. While it is true that biogas systems do capture methane – a greenhouse gas that has *86 times* the global

[15] *Id.* at 18.
[16] *Id.*
[17] *See, e.g.*, Peter S. Thorne, *Environmental Health Impacts of Concentrated Animal Feeding Operations: Anticipating Hazards--Searching for Solutions*, 115(2) ENV'T HEALTH PERSP. 296, 296–97 (2007).
[18] Susan S. Schiffman et al., *The Effect of Environmental Odors Emanating from Commercial Swine Operations on the Mood of Nearby Residents*, 37(4) BRAIN RES. BULL. 369 (1995).
[19] CEP Workshop 5 video, *supra* note 4.We assume that the designation of "lower carbon alternative" is inclusive of alternatives that lower other potent greenhouse gas emissions, such as methane and nitrous oxide.
[20] *See Anaerobic Digestion: Biogas Production and Odor Reduction*, PENN. ST. EXTENSION, https://extension.psu.edu/anaerobic-digestion-biogas-production-and-odor-reduction (last visited July 29, 2018) ("Anaerobic digestion does not reduce the volume or nutrient value of manure. If dilution water is added to the system, the volume of material to handle is increased.").
[21] L.A. Harper et al., *The Effect of Biofuel Production on Swine Farm Methane and Ammonia Emissions*, 39(6) J. ENV'T QUALITY 1984, 1984 (2010).

warming potential of carbon dioxide on a 20 year timescale–methane leakage involved the transport, storage, and distribution of biogas using existing infrastructure may diminish climate benefits from capping hog waste lagoons.[22] Scientists also disagree about whether biogas technology can reduce the nitrous oxide emissions (N_2O) associated with swine waste storage and application to soil. Even more potent than methane, N_2O has approximately 300 times the global warming potential of CO_2,[23] and is produced naturally by bacteria found in animal manure. Some studies have indicated that the anaerobic digestion process reduces N_2O emissions compared to pre-digested waste when applied as a soil amendment,[24] while others showed increases in N_2O releases when applied to crops.[25] Whether N_2O emissions are reduced or increased may depend on the ability of crops to uptake nitrogen, and many models that predict N_2O emissions will be reduced by digestion presume that waste is applied at agronomic rates.[26] This is a discouraging prospect given that nitrogen overloading on agricultural lands is a well-recognized and growing ecological problem.[27]

Further, biogas production will exacerbate an already dire water pollution problem in rivers and streams in eastern North Carolina, which are overloaded with pollution from industrial

[22] Experts studying natural gas and coal have pointed out that natural gas infrastructure is at risk for significant leakage; directed biogas may rely on the same infrastructure for transport, storage, and distribution. *See, e.g.*, William H. Schlesinger, *Natural Gas or Coal: It's All About the Leak Rate*, NATURE.ORG (June 24, 2016) https://blog.nature.org/science/2016/06/24/natural-gas-coal-leak-rate-energy-climate/ (noting that ""any leakage rate above 1 percent of gross production negates the advantages of natural gas with respect to mitigating climate change" primarily due to the high global warming potential of methane); *see also* Thomas K. Flesch, Raymond L. Desjardins, & Devon Worth, *Fugitive Methane Emissions from an Agricultural Biodigester*, 35 BIOMASS & BIOENERGY 3927, 3927 (2011).

[23] *Greenhouse Gas Emissions: Overview of Greenhouse Gases*, EPA, https://www.epa.gov/ghgemissions/overview-greenhouse-gases (last visited July 29, 2019).

[24] *See* A. Vallejo et al., *Nitrogen Oxides Emission from Soils Bearing a Potato Crop as Influenced by Fertilization with Treated Pig Slurries and Composts*, 38 SOIL BIOLOGY AND BIOCHEMISTRY 2782, 2782 (2006); *see also* H. P. COLLINS ET AL., APPLICATION OF AD DAIRY MANURE EFFLUENTS TO FIELDS AND ASSOCIATED IMPACTS (CSANR Res. Rep. 2010 – 001) (noting a 50 percent N_2O reduction in digested material after one year that tapered off dramatically the following year).

[25] *See* S. Wulf, M. Maeting & J. Clemens, *Application Technique and Slurry Co-Fermentation Effects on Ammonia, Nitrous Oxide, and Methane Emissions after Spreading: II. Greenhouse Gas Emissions*, 31 J. ENV'T QUALITY 1795, 1795 (2002) (measuring higher nitrous emissions in digested material on grasslands, while observing the opposite on arable land); *see also* B. Amon, V. Kryvoruchko, et al., *Methane, Nitrous Oxide and Ammonia Emissions During Storage and After Application of Dairy Cattle Slurry and Influence of Slurry Treatment*, 112 AGRIC., ECOSYSTEMS & ENV'T 153, 153 (2006) (finding higher nitrous emissions from digested dairy manure compared to undigested manure).

[26] A. LEIP ET AL., EVALUATION OF THE LIVESTOCK SECTOR'S CONTRIBUTION TO THE EU GREENHOUSE GAS EMISSIONS (GGELS) –FINAL REPORT 100-01 (Eur. Commission, Joint Res. Ctr. 2010).

[27] *See, e.g.*, Laura Lynch, *Farms, Factories, and a Dangerous Nitrogen Overload*, PRI.ORG, Jan. 26, 2012, https://www.pri.org/stories/2012-01-26/farms-factories-and-dangerous-nitrogen-overload.

hog operations. Anaerobic digestion makes nutrients more readily available for plants,[28] meaning that less liquid waste is needed to adequately fertilize crops. Thus, the risk of over-application and runoff of nutrient-laden wastewater is substantial.[29]

The installation of anaerobic digesters over hog waste lagoons does not address the significant risk of pollution from industrial hog operations during major rain events, which are becoming more frequent and intense because of climate change. The lagoon and sprayfield system is extremely vulnerable to flooding during major rain events, which was evident during Hurricane Matthew in 2016 and Hurricane Florence in 2018, during which dozens of hog waste lagoons were inundated, overflowed, or breached.[30] Covered lagoons are just as vulnerable to inundation as uncovered lagoons, and sprayfields remain equally susceptible to flooding during major storm events. DEQ has committed to promoting resiliency as it charts a clean energy future for the State, and including biogas technology as part of the CEP is inconsistent with this stated goal.[31]

III. Conclusion

For almost three decades, swine lagoons and sprayfields have been a tremendous threat to the health and wellbeing of our environment and North Carolina's most vulnerable communities. Over 20 years ago, a Blue Ribbon Commission declared that the reliance on this system threatens North Carolina's waterways and should be discontinued.[32] Unless combined with a move away from lagoons and sprayfields, expanded biogas production offers at best very few remedies or mitigating effects, and at worst, the potential to exacerbate the harms described above. Biogas production is ill-suited to minimizing environmental damages without any accompanying

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[28] Joe H. Harrison et al., *Transformation and Agronomic Use of Nutrients from Digester Effluent*, EXTENSION.ORG (May 17, 2013), http://articles.extension.org/pages/67900/transformation-and-agronomic-use-of-nutrients-from-digester-effluent.

[29] Over-application of nutrients may go unnoticed for years, as soil samples are only required once every three years and groundwater sampling is only required under limited circumstances. *See* N.C. Gen. Stat. 143.215.10C(3)(6); *see also* Swine Waste Management System General Permit (2019), https://files.nc.gov/ncdeq/Water%20Resources/General-Permit---Swine-2019.pdf.

[30] *See e.g.*, Kendra Pierre-Louis, *Lagoons of Pig Waste Are Overflowing After Florence. Yes, That's as Nasty as It Sounds*, NY TIMES (Sept. 19, 2018) https://www.nytimes.com/2018/09/19/climate/florence-hog-farms.html (noting that at the time of writing, 110 hog waste lagoons had released or were imminently going to release hog waste into rivers and streams in eastern North Carolina).

[31] In an effort to mitigate the impacts of systems vulnerable to the effects of climate change, the State has invested in a buyout program to remove lagoons from the 100-year floodplain. DEQ should not contradict the policy objective of that program by inviting additional investment in facilities that pose an elevated risk to water quality.

[32] Blue Ribbon Study Commission on Agricultural Waste, *Report to the 1995 General Assembly of N.C. 1996 Regular Session* 29 (May 16, 1996), https://ncleg.net/Library/studies/1996/st10736.pdf (emphasis added).

requirements for the use of environmentally superior technologies. Yet, nothing in the current regulatory framework for biogas production requires such a transition.

For these reasons, swine waste biogas should not be counted among North Carolina's clean energy options or among the low greenhouse gas alternatives. The undersigned respectfully request that DEQ exclude biogas that is the product of swine waste-to-energy projects that fail to meet environmental performance criteria from the CEP. We are particularly concerned that biogas projects will compound the burden already disproportionately borne by people of color, who are statistically more likely to reside near permitted swine operations.

Thank you for consideration of these comments. We look forward to reviewing the draft Clean Energy Plan in the coming weeks and submitting additional comments at that time. Should you have any questions or wish to discuss these comments further, please do not hesitate to contact me at 919-967-1450 or bhildebrand@selcnc.org.

Sincerely,

Blakely E. Hildebrand
Staff Attorney
Southern Environmental Law Center

North Carolina Environmental Justice Network
Rural Empowerment Association for Community Help (REACH)
Waterkeeper Alliance
Winyah Rivers Foundation
Cape Fear River Watch
Sound Rivers, Inc.
Coastal Carolina Riverwatch
Crystal Coast Waterkeeper
White Oak Riverkeeper Alliance
Center for Biological Diversity
North Carolina Conservation Network
Yadkin Riverkeeper, Inc.
Lawyers Committee for Civil Rights Under Law - Regional Office
Natural Resources Defense Council

CC:

Michael Regan, Secretary, N.C. Department of Environmental Quality

Comments submitted to the N.C. Department of Environmental Quality regarding the Clean Energy Plan

Jonas Monast and Ethan Blumenthal
Center for Climate, Energy, Environment, and Economics (CE[3]) at the
University of North Carolina School of Law

July 25, 2019

We commend the North Carolina Department of Environmental Quality for developing a Clean Energy Plan for the state and for the multiple efforts to engage stakeholders during the process. The process is taking place at a time when energy regulators and electric utilities face risks of over-investment, stranded assets, and/or path dependencies that could prevent utilities from offering customers the lowest cost, highest value services. An effective Clean Energy Plan could result in emission reductions while also delivering additional benefits for North Carolina. In particular, the Plan can help guide long-term planning for the electricity sector at a time of economic, technological, and policy uncertainty. With a coordinated approach to energy and environmental policy, our state can reduce greenhouse gas emissions from the power sector, ensure continued access to affordable and reliable electricity, and address other electricity sector risks.

This comment letter provides a brief overview of the changes underway in the electricity sector. It then discusses the role of the North Carolina Utilities Commission (NCUC) and the opportunity to use the NCUC's existing statutory authority to implement clean energy goals while also ensuring that the state's electricity provides deliver affordable and reliable power. The letter concludes by discussing how a price on carbon—via a carbon market or a carbon tax—could provide much needed guidance to help manage the evolution of the state's electricity sector.

1. The Transitioning Electricity Sector

Low natural gas prices, decreasing renewables costs, aging infrastructure, and technological advances are driving a transformation across the U.S. electricity sector. A growing number of coal-fired power plants are struggling to remain competitive.[1] Nuclear power plants in some parts of the country are facing similar pressures.[2] In April 2019, the U.S. generated more electricity from renewable sources than from coal for the first time—an outcome based in part on the regular maintenance of coal-fired power plants during the Spring season but nonetheless a

[1] U.S. EIA, *Power Sector Coal Demand Has Fallen in Nearly Every State Since 2007* (Apr. 28, 2016), http://wnew.www.eia.gov/todayinenergy/detail.php?id=26012.
[2] *More Than Half of the Nation's Nuclear Power Plants Are at Risk of Closing* (NPR radio broadcast June 12, 2018 5:10 AM), *available at* https://www.npr.org/2018/06/12/618812542/more-than-half-of-the-nation-s-nuclear-power-plants-are-at-risk-of-closing.

noteworthy data point indicative of the expanding role of renewable energy resources.[3] The U.S. Energy Information Administration ("USEIA") projects substantial growth in both natural gas and renewable energy (nonhydroelectric) sectors, with natural gas growing the most on an absolute basis and renewables growing the most by percentage.[4] Battery storage technologies continue to improve and costs continue to fall. A recent report by the National Renewable Energy Laboratory, for example, found that there are opportunities to implement existing battery storage technology for peaking capacity throughout the U.S. and that potential increases sharply with increased renewable energy generation penetration.[5]

These factors are having direct impacts in North Carolina. In 2009, coal-fired generation accounted for approximately 55 percent of in-state electricity generation, followed by nuclear power at 34 percent.[6] Natural gas-fired generation accounted for only 4 percent of in-state generation at the time.[7] By 2018, natural gas accounted for approximately 33 percent of in-state electricity generation, with nuclear power and coal-fired power accounting for approximately 31 percent and 24 percent, respectively.[8] These changes contributed to a 25 percent reduction in the state's electricity sector carbon dioxide emissions and a 70 percent reduction in electricity sector sulfur dioxide emissions from 2007-2017.[9] The energy transition is not only impacting electricity generation, but also which companies are providing power in the state—independent power producers generated 8.74 percent of electricity generated in North Carolina in 2017, rising from only 1.13 percent in 2009.[10]

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[3] *Renewables outstrip coal in US electricity generation*, ENGINEERING & TECH. (June 28, 2019), https://eandt.theiet.org/content/articles/2019/06/renewables-outstrip-coal-in-us-electricity-generation/.
[4] ANN. ENERGY OUTLOOK 2018, *supra* note , at 13-14.
[5] *See* NREL, THE POTENTIAL FOR BATTERY ENERGY STORAGE TO PROVIDE PEAKING CAPACITY IN THE UNITED STATES (2019), https://www.nrel.gov/docs/fy19osti/74184.pdf.
[6] "Net generation for all sectors (thousand megawatthours)," U.S. Electricity Information Administration (last visited July 22, 2019). Accessed at https://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=vtvv&geo=00000004&sec=g&linechart=ELEC.GEN.COW-NC-99.A~ELEC.GEN.NG-NC-99.A~ELEC.GEN.NUC-NC-99.A&columnchart=ELEC.GEN.ALL-NC-99.A&map=ELEC.GEN.ALL-NC-99.A&freq=A&start=2009&end=2018&chartindexed=1&ctype=linechart&ltype=pin&rtype=s&pin=&rse=0&maptype=0.
[7] *Id.*
[8] *Id.*
[9] North Carolina Electricity Profile 2017," U.S. Energy Information Administration (released January 2019). Accessed at https://www.eia.gov/electricity/state/northcarolina/. *State Electricity Profiles 2009* at 202, U.S. Energy Information Administration (April 2011). Accessed at https://www.eia.gov/electricity/state/archive/sep2009.pdf.
[10] NORTH CAROLINA ELECTRICITY PROFILE 2017: FULL DATA TABLES, TABLE 10: SOURCE-DISPOSITION, U.S. ENERGY INFO. ADMIN. (2019), *available at* https://www.eia.gov/electricity/state/NorthCarolina/.

2. Expanding the Interpretation of "Least Cost" in Electricity System Planning[11]

The NCUC plays a key role in determining how electric utilities respond to the changing circumstances outlined above, the outcome of which will affect electricity rates, investor returns, public health, local and state economic development, and the state's contribution to the global challenge of climate change. This period of transition provides an opportunity for reexamining the role of least cost planning for the electricity system and the relationship between environmental impacts and consumer prices.

State utilities commissions typically employ a 'least cost' framework for assessing whether a utility's investment is prudent. Under the least cost framework, the optimal choice is the least cost investment after accounting for other factors such as reliability, state renewable energy or energy efficiency mandates, other legal obligations, and a range of risk factors. Least cost is not a rigid standard, however. The approach allows utility commissioners to exercise considerable discretion to choose among sources of information, desirable outcomes, and risk assessments. New information, changing market conditions, more stringent regulations, and emerging technologies can all alter the calculus. In some circumstances, it may be less costly to society to avoid potentially large rate increases in the future by investing upfront in higher cost generation options.

Decisions regarding the makeup of the electricity sector have wide-ranging economic and environmental impacts. While direct regulation of public health and environmental impacts generally fall outside the jurisdiction of the PUC, commissioners may consider the costs and impacts associated with emissions from power plants due to the financial impact of future environmental regulations. The PUC, therefore, need not take on the role of an environmental regulatory agency in order to consider, and potentially mitigate, the environmental impacts of utility sector investments.

Legislation explicitly expanding the range of factors PUCs consider may foster consideration of a broader suite of public policy goals affected by electric utility decisions. However, in the absence of legislation specifically expanding the factors they may consider, PUCs can generally take steps within their existing statutory authority to pursue a range of societal objectives affected by the electricity sector. For example, although direct regulation of public health impacts may fall outside the regulatory purview of the utility commissioner, it does not follow that commissioners must ignore the health impacts of their decisions. PUC decisions affect electricity generation investments and thus the amount and types of emissions. They also affect the economic impact of changing course due to the costs locked in when constructing a new power plant. Ignoring the prospect of higher costs over the lifetime of a facility may subject consumers to higher prices while also robbing them of the benefits of early action. Therefore, viewing environmental issues through the lens of potential increases in operating costs over the

[11] This section draws upon Monast's recent scholarship on electricity sector decision-making, including the following: Jonas J. Monast, *Electricity Competition and the Public Good: Rethinking Markets and Monopolies*, 90 U. OF COLO. L. REV. 667 (2019); Jonas J. Monast, *Maximizing Utility in Electric Utility Regulation*, 43 FLA. ST. U. L. REV. 135 (2016); Jonas J. Monast & David Hoppock, *Designing CO2 Performance Standards for a Transitioning Electricity Sector: A Multi-Benefits Framework*, 44 ENVTL. L. REP. 11068 (2014).

lifetime of a power plant should allow commissioners to consider impacts on public health and the environment under existing least cost framework unless explicitly prohibited by state law from doing so.

Identifying least cost investment options over the next one to two decades is particularly complex due to the increased level of uncertainty regarding technology, markets, and regulation. Projections may fail to consider the potential cost impacts of changing circumstances and may undervalue non-cost factors. As a result, the traditional application of the least cost framework may undermine the goal of minimizing cost in the long term, as policy shifts to force electric utilities to internalize environmental externalities or as consumers bear costs in other ways such as medical bills.

A Clean Energy Plan for the state could provide important guidance to help the state's utilities and NCUC commissioners apply the least cost framework to reduce the state's greenhouse gas emissions, deliver additional public health benefits, and maintain an affordable and reliable electricity sector. Changes in state laws or DEQ regulations that require electric generators to reduce emissions would directly influence NCUC decisions. Absent such changes, the Clean Energy Plan could include the following recommendations for NCUC decision-making that would not require changes to existing law:

1. Ensure that the NCUC's approach to least cost planning includes variables such as temporal considerations (e.g., short-term versus long-term "least cost" approaches);
2. Consider the potential for near-term technological advances to alter electricity demand projections;
3. Ensure that current investments do not foreclose the potential for new technologies and energy services to deliver consumer and environmental benefits; and
4. Identify investments that could lead to multiple benefits for the electricity sector, such as minimizing risks facing the sector (e.g., the risk of stranded assets due to new technologies, shifting economics, or changing customer expectations), reducing emissions, and ensuring reliability.[12]

3. The Benefits of Carbon Pricing

In addition to recommending an expanded approach to least cost planning, we also encourage DEQ to also explore carbon pricing strategies as part of the state's Clean Energy Plan. Predictable market signals could guide electricity investments, providing certainty to electricity generators, utility commissioners, and environmental regulators. Similar to the discussion in the previous section, a carbon price could also deliver additional benefits to the state. For example, the policy could combine climate change mitigation and adaptation goals, with the carbon price limiting emissions while also generating revenue to fund adaptation projects.

[12] For example, utilities may be able to forestall major capital investments in some situations, effectively delaying largescale expenditures that could potentially limit options to react to new information regarding market demand, fuel prices, and regulatory requirements. End-use energy efficiency—gaining the same service with less overall electricity consumption—may also be a cost-effective option to reduce greenhouse gas emissions, provide energy savings for consumers, and help utilities hedge against price volatility and uncertain demand growth.

North Carolina has history of forward-thinking energy laws that deliver economic, public health, and environmental benefits. The Clean Smokestacks Act, for example, required its investor-owned utilities to reduce sulfur dioxide and nitrogen oxide emissions from in-state power plants by more than seventy percent over an eleven-year period.[13] A Duke University study estimates that the law created between six and sixteen billion dollars in health benefits for North Carolina citizens.[14] In addition, North Carolina's utilities were well-positioned to comply with new federal regulations governing hazardous air pollutants from coal-fired power plants and sulfur dioxide and nitrogen oxide emissions that affect air quality in downwind states.[15] The Renewable Energy and Energy Efficiency Portfolio Standard similarly is a major factor for North Carolina's ranking as the state with the second highest amount of installed solar capacity, contributing to economic development in some rural counties and attracting new investments in the state.[16]

Policymakers could consider numerous options for implementing a carbon price. For example, Mid-Atlantic and Northeastern states already participate in a regional carbon market, known as the Regional Greenhouse Gas Initiative or RGGI. The participating states establish limits on greenhouse gas emissions from their respective power plants and the power plant operators must purchase an emissions allowance for each ton of carbon dioxide that they emit. To date, RGGI allowance auctions have generated over $3 billion, producing net economic benefits to participating states through investments in energy efficiency, renewable energy, and bill assistance for low-income consumers.

North Carolina policymakers could consider joining the RGGI market. Based on current RGGI allowance prices, North Carolina could generate approximately $200 million annually to provide bill assistance for low income ratepayers, fund economic development projects in areas negatively affected by the energy transition, fund energy efficiency projects to reduce emissions and electricity bills, and/or invest in resiliency emission reductions.

Alternatively, North Carolina could explore other options, such as establishing a broader market that extends beyond the electric power sector, implementing a carbon tax with revenues similarly dedicated to resiliency and mitigation efforts, or implementing a revenue-neutral carbon tax that returns revenues to N.C. residents. Each approach presents tradeoffs (for example, a revenue neutral carbon tax may mitigate costs for North Carolina citizens, but it would fail to generate revenue that could fund resiliency efforts and storm recovery). This comment does not endorse one approach over another.

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[13] Clean Smokestacks Act, 2002 N.C. Sess. Laws 4 (codified as amended at N.C. GEN. STAT. § 62-143 (2011) and N.C. GEN. STAT. §§ 143-215.105–.114C (2011)).
[14] David Hoppock *et al*., *Benefits Of Early State Action In Environmental Regulation Of Electric Utilities: North Carolina's Clean Smokestacks Act* 3, Nicholas Inst. For Envtl. Pol'y Solutions, NI WP 12-05 (2012), available at http://nicholasinstitute.duke.edu/climate/policydesign/benefits-of-early-state-action-in-environmental-regulation-ofelectric-utilities.
[15] *Id.*
[16] *North Carolina*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/state/?sid=NC (last visited July 18, 2019).

Conclusion

Thank you for the opportunity to submit comments regarding the development of North Carolina's Clean Energy Plan. Please contact the Center for Climate, Energy, Environment, and Economics at the UNC School of Law if we may be of assistance during the development or implementation of the Plan.