To: North Carolina Department of Environmental Quality
From: Clean Energy Plan - Customer Access to Renewables Working Group
Ref: Customer Access to Renewables: Tensions and Possible Solutions
Date: May 17, 2019

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 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 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

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 appears to also 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 access to renewables, and more regarding 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.

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.

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 customer access to renewables to the affordability 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 regulatory and policy actions that could be taken by the **North Carolina Legislature** to improve customer access to renewables, including ending the ban on third-party sales of electricity, expanding the cap on the solar rebate under HB 589, restoring the 35% renewable energy state tax credit, and requiring NC utilities to offer on-bill financing for both renewable energy and energy efficiency. The legislature could also enact a commercial PACE (C-PACE) program statewide; the administrative burden of administering a program at the county level is too high, and currently requires state-level approval.

Additional actions that could be taken by the **N.C. Utilities Commission** include requiring virtual net metering by NC utilities offering community solar programs, requiring utilities to invest in a specific amount of solar paired with storage, revising Duke Energy's Green Source Advantage Program to allow greater participation by smaller customers, and considering systems that allow consumers to choose to have their power supplied by renewable generation.

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.

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 lower efficiency/low-cost options.

Miriam Makhyoun and Conitsha Barnes presenting
Autumn Proudlove, Sterling Bowen, Elizabeth Severt and David Tsai also on Subcommittee

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?

DERs are: non-central power plant resources that do not have Automated Generation Control; may be distribution or transmission interconnected; can be in front of or behind a meter; can be generators or loads; can be passive or active; are either interconnected by the relevant utility process (in the case of generators) or enrolled in the serving utility's DR program (in the case of DSM measures); and can be owned by either the utility, the meter owner, or a third party.

Policy Options	Design Considerations	Benefits	Drawbacks
Third-Party PPAs	Eligible customers, system size limit, net metering eligibility	Provides additional financing and ownership options to customers. Allows third parties contracting with tax-exempt entities to claim the federal ITC.	
Virtual or Group Net Metering	System size limit, aggregate cap, REC ownership, eligible customers, eligible technologies, number of customers that may have a stake in a single project	Subscriber rate is tied to the net metering rate (can be benefit or drawback), provides an option for renters and customers without suitable sites for solar	
Community Solar or Community Renewable Energy Policy	Credit rate for subscribers, system size limit, aggregate cap, REC ownership, eligible subscribers, eligible technologies, subscription limits, carve-outs, project ownership (third parties only, utilities only, third parties and utilities) low-income provisions	Provides an option for renters and customers without suitable sites for solar. Program design is very important - can make a program successful or unsuccessful.	Program design is very important - can make a program successful or unsuccessful.
Bring Your Own Device Program (Batteries or Thermostats)	Compensation rate or incentive for participation, rules for participants (ex. Allowing utility to control the system at certain times)		
Optional Energy Storage/DER Rate	Energy rate structure (typically time-varying), demand charges (whether to include and what design - coincident peak, non-coincident, how many, rates, etc.), eligible technologies, eligible customers	Utilities can send price signals to DER owners	Tariff could shift system peak
Non-Wires Alternative Tariff and Procurement (credits for certain DERs in locations where aggregated they can potentially defer/mitiate distribution system investments)	Eligible circuits, eligible customers, eligible technologies, credit rate, interaction with other programs (like net metering)		
Performance-Based Demand-Side Management Compensation (credit for providing capacity during certain events or specified hours)	Eligible technologies (demand response, energy storage), eligible customers, time periods for compensation, notification procedures, compensation rate		
Microgrid Services Tariff	If a standby charge were included, how much would that detract from the tariff		Standby rate likely
Leasing	Aggregate cap, eligible customers, system size limit, net metering eligibility, whether utilities allowed to be lessors or not	Provides additional financing and ownership options to customers	Lessors leasing to tax-exempt entities may not claim the federal ITC.
Utility-Owned BTM Program	Aggregate cap, eligible customers, product, customer compensation or incentive, impact on third party market		
Optional Smart Home Rate	Energy rate structure, demand charges, eligible customers	Price signals	Privacy concerns

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?*

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 is 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..

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?
    - 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. hile 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."

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

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 are opposed to full-scale retail-choice deregulation and does not address it here.

We recommend convening a broad stakeholder group to explore these issues and tools further, and produce a comprehensive plan that clearly defines targets and aligns utility incentives and mandates in order to meet them. 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 was unable to achieve unanimity on all points, 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 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.

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.	Pass a new law, like a Clean Smokestacks 2.0, that would 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 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	Alternative cost recovery/ratemaking tools such as PBR (potentially including but not limited to MYRP, PIMs) Revenue decoupling

bias") and results in an incentive to do so.	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)

Members of the UBM Group:
Sarah Adair, Duke Energy
Zach Ambrose, Ambrose Strategy (for EDF)
Dionne Delli-Gatti, EDF
Molly Diggins, Sierra Club
Nick Jimenez, SELC
Miriam Makhyoun, EQ Research
Ryan Miller, NCBPA
Sally Robertson, NC WARN
John Thigpen, Bloomberg American Cities Climate Challenge (Charlotte)
Gudrun Thompson, SELC
Ivan Urlaub, NC Sustainable Energy Association
Michael Youth, NC Electric Cooperatives

Clean Energy Plan Memo - Utility System Planning and Investment

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, 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 essential participants and partners 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, clean energy advocates, and renewable energy developers.

North Carolina's current path, of gradual improvements to a traditional planning process, is not adequate to the challenges of integrating deep renewable and distributed energy penetration, which are, in turn, necessary for the state to achieve Executive Order 80's economy-wide GHG reduction targets. Therefore, it is necessary that North Carolina move to a more holistic, iterative, and transparent planning process that incorporates the market solutions, which are driving energy generation costs down, all while maintaining a clean, reliable, affordable, resilient, and secure electricity system.

In North Carolina, two trends run parallel to those developing nationally. First, there is the tension between the projected Integrated Resource Plan (IRP) put forward by the primary utility and the clean energy goals set by the state government. One factor underlying this tension is the lack of accountability and transparency in the goal-setting of the IRP process, which lacks rules governing stakeholder involvement prior to IRP submission, meaning that North Carolina's primary long-term energy planning mechanism is 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. Many stakeholder groups opposed the plan for a variety of reasons, including: overall cost and ratepayer impact, the utility's proposed cost recovery mechanism, and lack of DER opportunity evaluation. More broadly, the failure of the grid modernization plan in front of the Commission indicated the need for a collaborative planning process that is inclusive of, rather than adversarial to, clean energy and ratepayer stakeholders.

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 toward clean energy as 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]

Addressing the tensions present between multiple parties can be achieved through a more defined stakeholder-centered utility planning process, which could be authorized by either the North Carolina General Assembly or the Utilities Commission. This could entail either enabling legislation which defines the planning and investment process at a high level or result from a separate dedicated stakeholder process resource planning docket opened by the NCUC under existing authority. To align with proven success in other states, the process should initially include an Integrated Resource Plan (IRP) and Integrated Distribution Plan (IDP)[3], 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.

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[1] **The Coal Crossover: Economic Viability of Coal Compared to New Local Solar and Wind Resources**, Vibrant Clean Energy, March 2019.

[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

[3] 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 - See the following report for an in-depth report explaining the components and process: **Integrated Distribution Planning**, ICF International, August 2016

These regulated planning processes should be transparent, consistent, data-driven, and involve stakeholders both in goal-setting and planning phases. Such ISOP plans should be submitted on a regular schedule and include defined tools and outcomes. This includes improved data access for industry and stakeholders, which could come in the form of tools such as hosting capacity analysis, creating market opportunities and investment confidence. Any IRP, IDP, and ISOP requirements could be developed and defined collaboratively by the utility, stakeholders, and the NCUC.

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 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.

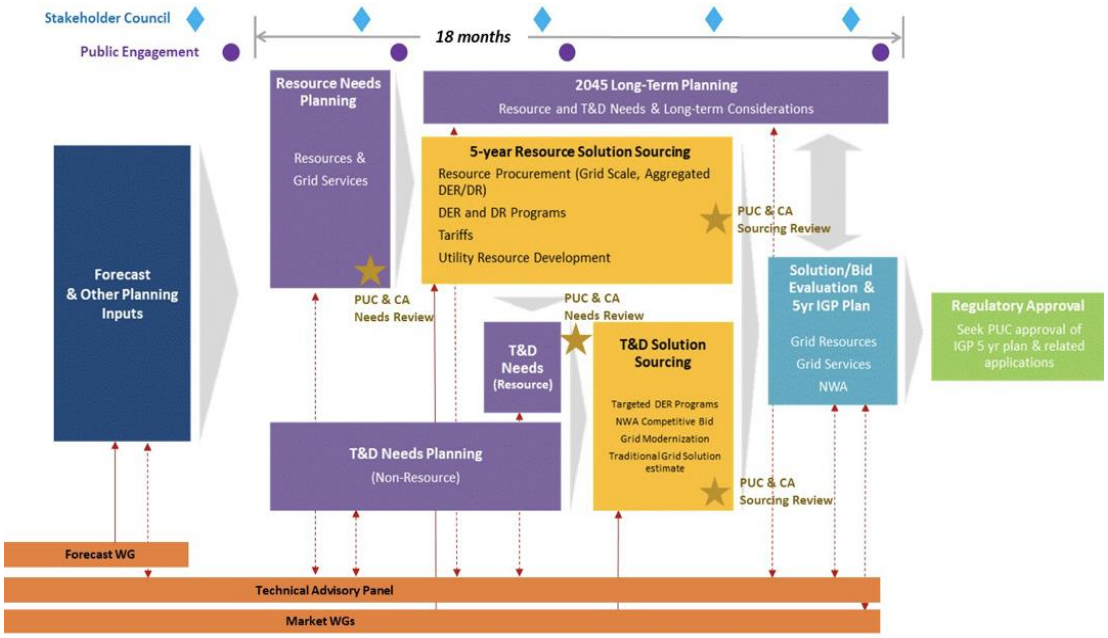

*Figure 1 - Hawaii's Integrated Grid Plan (analogous to ISOP) as an example of the complexity, transparency, and stakeholder engagement (**Integrated Grid Planning Report**, Hawaiian Electric, Maui Electric & Hawai'i Electric Light, March 1, 2018,)*

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.[4]

Minnesota

Goal: IDP aimed at better incorporating DERs with new and improved modeling/analysis tools

Outcome: Multi-year process now requires the regulated utilities (Xcel Energy) to develop DER 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.

Reference: Docket 15-556

Nevada

Goal: Address distributed resources along with their cost, benefits, financial compensation mechanisms, integration, and barriers to adoption.

Outcome: Distributed Resource Plan proposal including a system load/DER forecast, locational net benefit analysis, hosting capacity analysis, and grid needs assessment, filed every 3 years with the IRP.

Reference: SB 146, Docket 17-08022

Hawaii

Goal: Move to an Integrated Grid Planning (IGP) process to achieve 100% renewables by 2045

Outcome: A planning program which incorporates both distribution and generation planning that will continue to change over time. The IGP includes a capacity expansion model, a substation load and capacity analysis, hosting capacity analysis, and continual stakeholder engagement throughout the 3-year process, producing a 5-year action plan.

Reference: HB 623, Docket 2018-0165

A better defined and inclusive resource planning process can ensure that the needs of diverse grid stakeholder groups are accounted for and that the electric sector is able to do its part first in achieving EO80's economy-wide targets and, long-term, putting North Carolina on the path to a low-carbon future.

[4]We recommend inviting input from representatives of the cited states on how, coming out of the CEP process, North Carolina can transition going forward to a resource planning process which includes the same level of stakeholder engagement and transparency achieved elsewhere.

Equitable Access & Just Transition to Clean Energy

How can we achieve climate justice while ensuring equitable access to energy for all North Carolinians?

Globally, climate change and the rising cost of energy pose a huge threat for 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. These same communities are also burdened with the environmental and health burdens associated with the fossil fuel industry, including climate change, which have compounding effects on their quality of life. 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], people living in poverty have not seen the benefits of this growth. Unfortunately, there is a huge disparity between the people who experience an energy burden and those who benefit from the growing clean energy and energy efficiency industries and related investments. Public policy can help address this disparity - by focusing on energy equity and a transition to a clean energy economy that puts vulnerable communities first.

Policy Recommendations to Address Energy Equity in NC

Need	**Policy Recommendation**	**Decision Maker(s)**	**Action(s) Needed**
Address 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	Legislature DEQ	Legislative action needed to give DEQ this authority DEQ may need to make investments in monitoring ($$ from state budget)
Address 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 majority of funds going back to frontline and vulnerable communities	Legislature	Legislative action needed
	Targeted investment in resilient infrastructure and technical assistance for flood mitigation and climate adaptation and resilience planning in climate-vulnerable and low income communities.	DEQ Housing Finance Agency USDA NCORR	
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	NCUC	Regulatory change

[1] 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

	cost-effectiveness testing	Legislature	from NCUC; Might require expanding statutory language
	Eliminate or dramatically reduce fixed charges	NCUC	Regulatory change from NCUC
Expand energy efficiency as a tool for resilience and increase housing quality & 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
	Expand tariffed on-bill financing programs for rural cooperatives 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 communities	Create a Green Bank & Loan Loss Reserve Fund to make energy efficiency, renewable energy & building repair dollars available to residents, businesses, municipal utilities and institutions such as schools, faith institutions, and local governments. Connecticut & New York examples	DEQ Dept of Commerce Third-party administrator	Legislation required, also possibly NCUC authorization
Create long-term jobs with family sustaining pay and benefits for displaced fossil fuel workers and low income communities	Targeted investment in renewables, energy efficiency, home repair, and weatherization training programs through partnerships with schools. Successful Strategies from Low Income Solar Policy Guide	DEQ Commerce NCCAA	

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 the household expenses.
- **Accessible:** 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[3]:** Emissions-free energy generation that doesn't contribute 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, including 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), Rory McIlmoil (Appalachian Voices), Daniel Parkhurst (Clean Air Carolina), Nicole Spivey (Greensboro Sustainability Council), Rachel Weber (Dogwood Alliance), Walter Robinson (NC State University)*

[3] 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 May 17

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

Prepare **up to** a two page memo with the answers to the following questions. The memo should include 1-2 sentences or bullets at the top that summarize your key findings.

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. Since 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. There is a difference between reliability and resiliency, 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 benefit analysis 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.

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. The risk of cyber and physical attacks is very real. New grid technology and other investments can improve both reliability and resilience. Duke Energy has shared Grid Improvement Plans to strengthen the resilience of the grid, and is exploring the fundamental tension revolving around how to fund 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 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?

In summary of the policy options discussed above, the NCUC should define resilience, develop protocol for risk and cost benefit assessments, and identify challenges and possible solutions. In terms of possible solutions for grid resiliency, it is important to outline technologies that exist today to strengthen grid resiliency. When exploring technologies to strengthen grid resilience, the system should be divided into at least three parts – transmission, distribution, and customer/end user – each of which has different characteristics. Resilience should be considered from the aspect of the four National Infrastructure Advisory Council (NAIC) Resilience Constructs: robustness, resourcefulness, rapid recovery, and adaptability. With regards to increasing robustness of the three parts of the grid listed above, there are at least two options; withstanding the disaster through hardening and updated systems and having redundant systems in case one system does not withstand the disaster. Potential examples for each part are given in the table below:

	Transmission	**Distribution**	**End User**

Withstand	Harden and update	Harden and update	??
Redundant	Add lines	Islanding microgrids	Islanding storage

The state could also consider incentivizing investment in combined heat and power by state university system and other end users who have a constant need for both heat/cooling and electricity.