North Carolina
Clean Energy Plan
Workshop #5

North Carolina

Department of Environmental Quality

June 26, 2019

North Carolina

Clean Energy Plan Development

Workshop 5

Welcome, Opening Remarks, and Introductions – 9:00am

North Carolina DEQ and Rocky Mountain Institute

Objectives

- Present the vision statement and guiding structure for the Clean Energy Plan, along with an updated set of recommendations
- Prioritize and build out recommendations around *Equitable Access and Just Transition* and *Utility Incentives and Comprehensive System Planning*
- Share and discuss other related efforts going on in the state that can inform the development of North Carolina's Clean Energy Plan

Agenda

- Welcome, Opening Remarks, and Introductions
- Overview of Clean Energy Plan Vision, Guiding Structure, and Updated Recommendations
- Worksheet Activity on Prioritization Criteria for Recommendations
- Prioritization of *Equitable Access and Just Transition* Recommendations

BREAK

- Breakout Activity on Prioritized *Equitable Access and Just Transition* Recommendations

LUNCH

- Prioritization of *Utility Incentives and Comprehensive System Planning* Recommendations
- Clean Energy Plan Modeling and Other Collaborative Efforts (Part 2)

BREAK

- Breakout Activity on Prioritized *Utility Incentives and Comprehensive System Planning* Recommendations
- Next Steps

Proposed Ground Rules

1. Be Present
2. Democracy of Time

Check-In

Thinking back to the first workshop, how has your vision for North Carolina's clean energy future evolved with this process?

North Carolina

Clean Energy Plan Development

Overview of Clean Energy Plan Vision and Guiding Structure

North Carolina DEQ

Topics Covered

- Block Diagram Components
  - Vision statement
  - Pathway statement
  - Clean energy technology types
  - Views on current energy regulatory system
  - Values to prioritize going forward
- Clean Energy Plan Action Areas
- Review of Clean Energy Plan Structure and Outline

Vision and Pathway, Clean Energy Definition

Vision

The vision for NC's energy future:

- Is an energy system that is clean, equitable, modern, resilient, and efficient; in addition to being safe, affordable, and reliable,
- Increases deployment of both grid scale and distributed energy resources such as solar, energy efficiency, battery storage, wind, electrification, and other innovative technology solutions, and
- Gives customers more options and control over their energy use and supply, provides equitable access to renewable energy and energy efficiency opportunities, and offers fair rates for these services.

Pathway

To help achieve this vision, NC's energy policy and regulations should work toward an integrated energy system that:

- Recognizes the combined benefits of bidirectional flow of energy between the central grid and distributed energy resources,
- Invests and retains capital in local communities, creates workforce of the 21st century, and justly transitions to clean energy jobs,
- Serves as a catalyst for innovation, new business development, and economic growth in all parts of the state,
- Strengthens our resiliency to natural threats and decarbonizes the electric power sector, and
- Properly incentivizes the utilities, independent power producers, and consumers to make this vision a reality.

Clean Energy

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.

Views on the Current Energy and Regulatory System

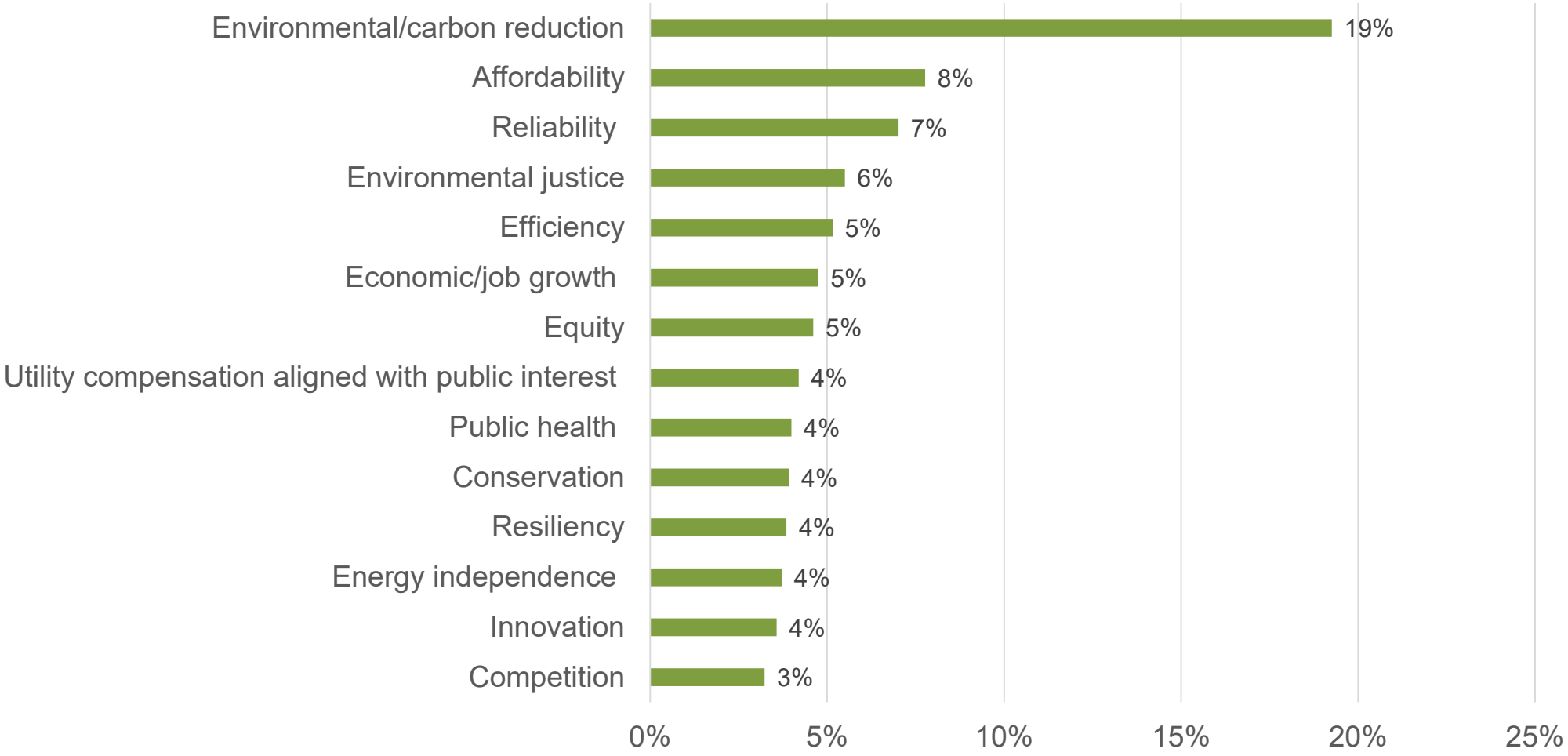
Successes

- Grid reliability
- Innovation
- Grid safety
- Affordability
- Investments in smart grid technologies
- Past incentives for RE and EE
- Investments in net metering
- Forward looking State policies
- Regional leader in solar energy growth

Challenges

- Decreasing market access
- Lack of transparency to customers
- IRP process results in stranded assets
- Aging grid infrastructure
- Unequitable access to clean energy
- Important changes require legislators to work together to meet people's needs
- Disproportionate energy cost and environmental burden to historically disadvantaged communities
- Misalignment between utility incentives and public desire for clean and zero carbon energy
- Lack of third party sales
- RE is unable to compete as least cost generation options due to integrated resources planning process (or cost-effectiveness tests)
- Expensive and complicated RE procurement process
- Lack of consumer choice and access to clean energy
- Lack of strong price signals toward clean energy
- Limited financing options for RE and EE investments
- Long interconnection delays and extensive administrative burden
- Decommissioning, Environmental, public health and societal impacts excluded from generation cost assessment
- Lack of comprehensive energy planning process for generation, transmission and distribution investments

Values to Prioritize Going Forward



Based on survey responses from ~400 stakeholders

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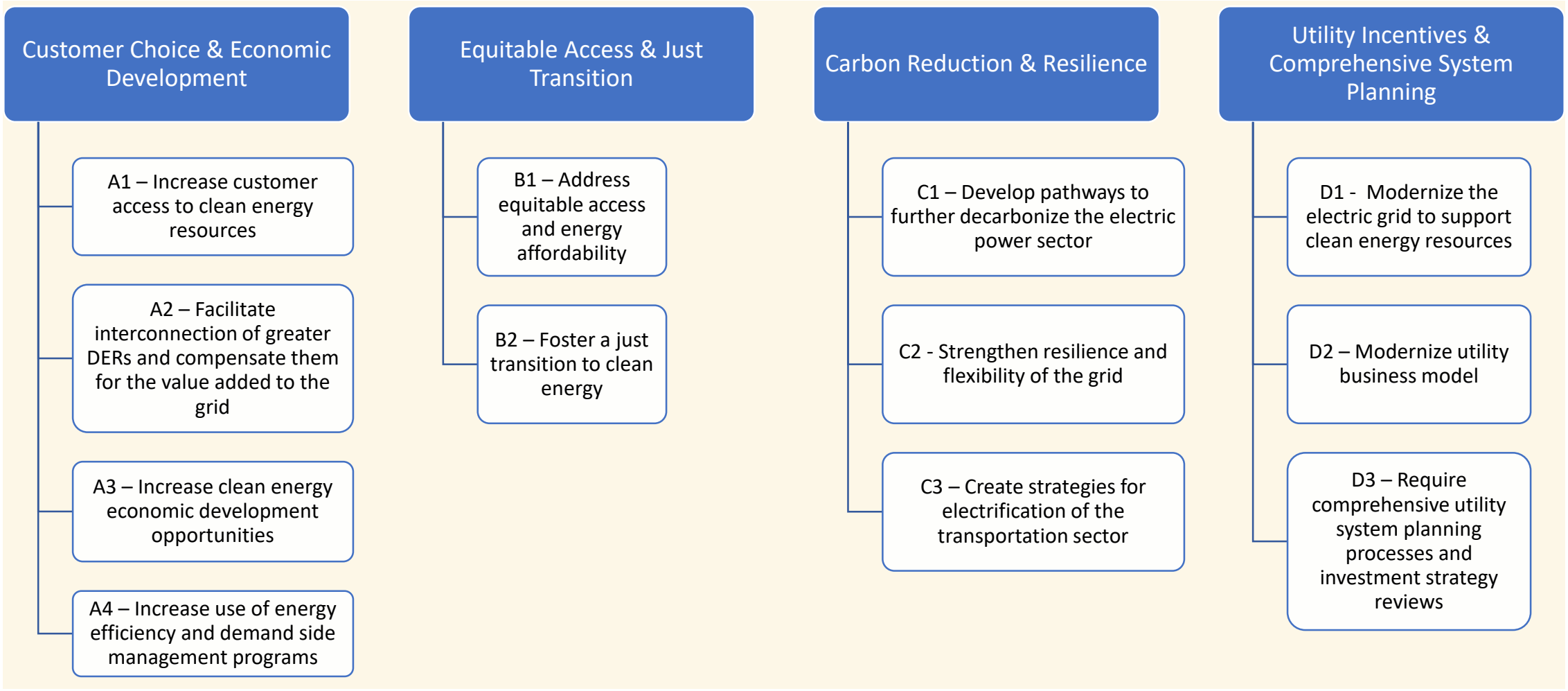
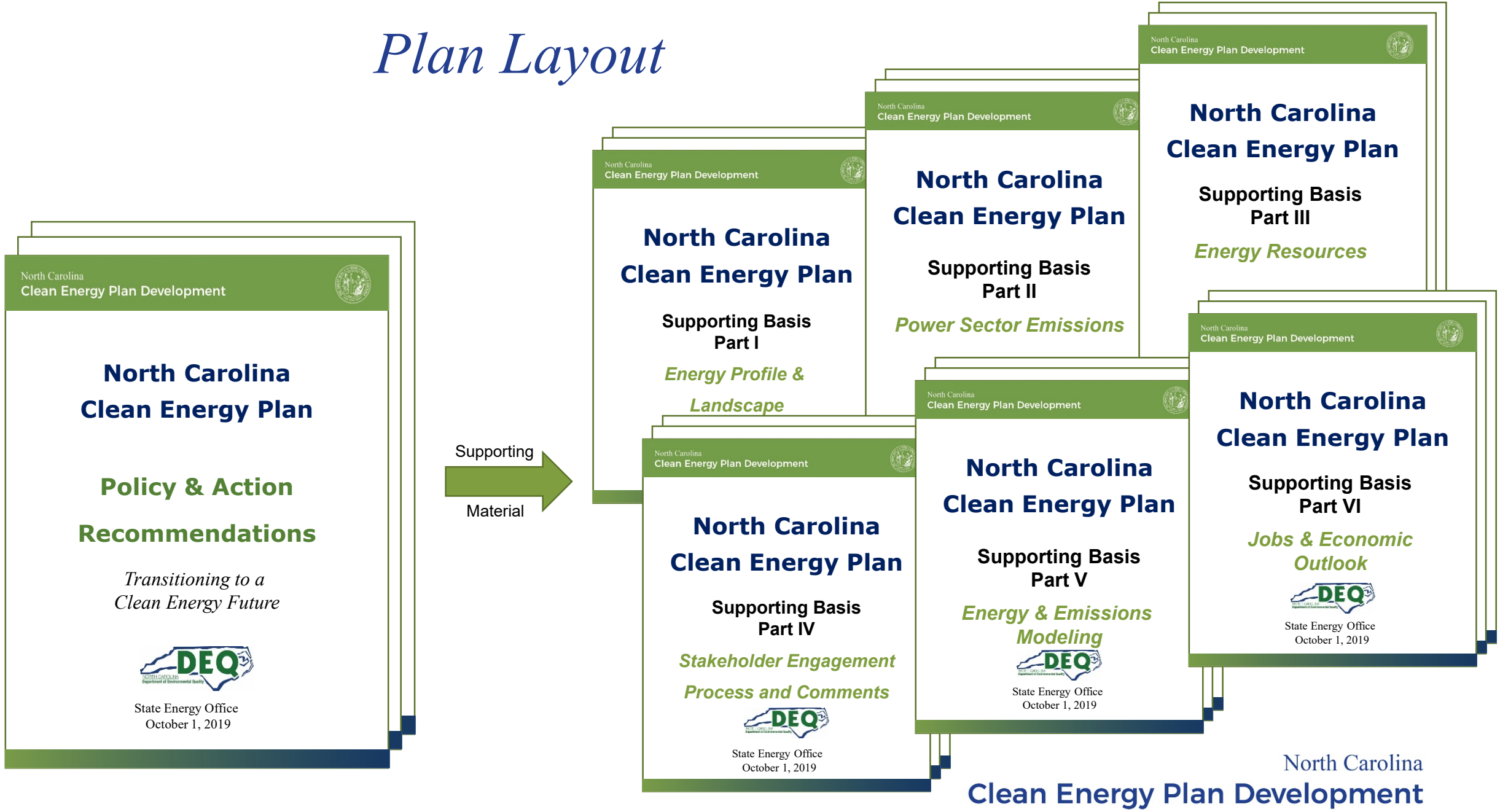
Clean Energy Plan Action Areas



Plan Layout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North Carolina
Clean Energy Plan
Policy & Action
Recommendations
Transitioning to a
Clean Energy Future
State Energy Office
October 1, 2019
Supporting
Material
North Carolina
Clean Energy Plan
Supporting Basis
Part I
Energy Profile &
Landscape
North Carolina
Clean Energy Plan
Supporting Basis
Part II
Power Sector Emissions
North Carolina
Clean Energy Plan
Supporting Basis
Part III
Energy Resources
North Carolina
Clean Energy Plan
Supporting Basis
Part IV
Stakeholder Engagement
Process and Comments
State Energy Office
October 1, 2019
North Carolina
Clean Energy Plan
Supporting Basis
Part V
Energy & Emissions
Modeling
State Energy Office
October 1, 2019
North Carolina
Clean Energy Plan
Supporting Basis
Part VI
Jobs & Economic
Outlook
State Energy Office
October 1, 2019
North Carolina
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Policy & Action Recommendations Draft Outline

I. **Acknowledgements**

II. **Introduction** (EO80 directive, process, timing, stakeholders, roles, …)

III. **Electric Sector Transformation in Process** <---- Workshops #1 – 4

IV. **Clean Energy Plan Stakeholder Process**

V. **Vision and Goals for North Carolina's Electricity System** <---- Workshops #1 - 2

VI. **Guiding Principles** <---- Workshops #1 - 2

VII. **Electricity System Values to Uphold and Promote** <---- Workshops #1 - 2

VIII. **Successes and Challenges of the Current System** <---- Workshops #3 - 4

IX. **Portfolio of Recommendations** <---- Workshops #5 - 6

X. **Detailed Recommendations** <---- Workshops #1 - 6

Supporting Basis Draft Outline

Part I – NC's Energy Sector Profile and Landscape

- Overview of Energy Sources: Electricity, Thermal Energy, Transportation
- Deeper Dive: Electricity Sector

Part II – NC's Power Sector Emissions

- Historic & projected GHG emissions under business as usual case

Part III – NC's Energy Resources

- Battery Storage
- Bioenergy
- Coal
- Hydropower
- Natural Gas
- Nuclear
- Solar
- Transportation Electrification
- Other

Supporting Basis
Draft Outline (Cont'd)

Part IV – Stakeholder Comments

- Clean Energy Stakeholder Engagement Process and Comments
  - Summary of Comments
  - Facilitated Workshops
  - Listening sessions
- Other Related Efforts
  - Energy Efficiency Roadmap
  - Cities Initiative
  - Southeast Energy Innovation Collaborative

Part V – Energy & Emissions Modeling

- Summary of External Modeling Assumptions, Policy Scenarios and Results
- External Modeling Analyses
  - NRDC Report
  - NCSEA Report
  - RFF Report
  - NCSU Report
  - Georgetown Climate Center Report
  - EPA Report

Part VI – Jobs & Economic Outlook

Current Schedule

June 26 - Workshop #5 - Stakeholders prioritize recommendations

July 24 - Workshop #6 **-** Stakeholders prioritize recommendations

August 12 – **September 4** Public Comment Period

End September – Final Plan presented to Climate Council for approval

October 1 – Final Plan submitted to the Governor

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Factors to Consider for Prioritizing Recommendations

Rocky Mountain Institute

Instructions for Worksheets

- Individually fill out worksheets to assess how each recommendation meets or does not meet criteria for prioritization
- Use 1-3 scoring:
  - 1 = does not meet criteria
  - 2 = partially meets criteria or neutral
  - 3 = meets criteria
- Timing:
  - 15 mins to individually fill out *Equitable Access and Just Transition* worksheet
    - 5 mins for partner discussion
  - 15 mins to individually fill out *Utility Incentives and Comprehensive System Planning* worksheet
    - 5 mins for partner discussion

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Prioritization of Equitable Access and Just Transition Recommendations

Rocky Mountain Institute

Prioritization Activity

- Choose two recommendations for the *Equitable Access and Just Transition* strategy and write on two index cards
- Pass around pairs of index cards until the alarm rings.
- When the alarm rings, stop and read the two cards you have and individually rate the recommendation on each card with a score of **1 to 5 for how important it is to include this recommendation in the Clean Energy Plan**
  - 1 = not important at all and 5 = extremely important
- Repeat 5 times
- At the end of five cycles, participants sum the five scores on the back of the last two cards they are holding

Equitable Access and Just Transition

Recommendations

1. Develop roof top solar and community solar rebate programs to increase access to diverse groups of customers, especially low-income
2. Include non-energy benefits (NEBs) in cost-effectiveness testing
3. 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.
4. 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
5. 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.
6. 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
7. Target investment in resilient infrastructure and technical assistance for flood mitigation and climate adaptation/resilience planning in climate-vulnerable and low-income communities
8. Targeted investment in renewables, energy efficiency, home repair, and weatherization training programs through partnerships with schools
9. Create long-term jobs with family-sustaining wages and benefits for low income communities in renewables/grid infrastructure industries

Implement carbon pricing policy that dramatically reduces carbon emissions and sets up

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Breakout Activity on Prioritized Equitable Access and Just Transition Recommendations

Rocky Mountain Institute

Building Out Recommendations

- Which values does this recommendation address? What other challenges does this recommendation help solve?
- What does implementation of this recommendation look like? What are the action items?
- What are the entities responsible for implementation?
- What would success look like in the near- and long-term?
- What metrics or data would need to be collected to track whether we're succeeding?

Building Out Recommendations

- **Values**:
  - Environment & Carbon Reduction
  - Reliability
  - Affordability
  - Efficiency
  - Economic/Job Growth
  - Environmental Justice
  - Utility Compensation Aligned with Public Interest
  - Equity
  - Public Health
  - Resiliency
  - Innovation

- **Potential Responsible Entities:**
  - Governor, Legislature, NCUC, DEQ, North Carolina Community Action Association (NCCAA), NC Department of Health and Human Services (DHHS), Local Gov, North Carolina Electric Membership Corporation (NCEMC), Commerce, North Carolina Office for Recovery and Resiliency (NCORR), Higher Education, Utilities, etc.

- **Near-term = 1-3 years; Longer-term = 3+ years**

LUNCH UNTIL 1:10

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Prioritization of Utility Incentives and Comprehensive System Planning Recommendations

Rocky Mountain Institute

Prioritization Activity

- Choose two recommendations for the *Utility Incentives and Comprehensive System Planning* strategy and write on two index cards
- Pass around pairs of index cards until the alarm rings.
- When the alarm rings, stop and read the two cards you have and individually rate the recommendation on each card with a score of **1 to 5 for how important it is to include this recommendation in the Clean Energy Plan**
  - 1 = not important at all and 5 = extremely important
- Repeat 5 times
- At the end of five cycles, participants sum the five scores on the back of the last two cards they are holding

Utility Incentives and Comprehensive System Planning Recommendations

1. Shift to a performance-based regulatory model (potentially including but not limited to multi-year rate plans and performance incentive mechanisms).
2. Require better utilization of energy efficiency, storage and renewables to manage peak demand
3. Support energy storage that provides localized power to offset demand
4. Utilize smart inverters, transformers and power controllers that facilitate bidirectional flow of power
5. Explore alternate cost recovery and/or incentives for utilities and third parties to invest in grid upgrades, storage investments and renewable sources
6. Increase speed and transparency of the interconnection process by updating or easing interconnection rules to facilitate higher levels of DERs
7. Launch public process to align utility incentives with public interest and grid needs
8. Support beneficial electrification
9. Explore and implement new tools to more quickly retire carbon-intensive utility assets
10. 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
11. Expand utility cost benefit methodology to include societal and environmental benefits

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Clean Energy Plan Modeling and Other Collaborative Efforts (Part 2)

Franz Litz, Litz Strategies and Georgetown Climate Center

GEORGETOWN CLIMATE CENTER

A Leading Resource for State and Federal Policy

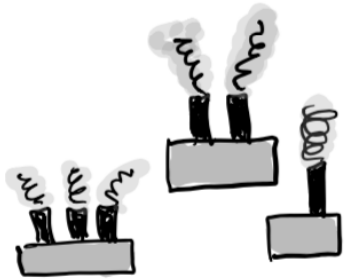
Understanding the Potential Impacts of an Electricity Sector Cap

Clean Energy Plan
Stakeholder Workshop #5

June 26, 2019

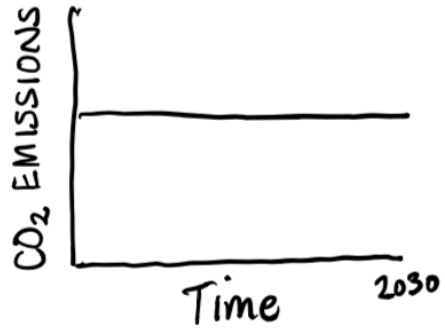
The Virginia Example

POWER SECTOR



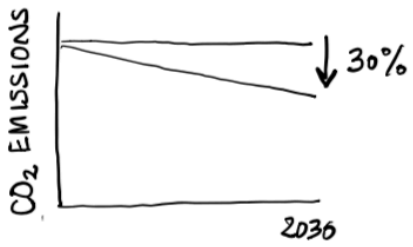
OPPORTUNITIES

EMISSIONS FLAT



What to do?

CAP+
REDUCE



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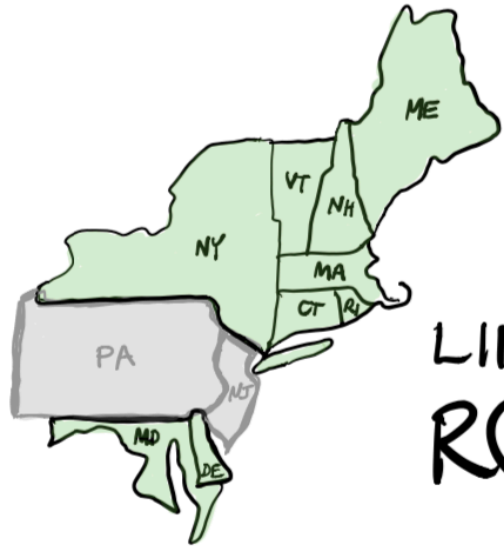


LINK TO
RGGI

STEPS IN VA's PROCESS

GOVERNOR'S EXECUTIVE ORDER

VA DEQ PROGRAM DESIGN ⟷ RGGI MODEL RULE

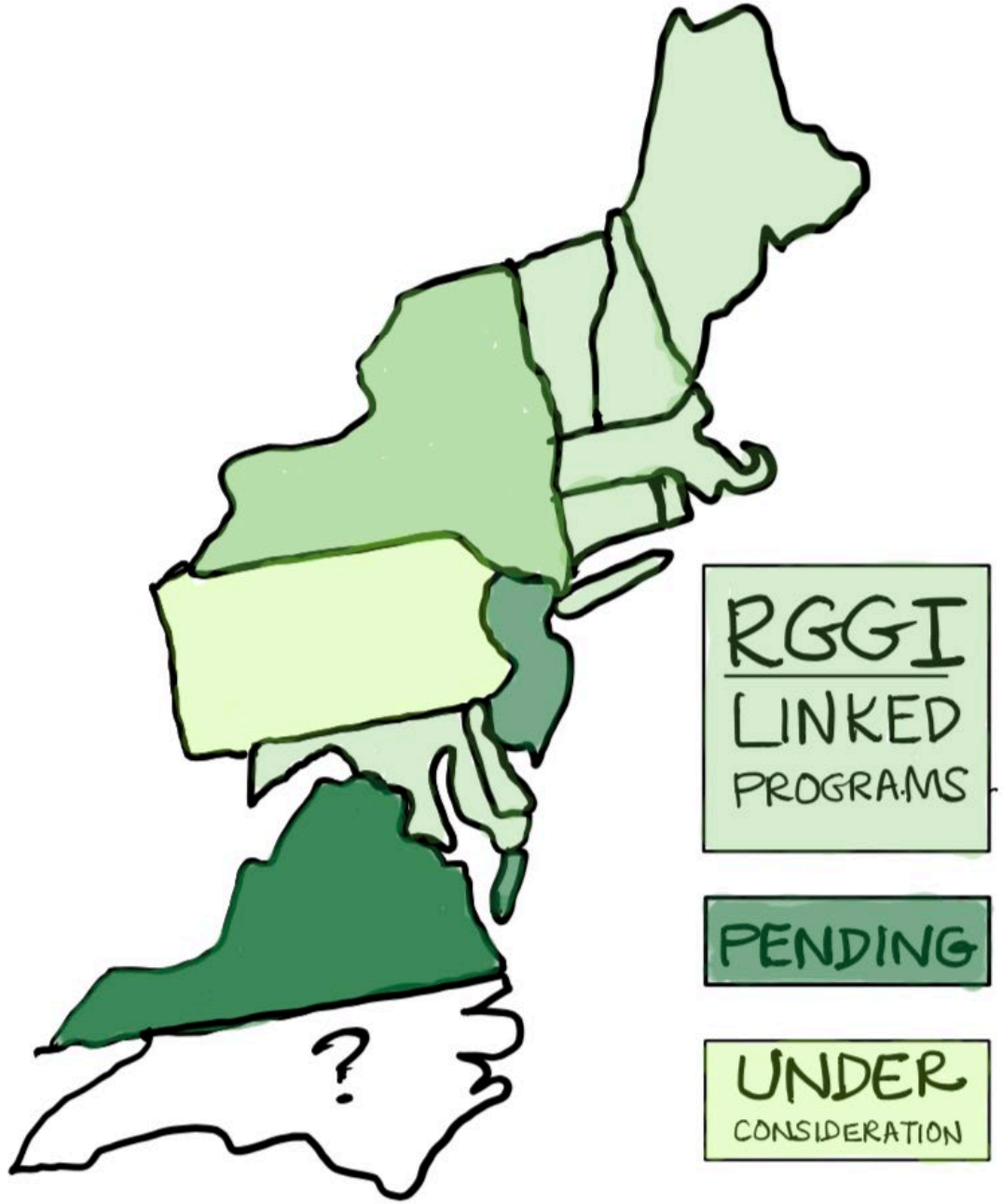
MODELING A FUTURE WITH A CAP ⟷ ICF's IPM

TALK TO RGGI

DESIGN AMBITION

ADMINISTRATION

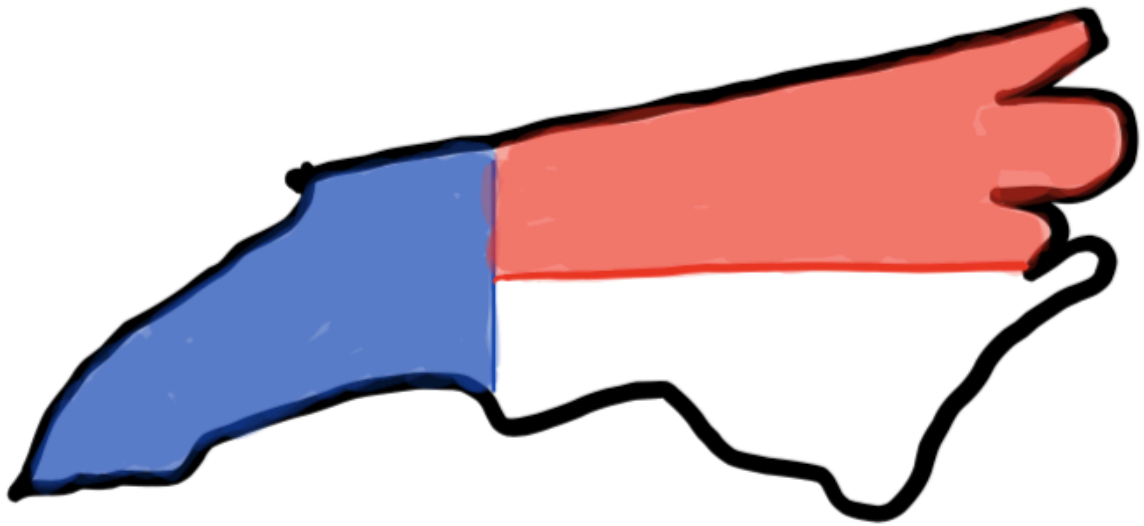
VA DEQ RULE-MAKING



RGGI LINKED PROGRAMS

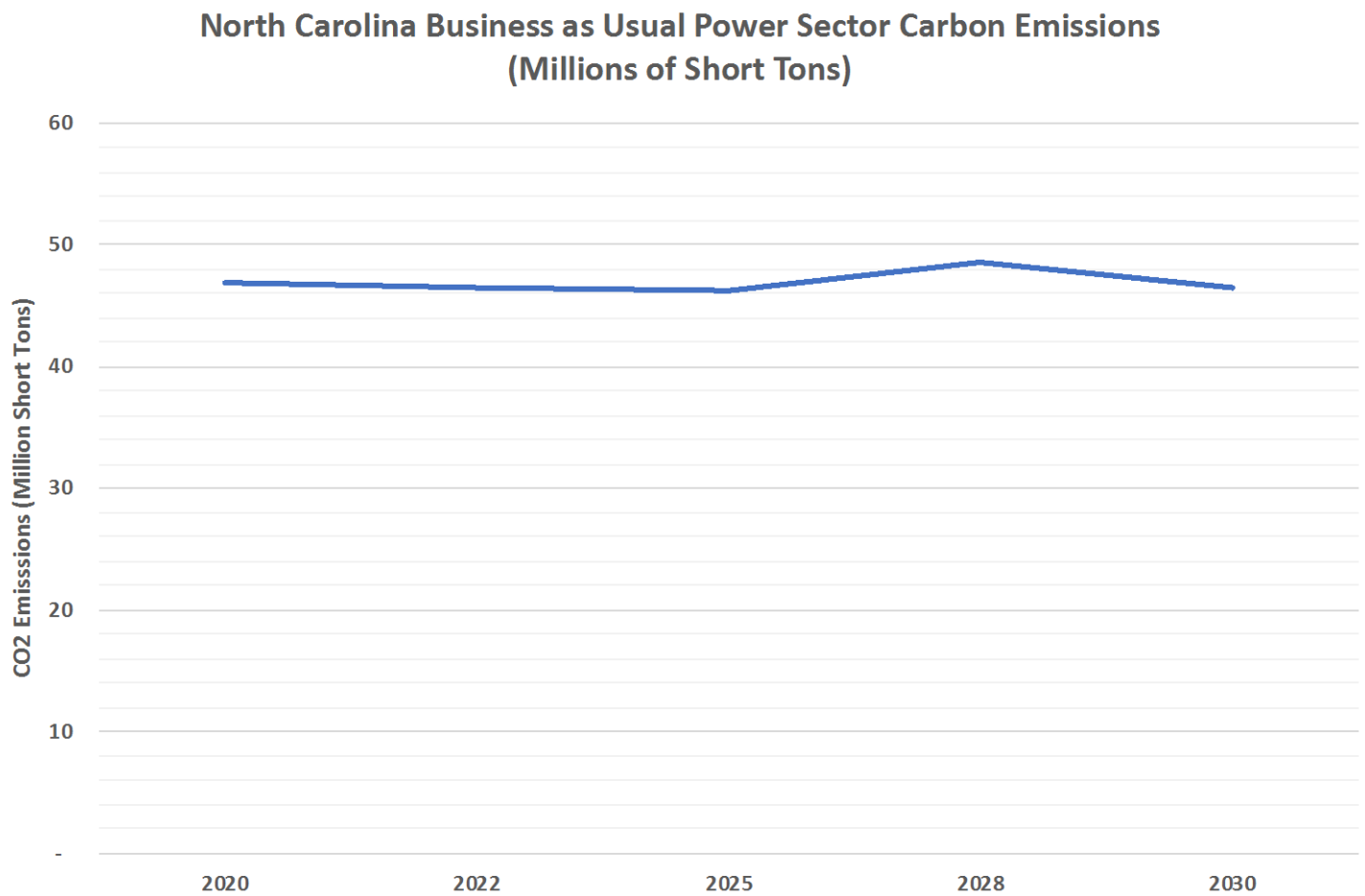
PENDING

UNDER CONSIDERATION



GOVERNOR'S EXECUTIVE ORDER 80

What do we expect Business as Usual?



MODEL PROJECTS FLAT EMISSIONS

WHAT MODEL?

ICF's Integrated Planning Model (IPM)

Used by RGGI, EPA, MOST UTILITIES, NRDC

We used RGGI's 2018 Assumption Book

Included NC statute + NC-specific inputs

WHAT HAPPENS TO THE FLEET BY 2030?

(BUSINESS AS USUAL)

SOLAR CAPACITY ↑↑

3GW

BEYOND

THE 2.7GW

REQ'D BY

HB 589

(5.7GW TOTAL)

GAS CAPACITY ↑

1.9 GW

BEYOND

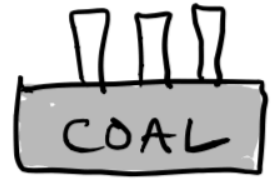
1.5 GW

PLANNED

BY DUKE

(3.4GW Total)

COAL CAPACITY ↓



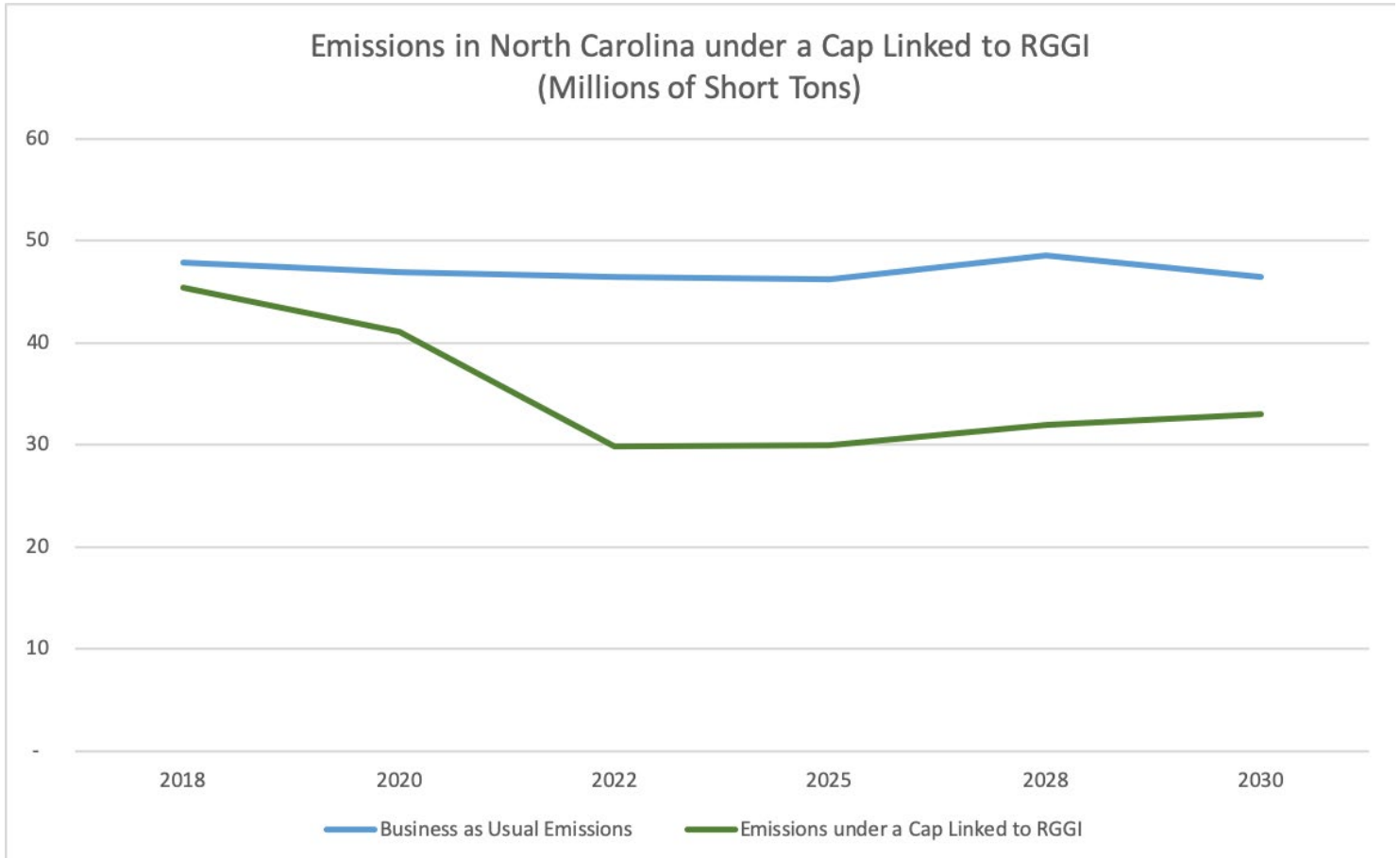
3.9 GW

RETIRE

by 2030

WHAT HAPPENS WHEN N.C. IMPLEMENTS A CAP THAT:

- STARTS IN 2022;
- DECLINES 3%/yr for 10 years; and
- Has cost-management features of RGGI.



CAPACITY

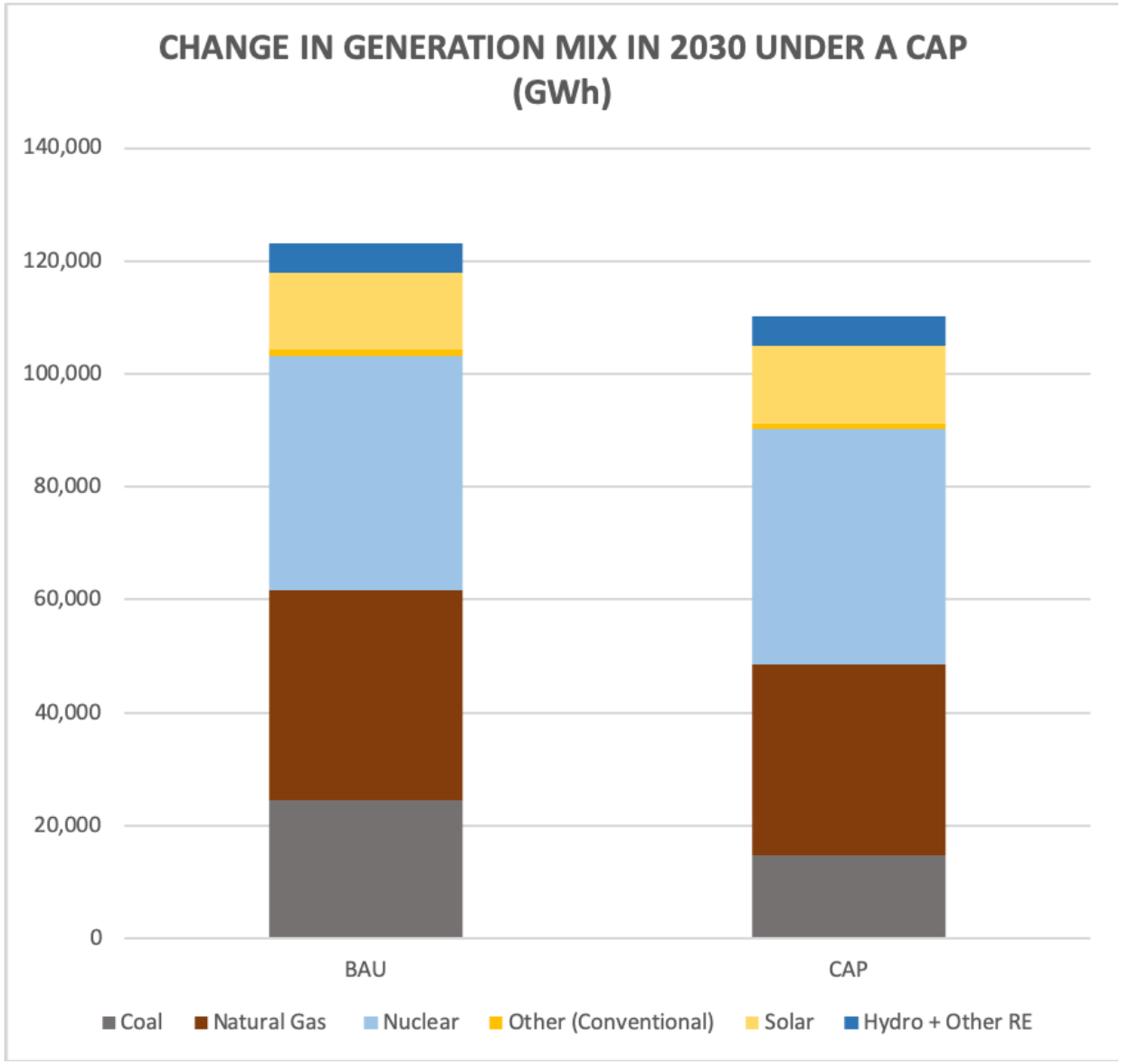
- Less gas is built ~ 860MW
- A bit more solar is built ~ 80MW

GENERATION

Less gas (8% or 6TWh)

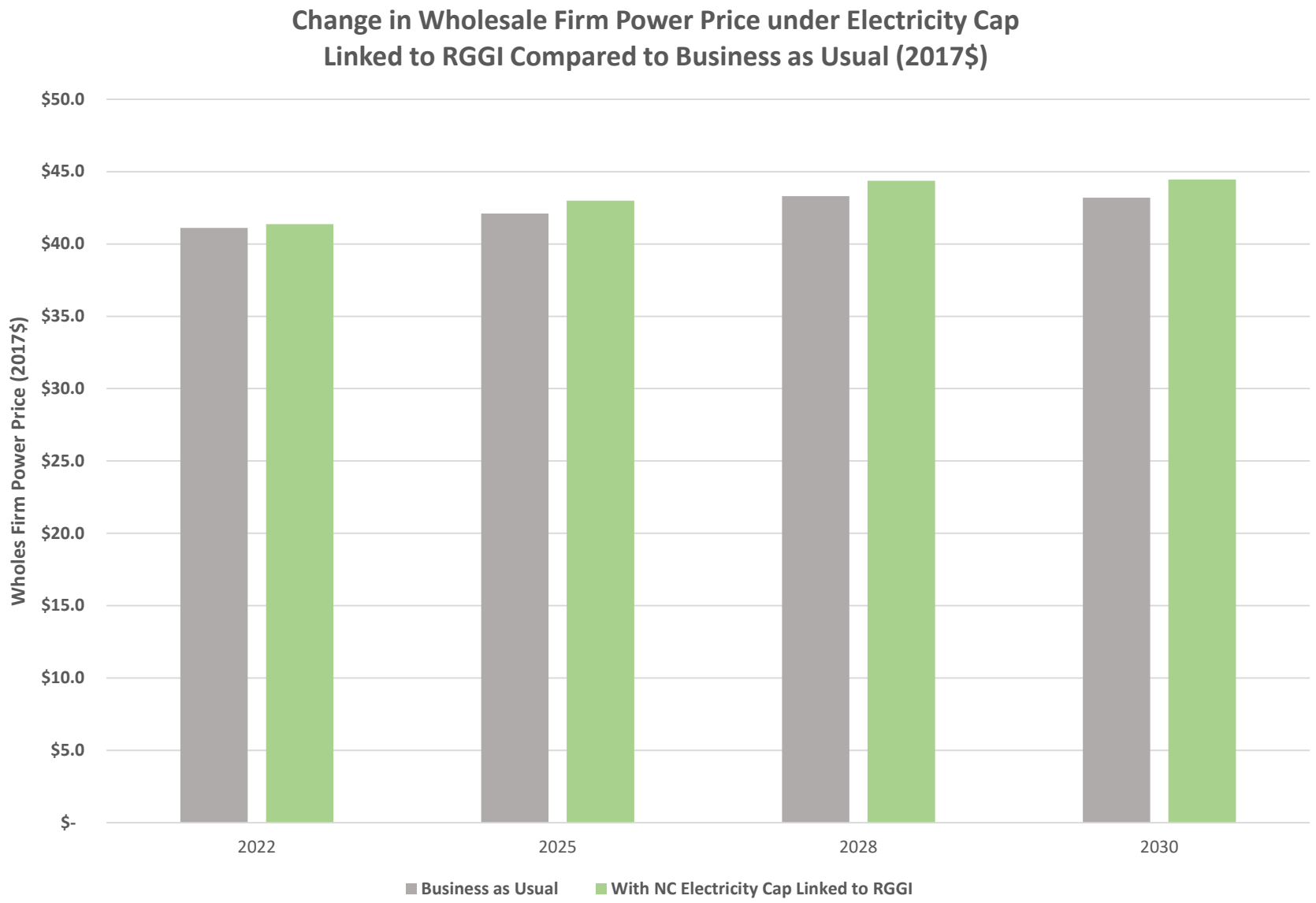
Less coal (40% or 10TWh)

A Bit More Solar (100GWh)

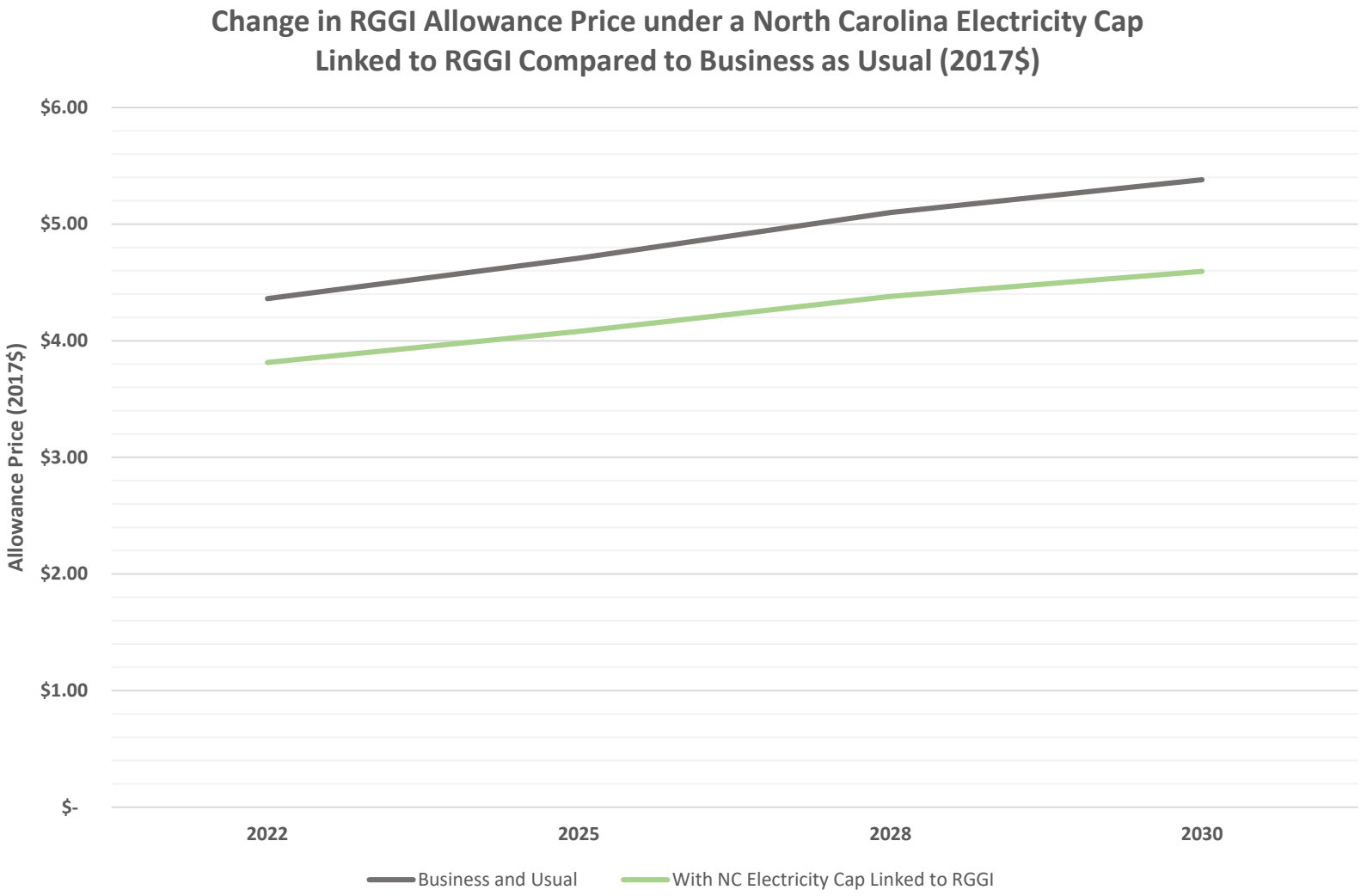


WHOLESALE ELECTRICITY PRICES

- RETAIL IMPACTS EXPECTED TO BE A FRACTION OF WHOLESALE
- ALLOWANCE VALUE CAN BENEFIT CONSUMERS



ALLOWANCE PRICES LOWER



CONCLUSIONS

1. NEW ACTION REQUIRED TO REDUCE EMISSIONS

2. A DECLINING CAP SIMILAR TO THAT ADOPTED BY VIRGINIA MAY BE AN ATTRACTIVE OPTION TO REDUCE EMISSIONS

GEORGETOWN CLIMATE CENTER
A Leading Resource for State and Federal Policy

Thank You!

franz@litzstrategies.com

North Carolina
Clean Energy Plan Development

Clean Energy Plan Modeling and Other Collaborative Efforts (Part 2)

Amanda Levin, NRDC

North Carolina's Power Future:

2019 Carbon & Clean Energy Policy Scenarios

PRELIMINARY RESULTS – KEEP CONFIDENTIAL

IPM MODELING UPDATE OVERVIEW

The following Natural Resources Defense Council (NRDC) analysis is based on Integrated Planning Model (IPM®) runs conducted by ICF. All assumptions were developed by and for the NRDC.

What is the Integrated Planning Model?

- ICF's Integrated Planning Model (IPM®) is a detailed model of the electric power system that is used routinely by the electricity industry and regulators, including the RGGI states, to assess the effects of environmental regulations and policies.

- IPM® determines the most cost-effective pathway available for the construction, economic retirement, and use of power plants, subject to resource adequacy requirements and environmental constraints.

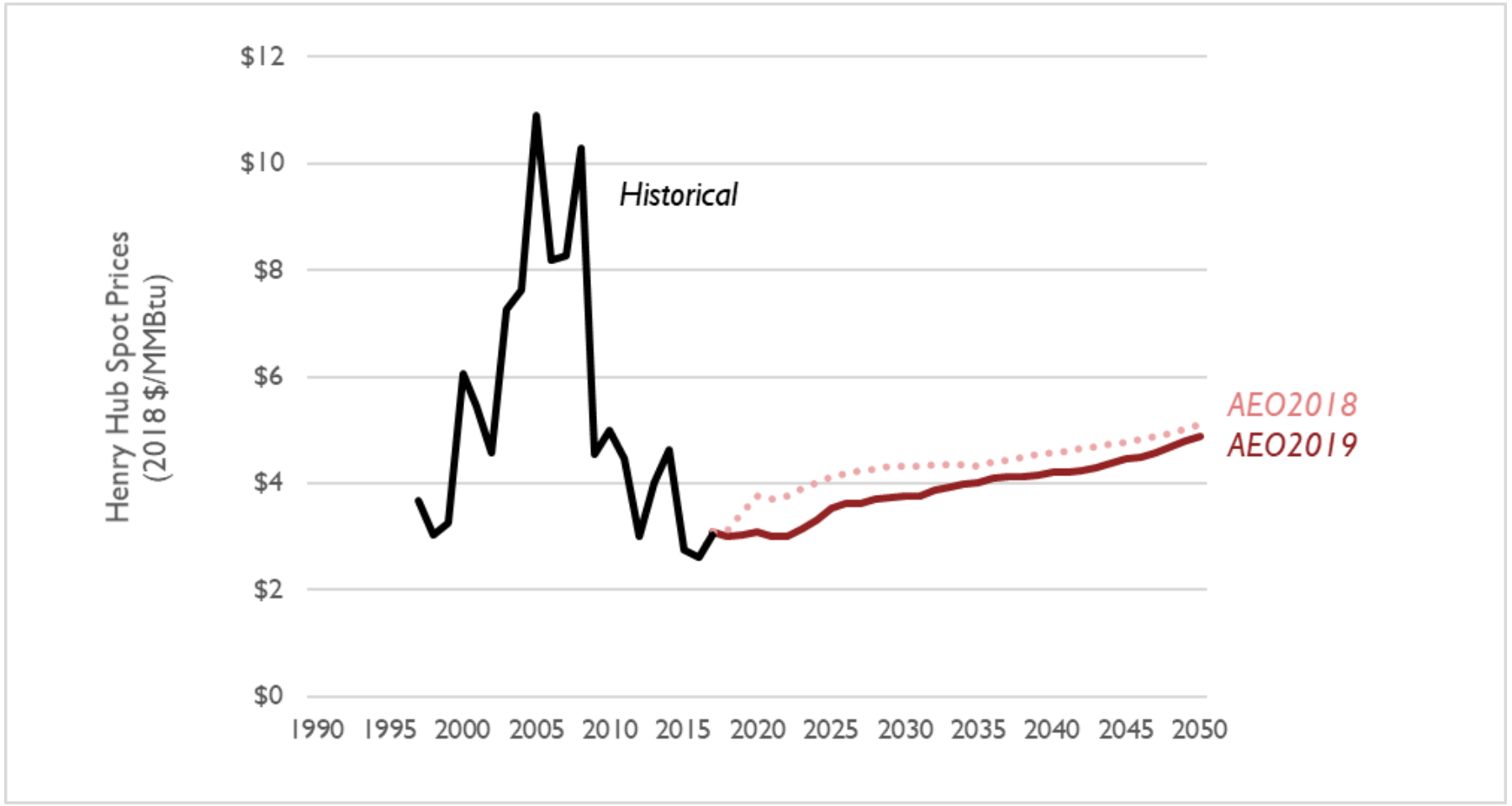
- The outputs of IPM ® modeling include emissions of carbon and other pollutants, wholesale electricity prices, natural gas prices, electricity generation by fuel type, and capacity retirements and additions, which are inputs in the calculation of retail bills.

- The modeling projections that follow are from an NRDC analysis performed by ICF. All assumptions and policy scenarios were developed by NRDC.

Model Scenarios	
Case Name	**Description**
"Optimized" BAU	Uses IPM v6. **Reflects 2019 assumptions for** demand, cost, & performance and energy policies as of Q1 2019.
IRP-Like BAU	BAU 2019 + **New Builds to match DEC and DEP's "No Carbon" IRP Cases**.
Clean Energy Policy	BAU 2019 **+ Stronger RPS & EERS.** EERS set at 1.5% (0.25% ramp rate). RPS set at 30% by 2030 (linear trajectory from 12.5% in 2021 to 30% in 2030)**.**
RGGI (w/ Leakage Measures)	BAU 2019 **+ NC Joins RGGI in 2021**. NC's Mass cap is set at 44.5 million short tons (2020 BAU Emissions). Cap declines by 3%/yr through 2030. Flat thereafter. As a "leakage mitigation" measure, in-state generation must be greater than or equal to "optimized" BAU in all years.
RGGI + Clean Policy	NC joins RGGI (same details as above RGGI run) plus the stronger RPS & EERS (as detailed in the clean energy policy case)**.**

	2019 Reference Case
Assumption	**Reference Case Sources**
IPM Version	IPM EPAv6
Electric Demand	AEO 2019
Capacity Build Costs - Conventional	AEO 2019
Capacity Build Costs - Renewable	NREL 2018 ATB. ITC and PTC assumed per 2015 omnibus.
Capacity Build Costs - Storage	Storage allowed as an economic addition. Costs reflect NRDC assumed trajectory (mid-case projection between ICF's default costs, McKinzie, Lazard, and BNEF)
Coal Supply/Prices	EPA v6
Gas Supply/Prices	Fuel Supply Curves (AEO 2019), based on AEO2019 reference case.
Firm capacity additions and retrofits	Latest market information (Q1 2019) and NRDC input
Nuclear Retirements	Any nuclear reactors that reach age 40 can receive a subsequent license renewal and operate for 20 more years. Additional 20-year renewal is allowed at age 60 (max lifetime is 80 years).
Pollution Control Retrofit Costs	EPA v6
CCS Retrofit cost and performance - Coal	EPA v6
CCS Retrofit cost and performance - Gas	Include new build options only; EPA v6
Biomass co-firing at coal facilities	EPA v6
Gas co-firing at coal facilities	EPA v6; NC units explicitly reviewed by ICF to accurately reflect operational parameters.
Coal-to-gas conversions	EPA v6; NC units explicitly reviewed by ICF to accurately reflect operational parameters.
Unit-level heat rates	EPA NEEDS v6
(Regulatory) RPS & State Policies	Reflects RPS and state policies as of January 2019. All battery storage, offshore wind, and solar carve-outs are reflected, where applicable. Includes HB589.
(Regulatory) SO2/NOx	CAIR and CSAPR
(Regulatory) MATS	As finalized; allow HCl compliance via low-chlorine PRB coals
(Regulatory) Coal Combustion Residuals	Include
(Regulatory) Water Intake Structures	Include
(Regulatory) RGGI	Include new model rule; NJ and VA join at NRDC's recommended levels in 2020.
(Regulatory) CA AB32	Include
(Regulatory) Regional Haze	Include
(Regulatory) CPP Constraints	No Banking. No CPP in Base Case.
(Structure) Run years	(state reporting 2020 - 2050)
(Structure) EE Supply Curves	3 supply curve steps per region with utility program costs in line with NRDC 2017 analysis
(Structure) Heat Rate Improvements	EPA v6 (not included in Reference Case)
EE penetration	Based on NRDC analysis

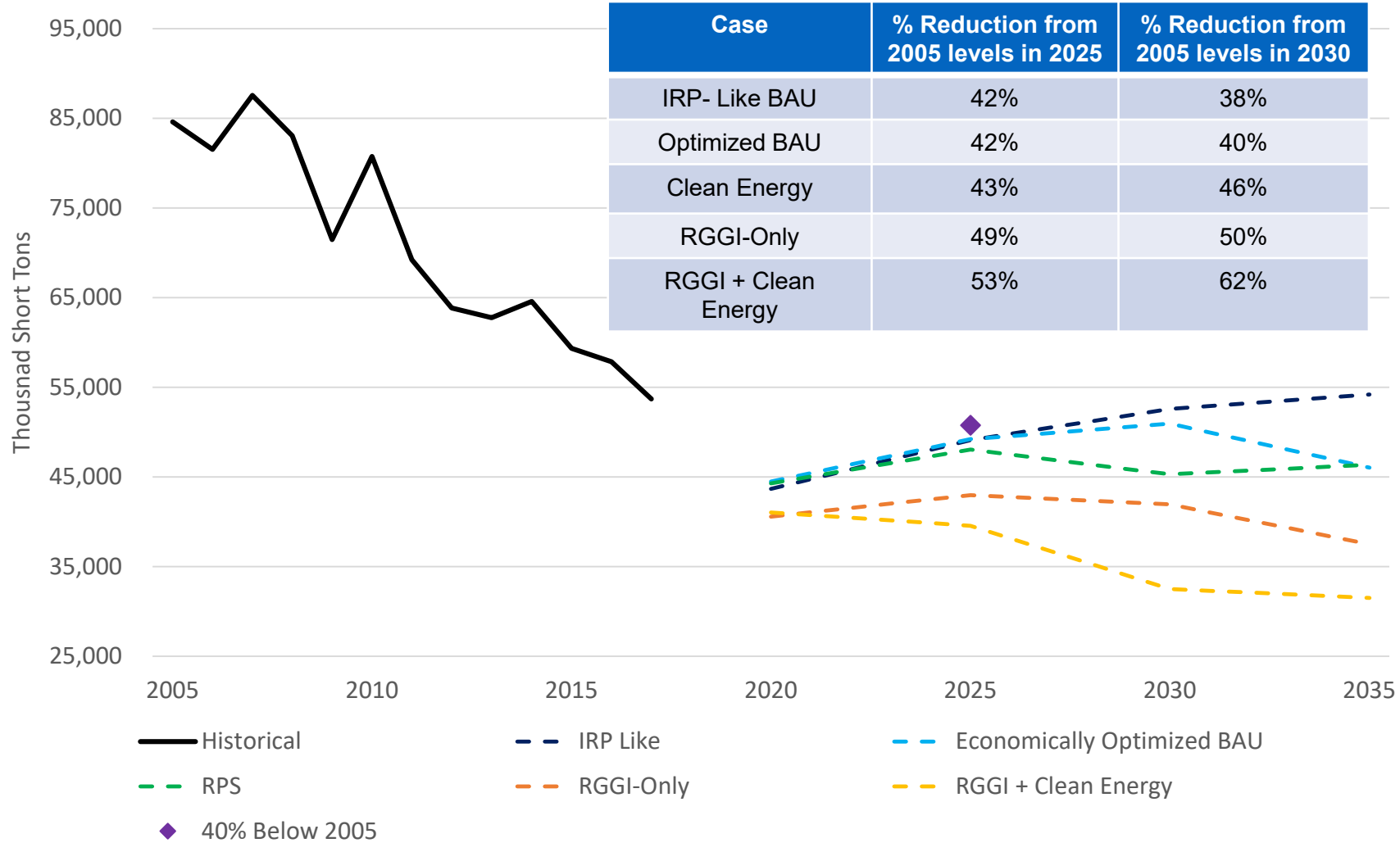
Gas Price Projections



PRELIMINARY RESULTS

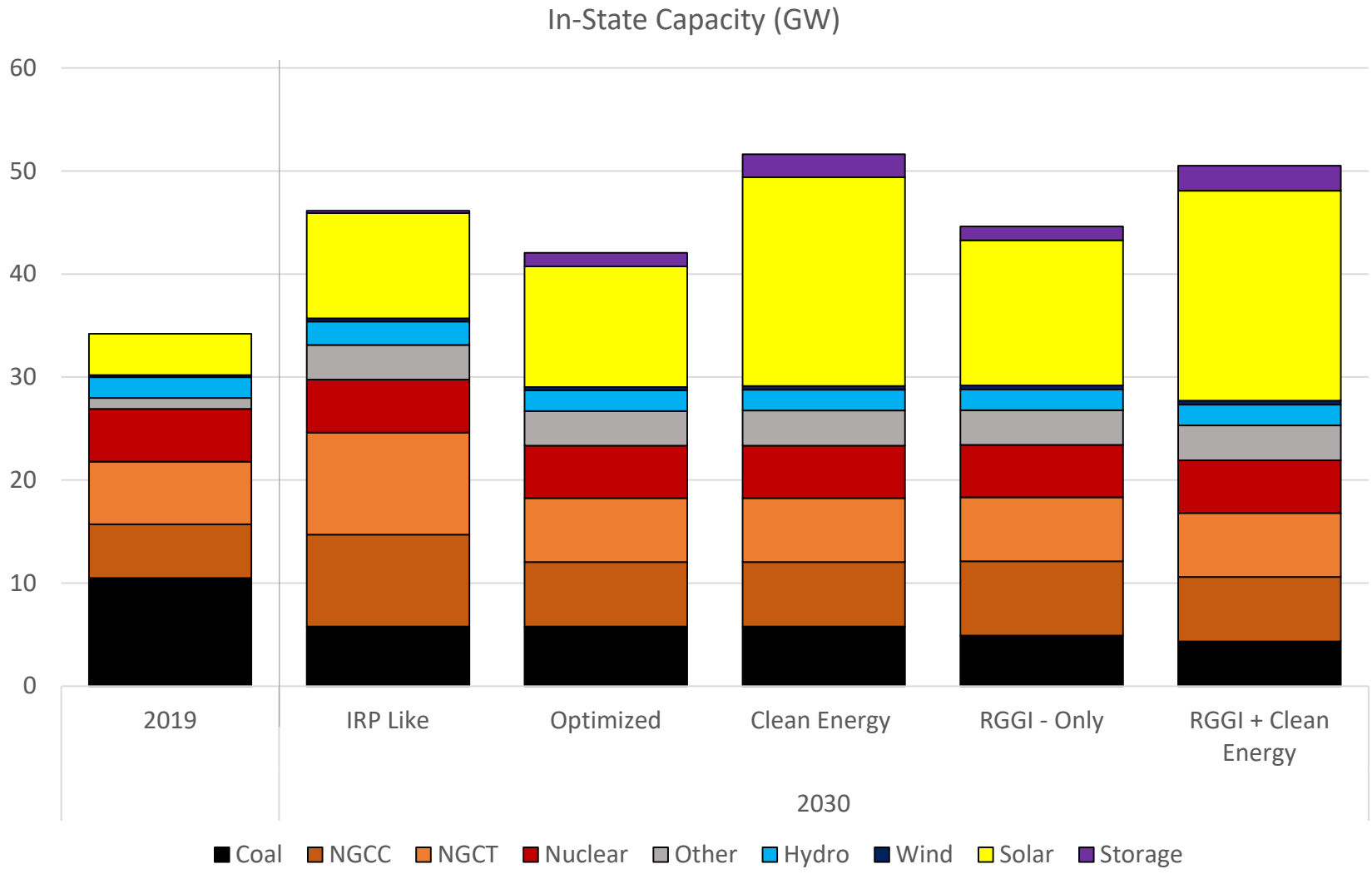
Power-related Carbon Emissions: 2005-2035

Case	% Reduction from 2005 levels in 2025	% Reduction from 2005 levels in 2030
IRP- Like BAU	42%	38%
Optimized BAU	42%	40%
Clean Energy	43%	46%
RGGI-Only	49%	50%
RGGI + Clean Energy	53%	62%



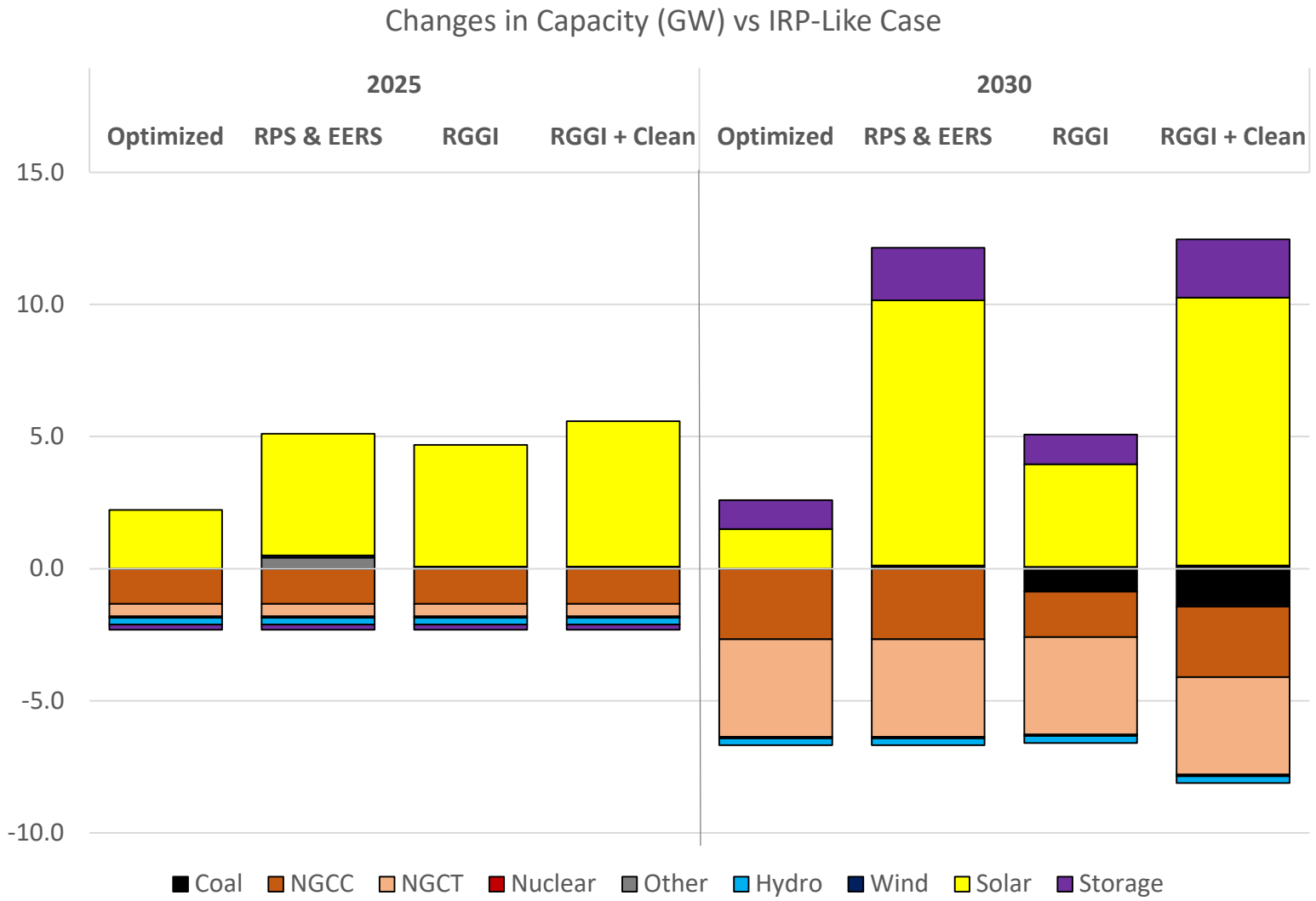
Preliminary Results (email alevin@ or lmartinez@nrdc.org to use or share materials or findings)

Snapshot: Capacity in 2030



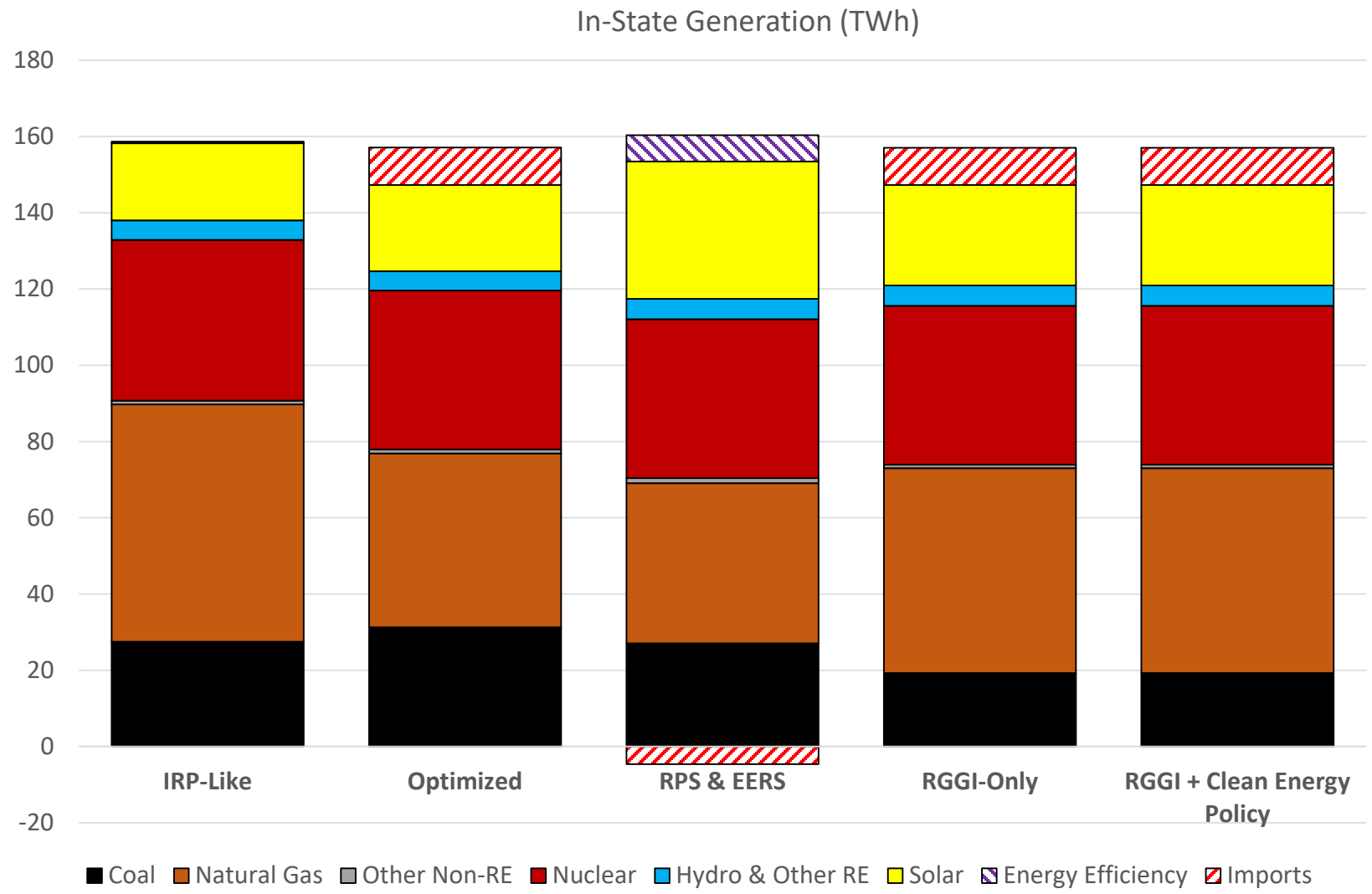
Preliminary Results (email alevin@ or lmartinez@nrdc.org to use or share materials or findings)

Capacity Changes: Policy and Optimized versus "IRP-like"



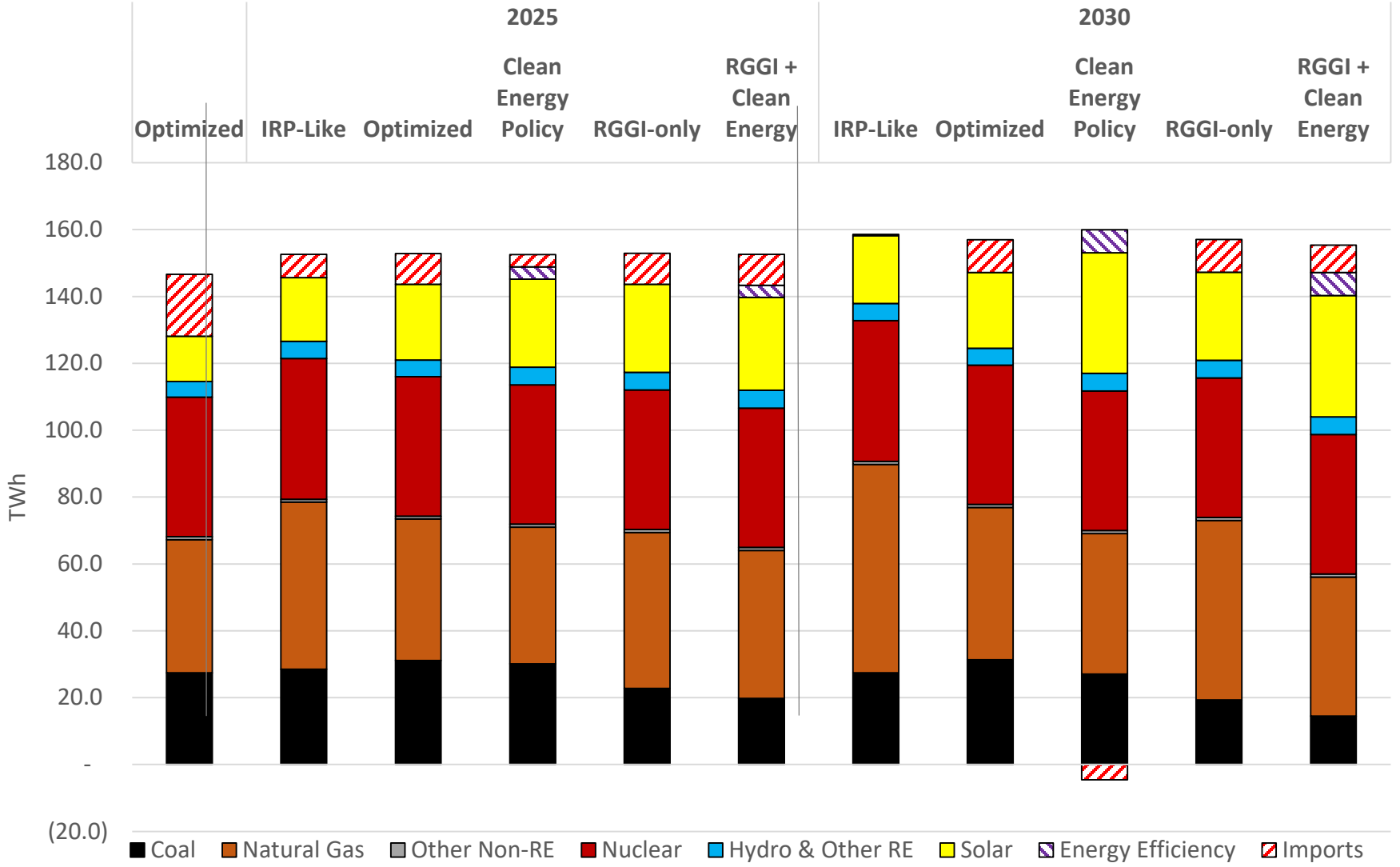
Preliminary Results (email alevin@ or lmartinez@nrdc.org to use or share materials or

Snapshot: Generation in 2030

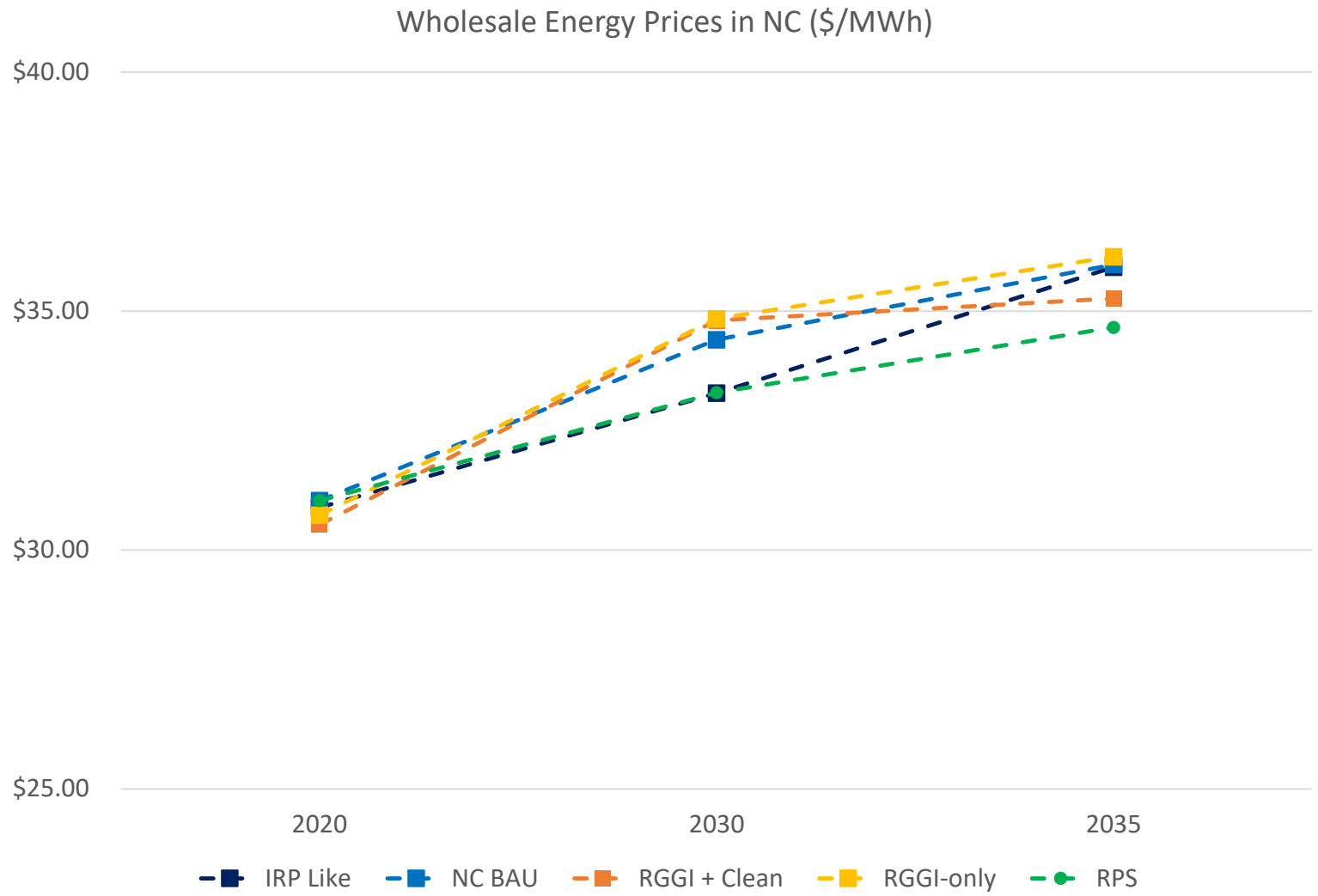


Preliminary Results (email alevin@ or lmartinez@nrdc.org to use or share materials or

Generation: 2020-2030

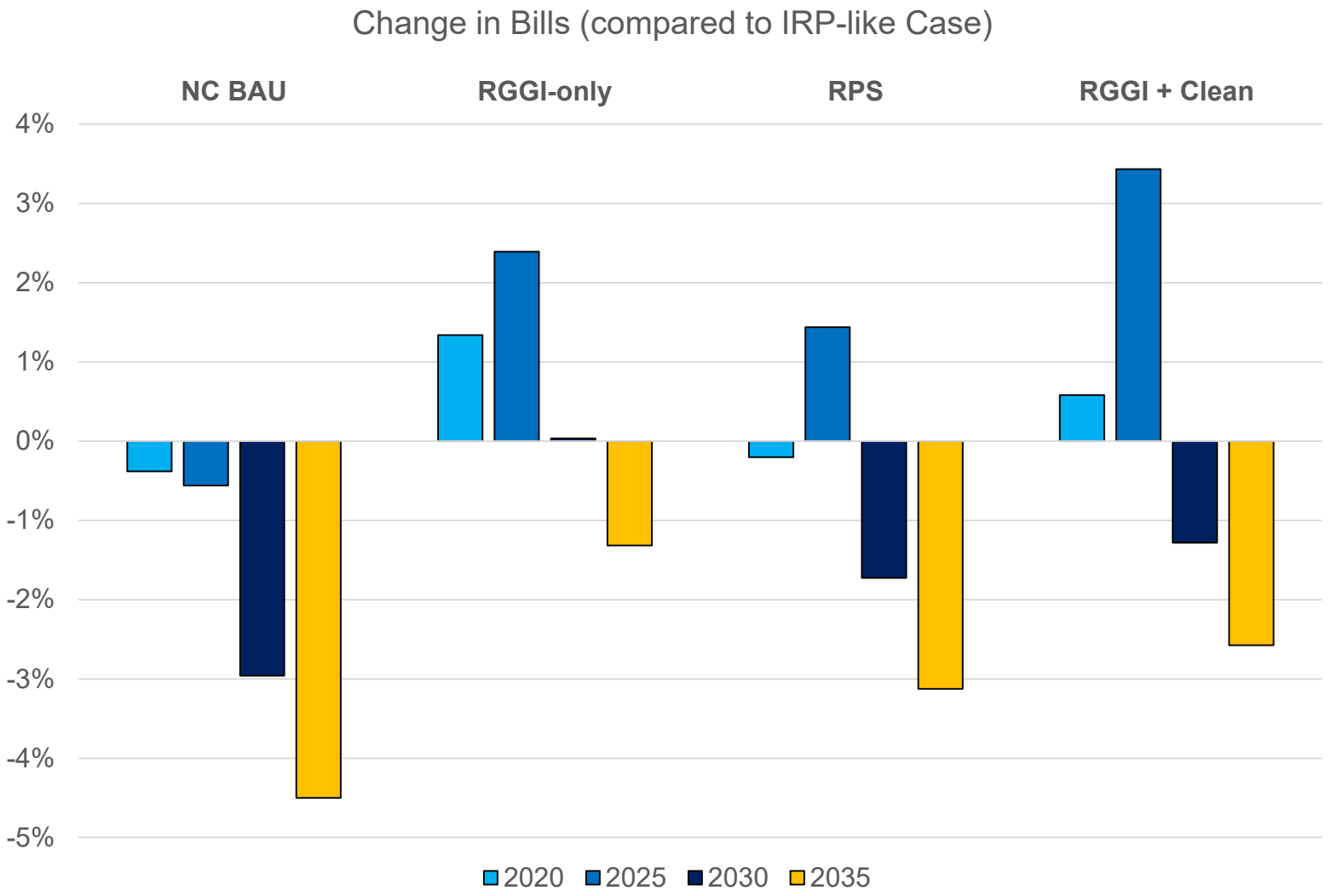


Wholesale Rates



Preliminary Results (email alevin@ or lmartinez@nrdc.org to use or share materials or

Residential Bill Impacts



RGGI Carbon Allowance Prices & Revenues

North Carolina in RGGI: Allowance Prices

- The addition of NC in RGGI drives significant reductions in in-state carbon pollution:

From 2005 Levels…	% Reduction in 2025	% Reduction in 2030
Optimized BAU	42%	40%
RGGI (w/ Leakage Mitigation)	49%	50%

RGGI Price (2012$/Short Ton)					
Case	**2020**	**2025**	**2030**	**2035**	**2040**
BAU	$3.73	$4.15	$4.72	$5.38	$4.41
NC Joins RGGI	$4.78	$5.43	$6.33	$7.40	$5.75

- The addition of NC results in higher RGGI prices.
- Allowance revenue decreases slightly over time, as the number of allowances falls. Increasing RGGI allowance prices mitigate this revenue decline, with revenue hovering around $200 million annually.

Total Annual Allowance Revenue in NC (in Millions $)				
Case	**2020**	**2025**	**2030**	**Cumulative**
NC Joins RGGI	$212.6	$205.3	$197.1	$2,262.2

APPENDIX SLIDES

IRP Like: Capacity

IRP-Like				
GW	2020	2025	2030	2035
Coal	6.5	6.5	5.8	5.8
NGCC	5.8	7.6	8.9	8.9
NGCT	6.2	6.7	9.9	12.7
Nuclear	5.2	5.2	5.2	5.2
Other	3.4	3.4	3.4	3.4
Hydro	2.0	2.3	2.3	2.3
Wind	0.2	0.3	0.3	0.3
Solar	7.3	9.5	10.2	10.3
Storage	0.0	0.2	0.2	0.2

Optimized BAU: Capacity

IRP-Like				
GW	**2020**	**2025**	**2030**	**2035**
Coal	6.5	6.5	5.8	5.8
NGCC	5.8	6.3	6.3	6.3
NGCT	6.2	6.2	6.2	6.2
Nuclear	5.1	5.1	5.1	5.1
Other	3.4	3.4	3.4	3.4
Hydro	2.0	2.0	2.0	2.0
Wind	0.2	0.3	0.3	0.3
Solar	6.0	11.7	11.7	11.7
Storage	-	-	1.3	1.3

Clean Energy Policy: Capacity

IRP-Like				
GW	2020	2025	2030	2035
Coal	6.5	6.5	5.8	5.8
NGCC	5.8	6.3	6.3	6.3
NGCT	6.2	6.2	6.2	6.2
Nuclear	5.1	5.1	5.1	5.1
Other	3.4	3.8	4.1	4.3
Hydro	2.0	2.0	2.0	2.0
Wind	0.3	0.4	0.4	0.4
Solar	6.0	14.1	20.3	22.3
Storage	-	-	2.2	2.2

RGGI (W/Leakage Mitigation): Capacity

IRP-Like				
GW	2020	2025	2030	2035
Coal	6.5	6.5	4.9	4.9
NGCC	5.8	6.3	7.2	7.2
NGCT	6.2	6.2	6.2	6.2
Nuclear	5.1	5.1	5.1	5.1
Other	3.4	3.4	3.4	3.4
Hydro	2.0	2.0	2.0	2.0
Wind	0.3	0.4	0.4	0.4
Solar	6.1	14.1	14.1	14.1
Storage	-	-	1.3	1.3

RGGI +Clean Energy Policy: Capacity

RGGI + Clean Energy				
GW	2020	2025	2030	2035
Coal	6.5	6.5	4.3	4.3
NGCC	5.8	6.3	6.3	6.3
NGCT	6.2	6.2	6.2	6.2
Nuclear	5.1	5.1	5.1	5.1
Other	3.4	3.4	3.4	3.4
Hydro	2.0	2.0	2.0	2.0
Wind	0.3	0.4	0.4	0.4
Solar	6.1	15.0	20.4	22.4
Storage	-	-	2.4	2.4

Generation: 2020

In TWh	2020				
	IRP-Like BAU	Optimized BAU	Clean Energy Policy	RGGI-only	RGGI + Clean Energy
Coal	26.8	27.4	27.3	20.6	21.0
Natural Gas	39.6	39.8	39.7	46.2	45.9
Other Non-RE	0.9	0.9	0.9	0.9	0.9
Nuclear	42.0	41.7	41.7	41.7	41.7
Hydro & Other RE	4.7	4.7	5.0	5.1	5.1
Solar	15.6	13.5	13.5	13.7	13.7
Energy Efficiency	-	-	-	-	
Imports	17.0	18.5	18.5	18.5	18.5

Generation: 2025

In TWh	2025				
	IRP-Like BAU	Optimized BAU	Clean Energy Policy	RGGI-only	RGGI + Clean Energy
Coal	28.5	31.1	30.1	22.7	20.0
Natural Gas	49.9	42.3	40.9	46.6	44.2
Other Non-RE	0.9	0.9	0.9	0.9	0.9
Nuclear	42.1	41.7	41.7	41.7	41.7
Hydro & Other RE	5.1	5.0	5.3	5.3	5.3
Solar	19.1	22.6	26.4	26.4	27.8
Energy Efficiency	-	-	3.7	-	3.7
Imports	6.9	9.2	3.7	9.2	9.2

Generation: 2030

In TWh	2030				
	IRP-Like BAU	Optimized BAU	Clean Energy Policy	RGGI-only	RGGI + Clean Energy
Coal	27.5	31.3	27.1	19.3	14.5
Natural Gas	62.3	45.6	42.0	53.7	41.6
Other Non-RE	0.9	0.9	0.9	0.9	0.9
Nuclear	42.1	41.7	41.7	41.7	41.7
Hydro & Other RE	5.1	5.0	5.3	5.3	5.3
Solar	20.3	22.6	36.0	26.4	36.2
Energy Efficiency	-	-	6.9	-	6.9
Imports	0.4	9.8	(4.6)	9.8	8.2

Generation: 2035

In TWh	2035				
	IRP-Like BAU	Optimized BAU	Clean Energy Policy	RGGI-only	RGGI + Clean Energy
Coal	28.8	29.0	28.8	17.8	15.3
Natural Gas	62.0	40.0	40.2	47.3	37.3
Other Non-RE	0.9	0.9	0.9	0.9	0.9
Nuclear	42.1	41.7	41.7	41.7	41.7
Hydro & Other RE	5.1	5.0	5.3	5.3	5.3
Solar	20.3	22.6	39.3	26.4	39.4
Energy Efficiency	-	-	8.1	-	8.1
Imports	5.1	23.6	(3.1)	23.6	13.0

North Carolina
Clean Energy Plan Development

Clean Energy Plan Modeling and Other Collaborative Efforts (Part 2)

Jen Weiss, Duke University

NC Energy Efficiency Roadmap

Jen Weiss

Nicholas Institute, Duke University

June 26, 2019

Duke
NICHOLAS INSTITUTE
FOR ENVIRONMENTAL POLICY SOLUTIONS

Why Energy Efficiency?

- Lower customer bills by saving energy
- Encourages economic growth through more efficient operations
- Increases grid reliability, reduces grid congestion and need for new infrastructure (i.e. power plants, transmission lines)
- EE is a “least cost” resource for state and regional power planning

Why an EE Roadmap for NC?

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

Our Definition of EE

- Reducing the **energy used** by equipment and/or processes while maintaining or improving the user's level of comfort and end-use functionality at a lower customer cost.
- Reduction in the **rate of energy** used may be achieved by substituting more advanced technology or by reorganizing the process to reduce waste heat, waste cooling, or energy.
- **Demand response** is a form of energy efficiency.
- Conservation as a result of a user reaction to a price increase is not considered energy efficiency.
- Electrification is not part of this EE Roadmap Process.

10/26/18 EE Workshop

- 43 Participants (all sectors)
- Current energy efficiency landscape in North Carolina and national trends
- A review of barriers and opportunities
- Breakout discussions on NC’s shared goals and objectives
- Consensus on 2-3 shared objectives

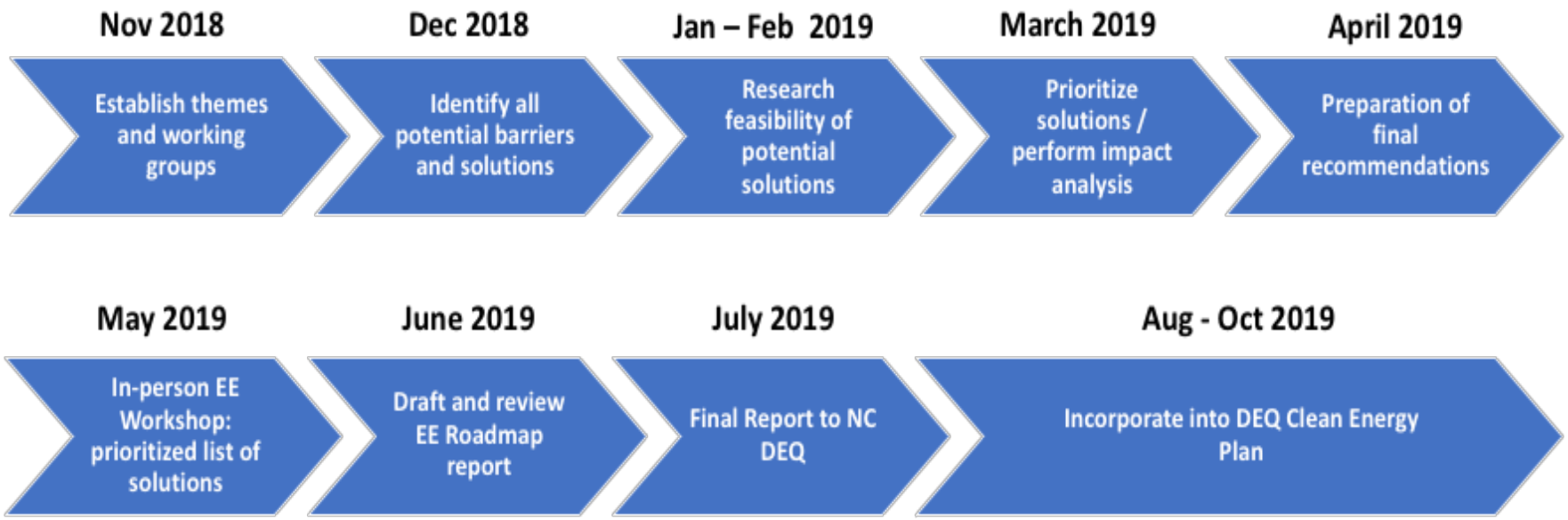
NC’s Shared Objectives

1. Align interests to create an EE conducive climate
2. Increase access for hard to reach sectors
3. Develop a uniform standard for tracking / benchmarking EE costs and benefits

11 Theme Working Groups

Theme 1: EE Education Campaign
Theme 2: Workforce Training
Theme 3: Building Code Improvement
Theme 4: Centralized Admin / Cross-Collaboration
Theme 5: EE Portfolio Standard or Target
Theme 6: Address Energy Poverty
Theme 7: Equitable EE Programs for all sectors
Theme 8: Equitable & Accessible EE Financing Programs
Theme 9: Cost / Benefit Analysis (Societal Cost Inclusion)
Theme 10: Data Access and Analysis
Theme 11: Standardized Tracking of EE

NC EE Roadmap Timeline



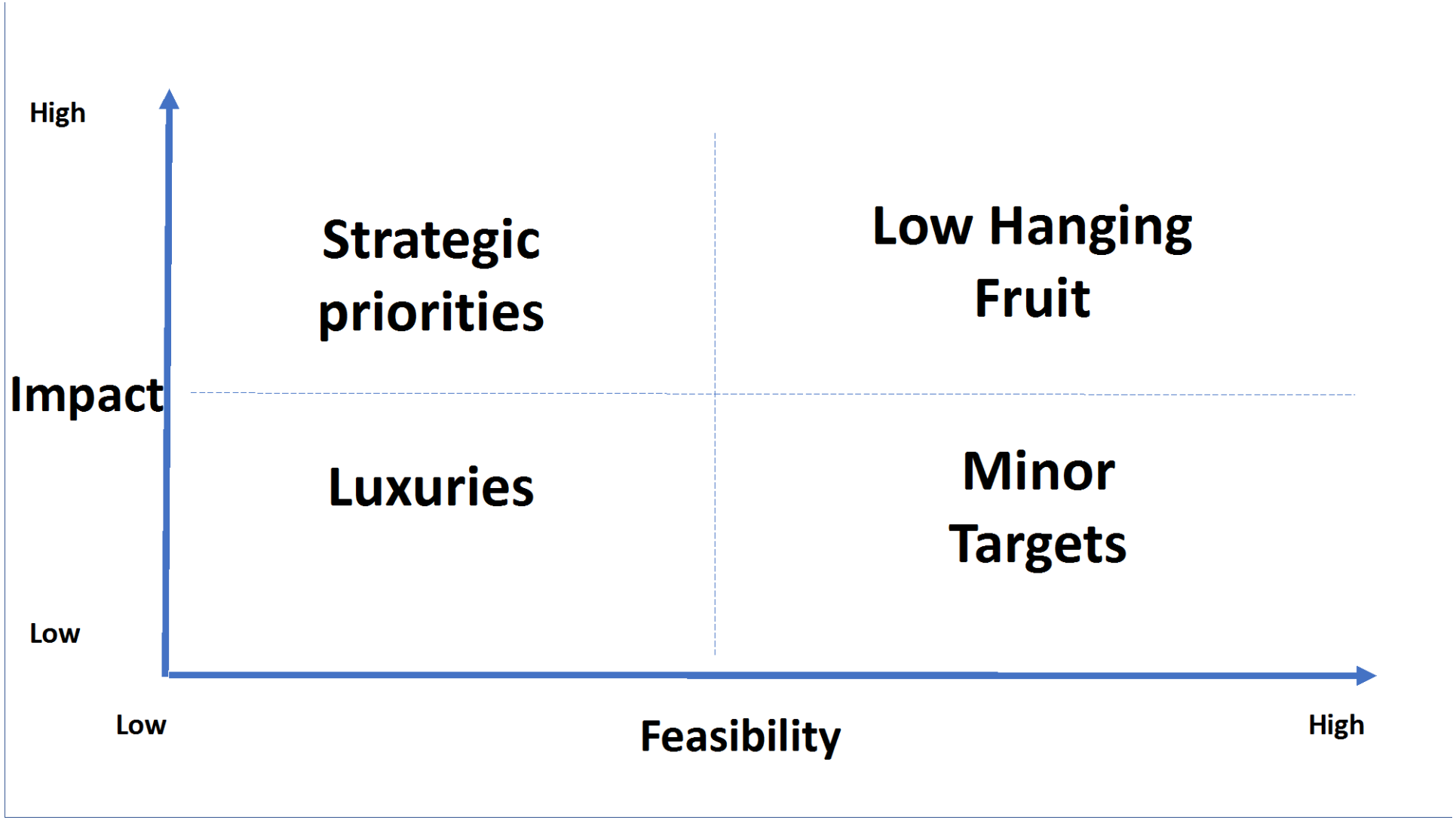
Solution Evaluation Criteria

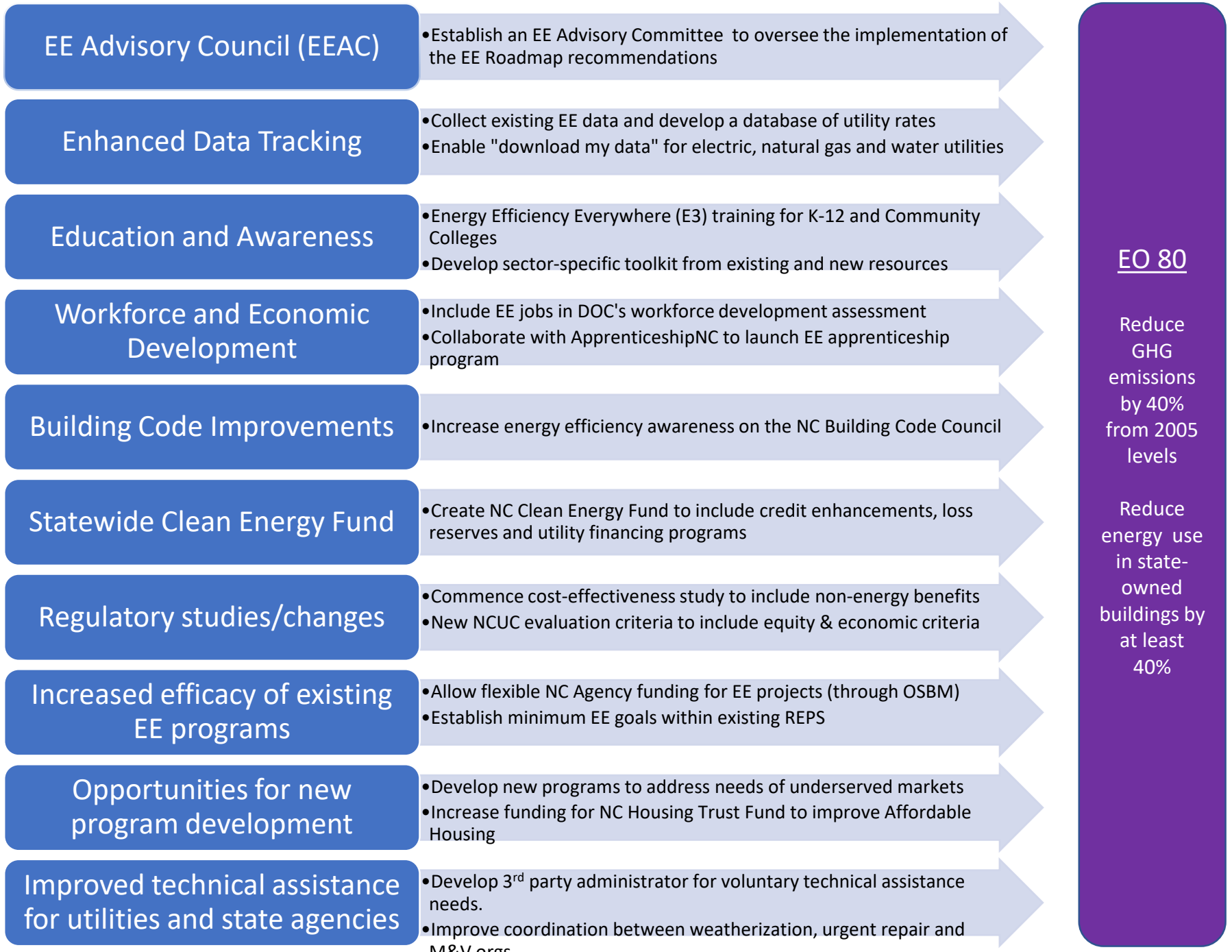
- Implementation
- Timing
- Identification of Costs and Benefits
- Breadth of Solution
- Market Transformation
- Existing Effort

5/23/19 EE Workshop

- 50 Participants (all sectors)
- Review the final recommendations produced by each thematic working group
- Provide feedback to clarify and refine the recommendations
- Prioritize the recommendations based on their relative feasibility and impact
- Generate insights and data that will inform the final set of recommendations for the NC EE Roadmap report

Feasibility and Impact Matrices




EE Advisory Council (EEAC)
•Establish an EE Advisory Committee to oversee the implementation of the EE Roadmap recommendations
Enhanced Data Tracking
•Collect existing EE data and develop a database of utility rates
•Enable "download my data" for electric, natural gas and water utilities
Education and Awareness
•Energy Efficiency Everywhere (E3) training for K-12 and Community Colleges
•Develop sector-specific toolkit from existing and new resources
Workforce and Economic Development
•Include EE jobs in DOC's workforce development assessment
•Collaborate with ApprenticeshipNC to launch EE apprenticeship program
Building Code Improvements
•Increase energy efficiency awareness on the NC Building Code Council
Statewide Clean Energy Fund
•Create NC Clean Energy Fund to include credit enhancements, loss reserves and utility financing programs
Regulatory studies/changes
•Commence cost-effectiveness study to include non-energy benefits
•New NCUC evaluation criteria to include equity & economic criteria
Increased efficacy of existing EE programs
•Allow flexible NC Agency funding for EE projects (through OSBM)
•Establish minimum EE goals within existing REPS
Opportunities for new program development
•Develop new programs to address needs of underserved markets
•Increase funding for NC Housing Trust Fund to improve Affordable Housing
Improved technical assistance for utilities and state agencies
•Develop 3rd party administrator for voluntary technical assistance needs.
•Improve coordination between weatherization, urgent repair and M&V orgs
EO 80
Reduce GHG emissions by 40% from 2005 levels
Reduce energy use in state-owned buildings by at least 40%

The EE Team

Steering Committee	Working Group Team Lead
Tim Duff	Terry Albrecht
Jack Floyd	Daniel Brookshire
Paula Hemmer	Josh Burton
Bridget Herring *	Kimberly Conley
Kate Konschnik *	Tim Gasper
Laura Langham	Onte Johnson
Caroline Macklin	Deandrea Salvador
Ryan Miller *	Gennelle Wilson
Al Ripley	
Kat Stahl	* Also a Working Group Lead

Thank you!

North Carolina

Clean Energy Plan Development

Breakout Activity on Utility Incentives and Comprehensive System Planning Recommendations

Rocky Mountain Institute

Building Out Recommendations

- Which values does this recommendation address? What other challenges does this recommendation help solve?
- What does implementation of this recommendation look like? What are the action items?
- What are the entities responsible for implementation?
- What would success look like in the near- and long-term?
- What metrics or data would need to be collected to track whether we're succeeding?

Building Out Recommendations

- **Values**:
  - Environment & Carbon Reduction
  - Reliability
  - Affordability
  - Efficiency
  - Economic/Job Growth
  - Environmental Justice
  - Utility Compensation Aligned with Public Interest
  - Equity
  - Public Health
  - Resiliency
  - Innovation

- **Potential Responsible Entities:**
  - Governor, Legislature, NCUC, DEQ, North Carolina Community Action Association (NCCAA), NC Department of Health and Human Services (DHHS), Local Gov, North Carolina Electric Membership Corporation (NCEMC), Commerce, North Carolina Office for Recovery and Resiliency (NCORR), Higher Education, Utilities, etc.

- **Near-term = 1-3 years; Longer-term = 3+ years**

Check-Out

Given the recommendations discussed today, what recommendation are you most excited about?

North Carolina

Clean Energy Plan Development

Next Steps
NC DEQ