

# North Carolina Power Sector Carbon Policies

An Analysis of North Carolina Clean Energy Plan  
Recommendation A1

# Clean Energy Plan Goals

2005

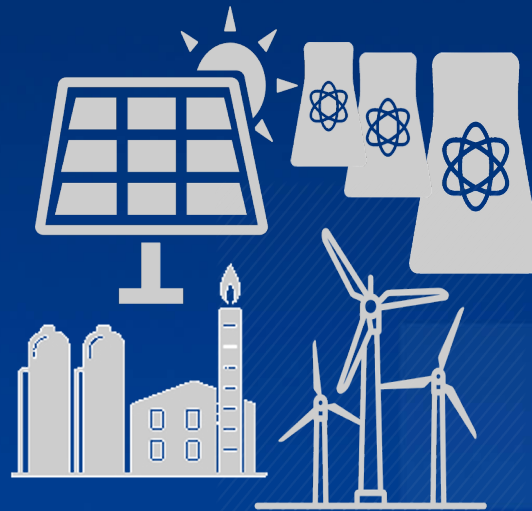
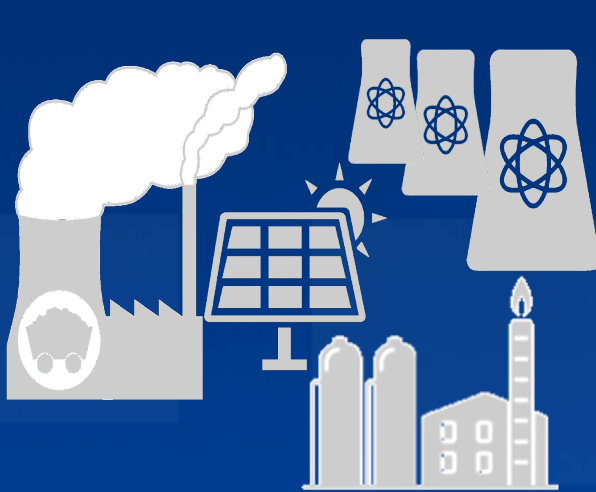
2030 Goal

2050 Goal

79.4 million metric tons of CO<sub>2</sub> emitted

23.8 million metric tons of CO<sub>2</sub>

Carbon Neutrality<sup>1</sup>



# CEP Recommendation A-1

## OVERVIEW OF STRATEGY AREAS & RECOMMENDATIONS

### Carbon Reduction (A)

#### A. Decarbonize the electric power sector

Page 55

- A-1. Deliver a report that recommends carbon-reduction policies and the specific design of such policies that best advance core values, such as GHG emission reductions, electricity affordability, and grid reliability. The report will evaluate policy designs for the following carbon reduction strategies:
  1. Accelerated coal retirements,
  2. Market-based carbon reduction program,
  3. Clean energy policies, such as an updated REPS, clean energy standard, and EERS, and
  4. A combination of these strategies.

*Legislature, State Agencies, Academia*

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  4. A combination of these strategies.

A1 Stakeholder group decided not to make recommendations but to provide options for decarbonization.

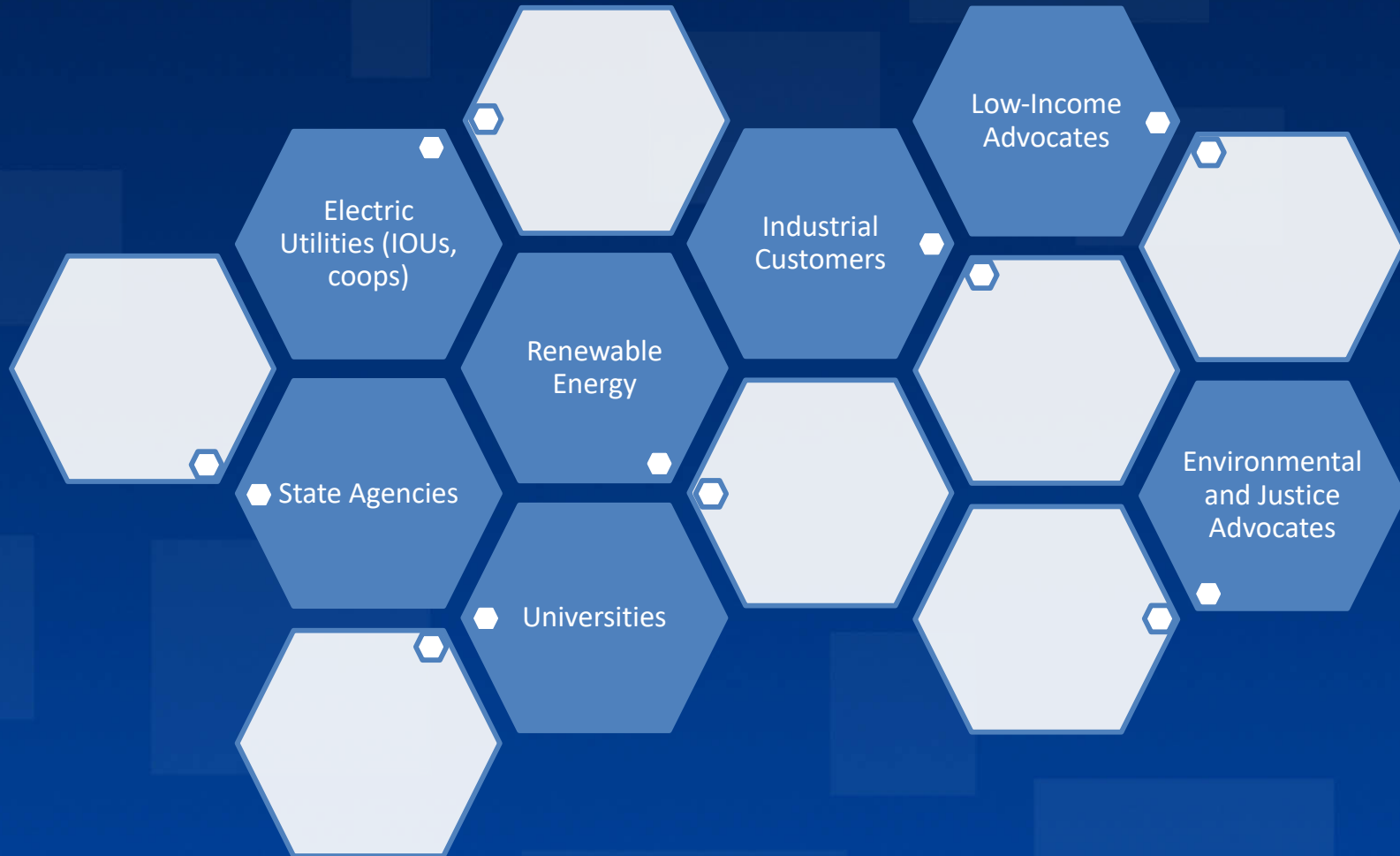
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# A1 Process

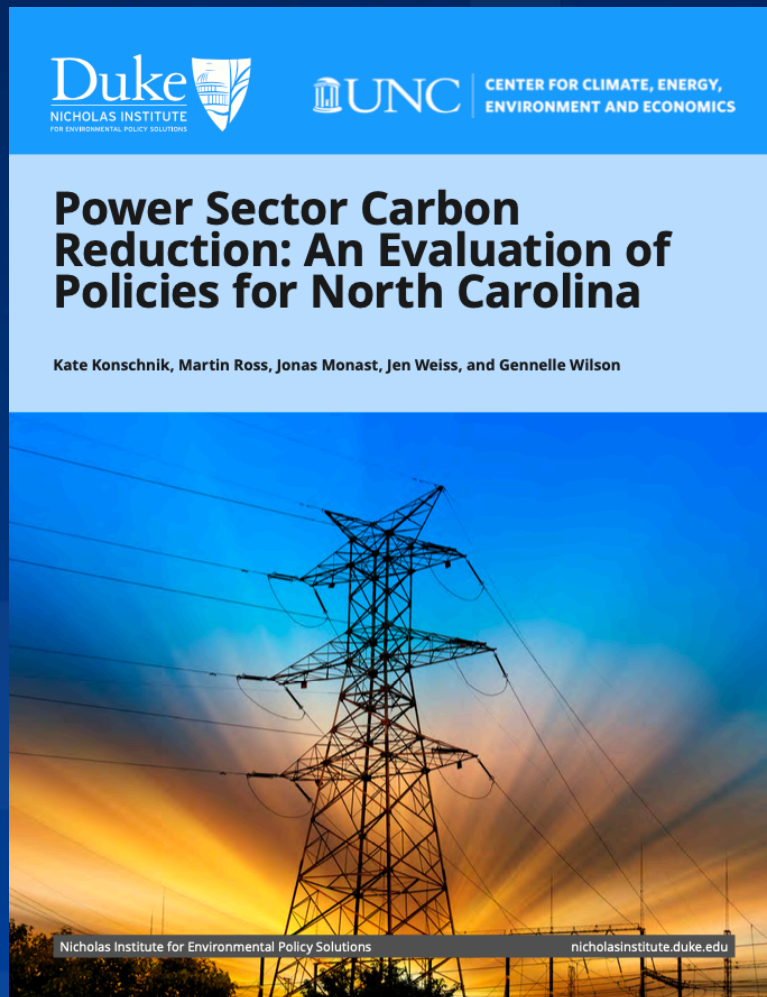
## December 2019 to February 2021:

- Bimonthly meetings with stakeholders (~90) through fall 2020
- Policy, Technical Working Groups
- Two public forums
- Power sector modeling, economic analysis
- Interaction with parallel processes
- Stakeholder input on the draft report
- Final report: March 2021

# Involved Sectors



# A1 Report Overview



Studies 4 policy “pathways”, variations, and combinations:

1. Accelerated coal retirements.
2. Carbon “adders” on new construction, generation.
3. Declining carbon budget (RGGI).
4. Clean energy standards (CES).

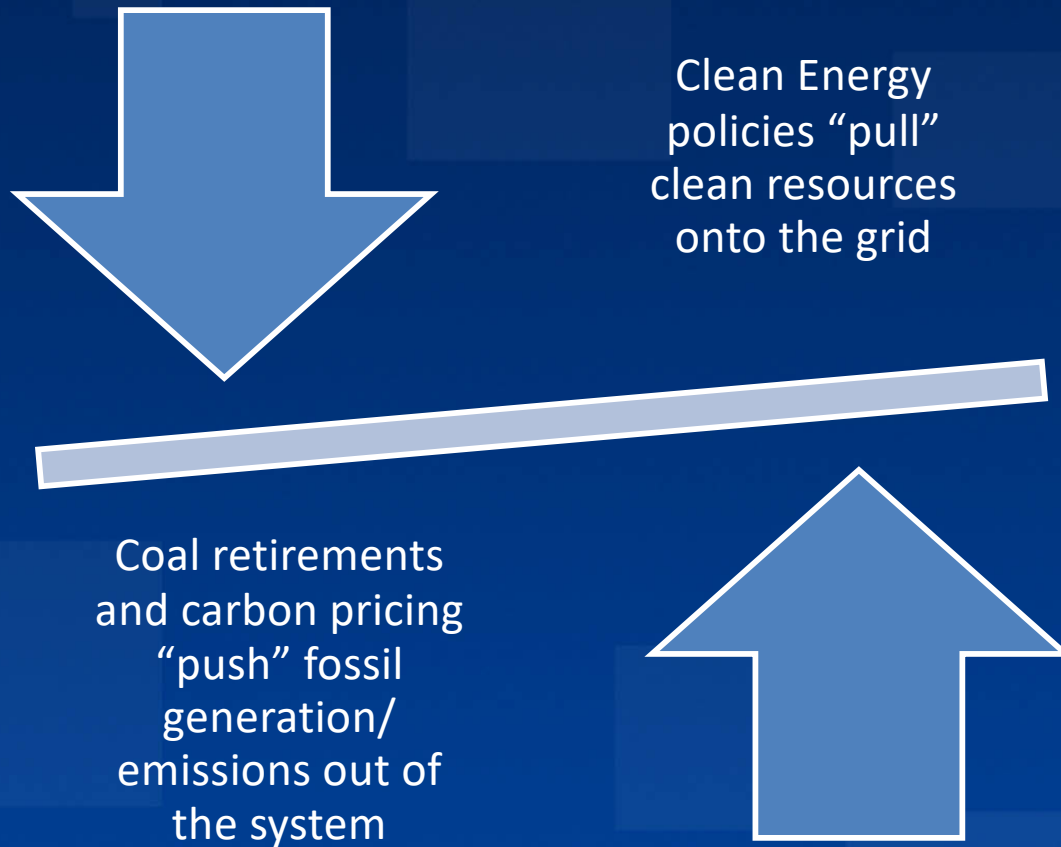
# RGGI Options

RGGI Allowance Value (2012\$)	Year
140 million	2023
139 million	2024
139 million	2025
139 million	2026
113 million	2027
113 million	2028
90 million	2029
90 million	2030
963 million	TOTAL

1. Typical RGGI budget (-3% each year, 2023-2030)
2. Slightly tighter budget to hit 22 mmt CO2 by 2030
3. Auction allowances; use resulting state funds on EE, bill assistance, or state budget
4. Freely distribute allowances; NCUC likely directs utilities to pass on value to customers



# Policy Dynamics



# Points of Policy Comparison

- In-state CO<sub>2</sub> power sector emissions, in 2030 and over time (2023-2050);
- In-state NO<sub>x</sub>, SO<sub>2</sub> power sector emissions, in 2030 and 2040;
- Imported CO<sub>2</sub> emissions;
- Cost (NPV in total costs over time, and \$/ton reduced);
- NC generation and capacity mix over time;
- [Subset of policies] Rate/bill changes; jobs/economic outlook.

# Qualitative A1 Core Values

- Manufacturing Competitiveness
- Energy Burden

Affordability

Equity

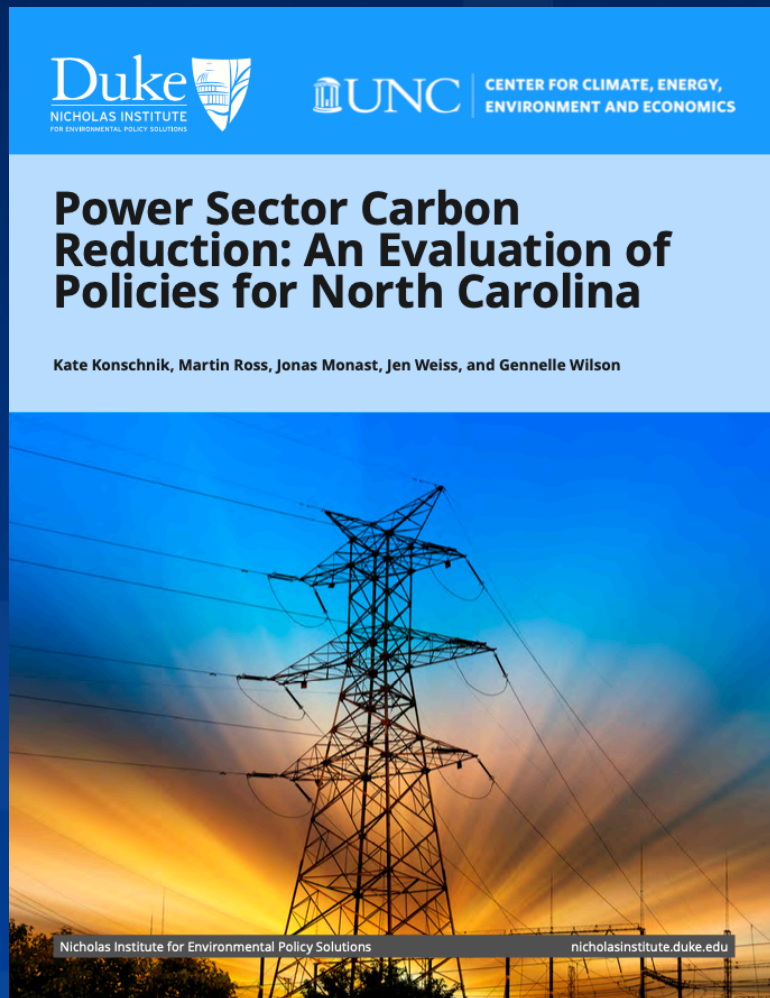
- Access to Clean Energy
- Impacts to Frontline Communities
- Just Transition



# A1 Report Caveats

- Modeling did not attempt to duplicate how Duke Energy operates the grid
- Assumptions – where there was disagreement among stakeholders, did not use most optimistic views of renewables, but then ran alternative cases
- Results are directional only
- Results turn on how we defined policies; any policy can be designed to meet different goals

# A1 Report Take-Aways



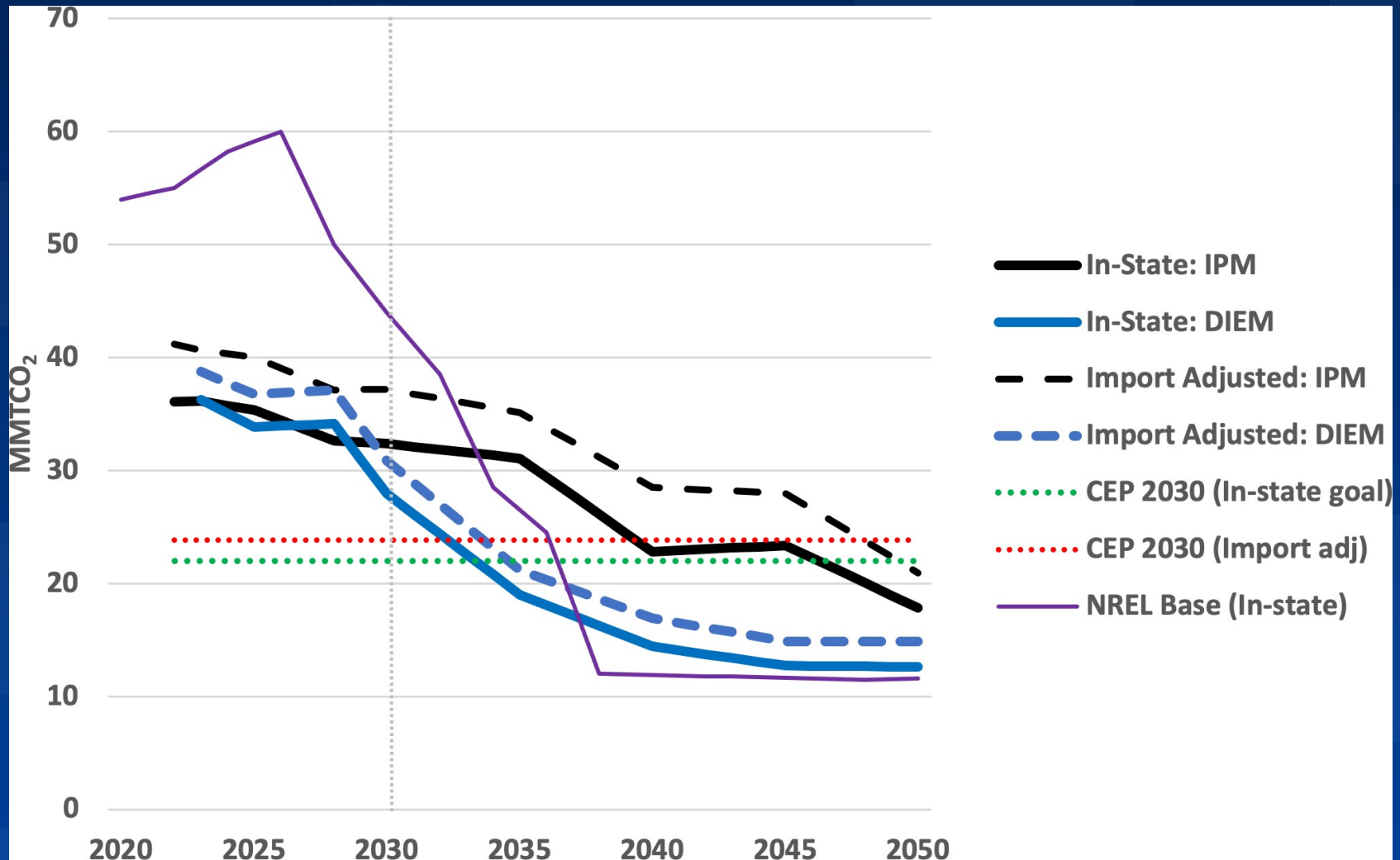
- System is poised for transition
- Highly responsive to modest changes in relative costs of different resources
- Policy can make a difference
- NC has cost effective options (ex. coal retirements, RGGI < 1% system cost increases)

# A1 Report Take-Aways

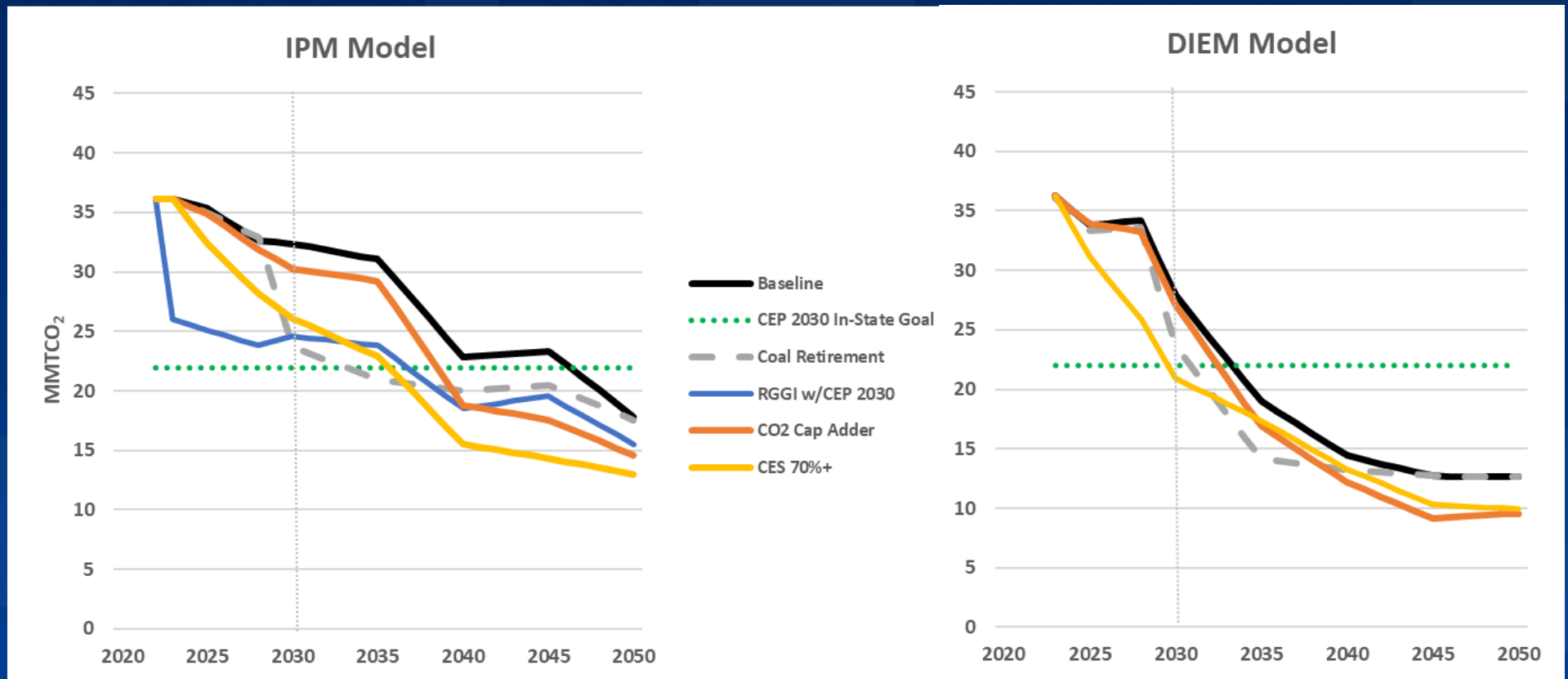
What might achieve the 2030 CEP target:

- Carbon Adder on Generation (\$6/ton in 2023 + 7%) (by proxy, RGGI?)
- CES on retail sales (70% clean by 2030; with/without offshore wind carve-out)
- CES Combinations: Coal Retirement, RGGI (with/without wind), and Carbon Adder on Capacity or Generation

# Baseline CO2 Emissions

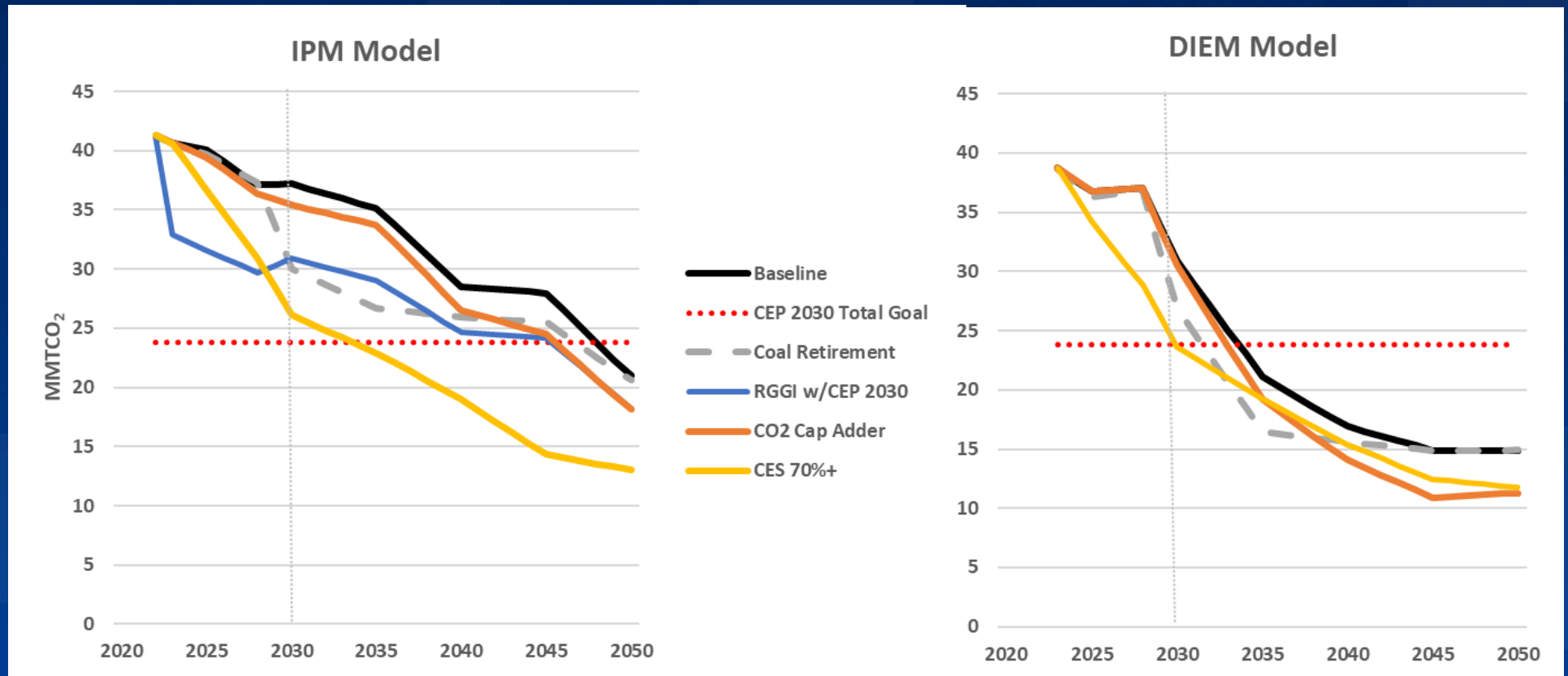


# NC In-State Emissions from Generation

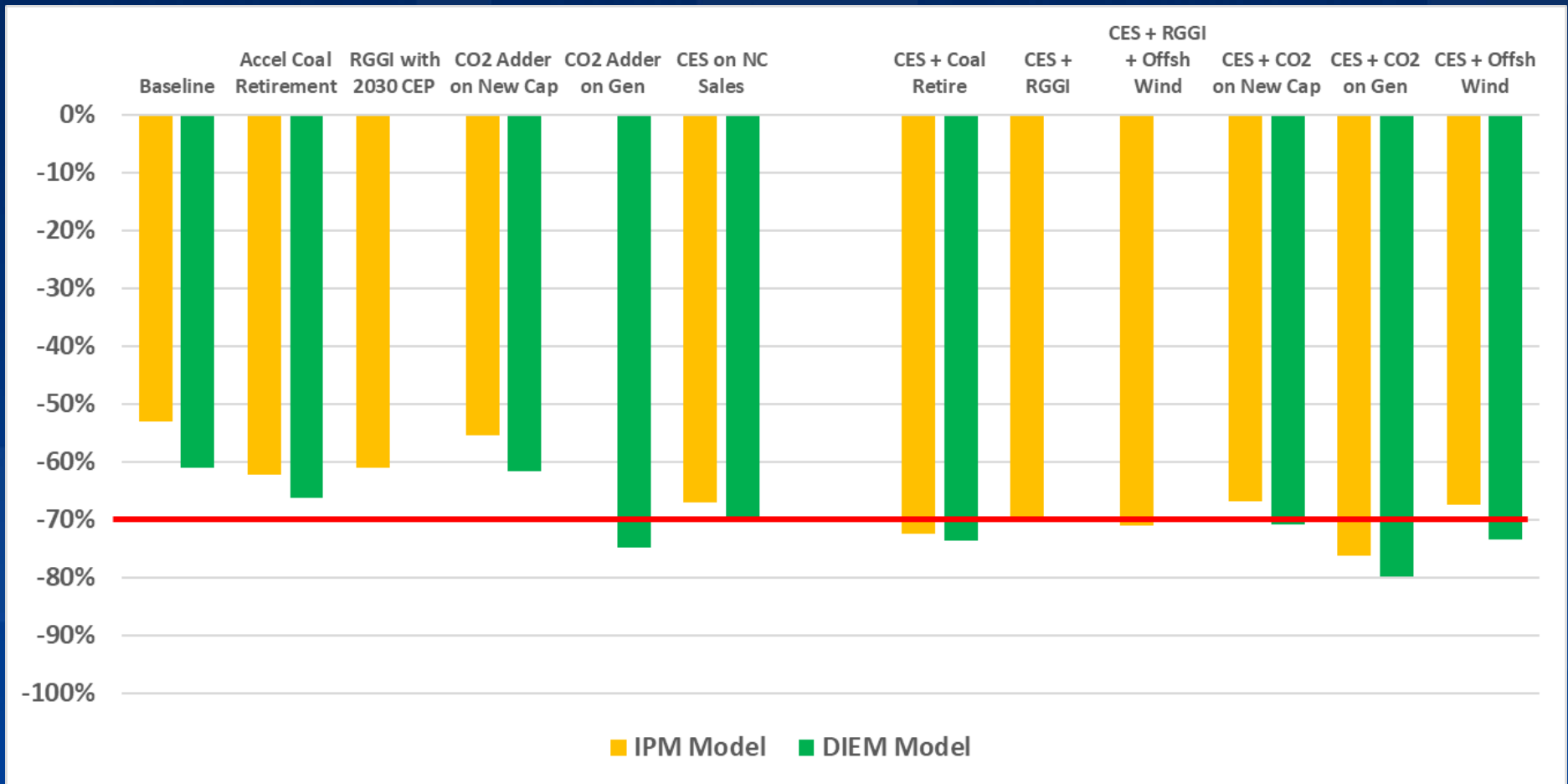




# NC Total Emissions from Generation (adjusted for imported electricity)

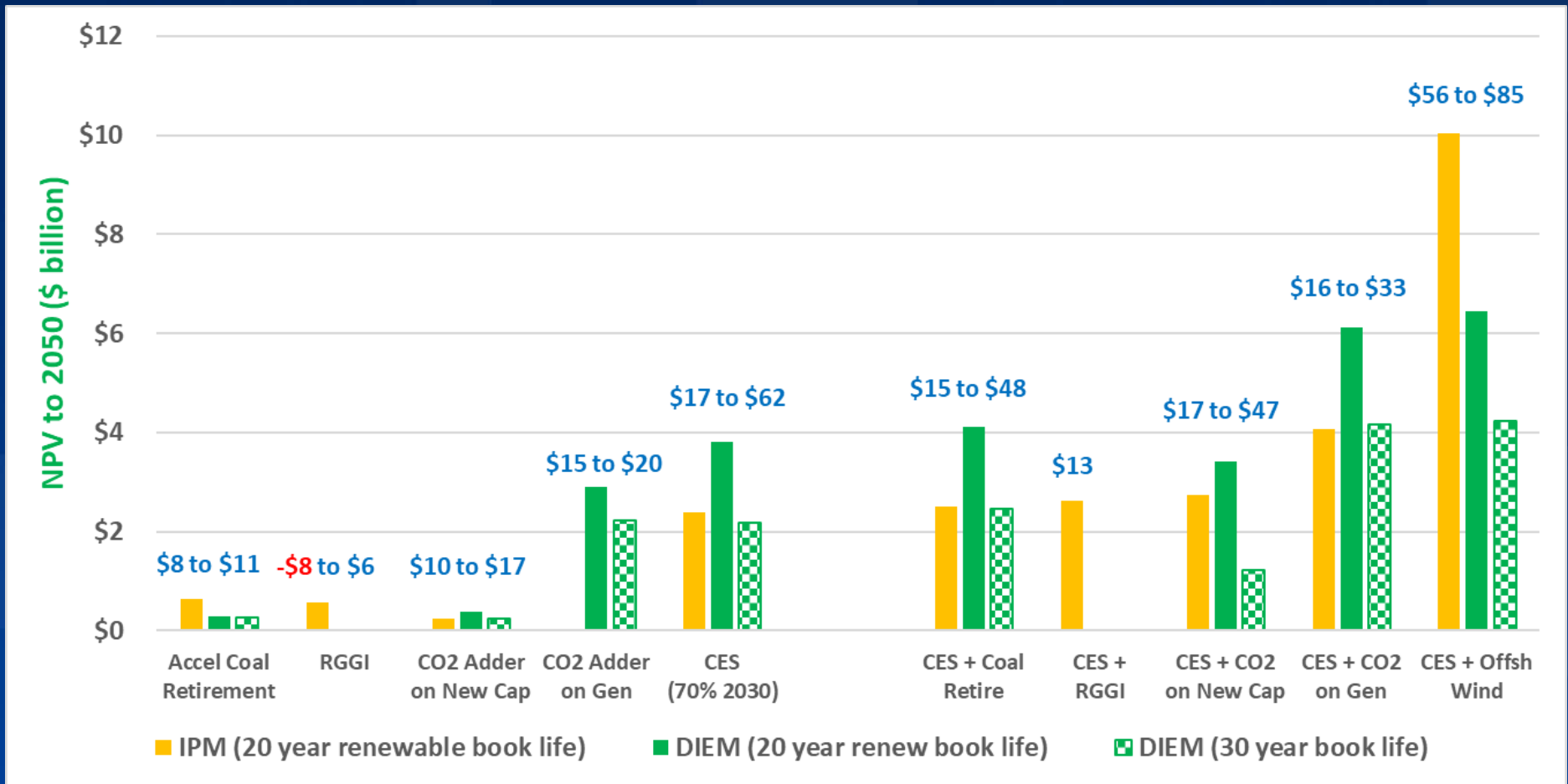


# Total Emissions Reductions in 2030 (% change from 2005)



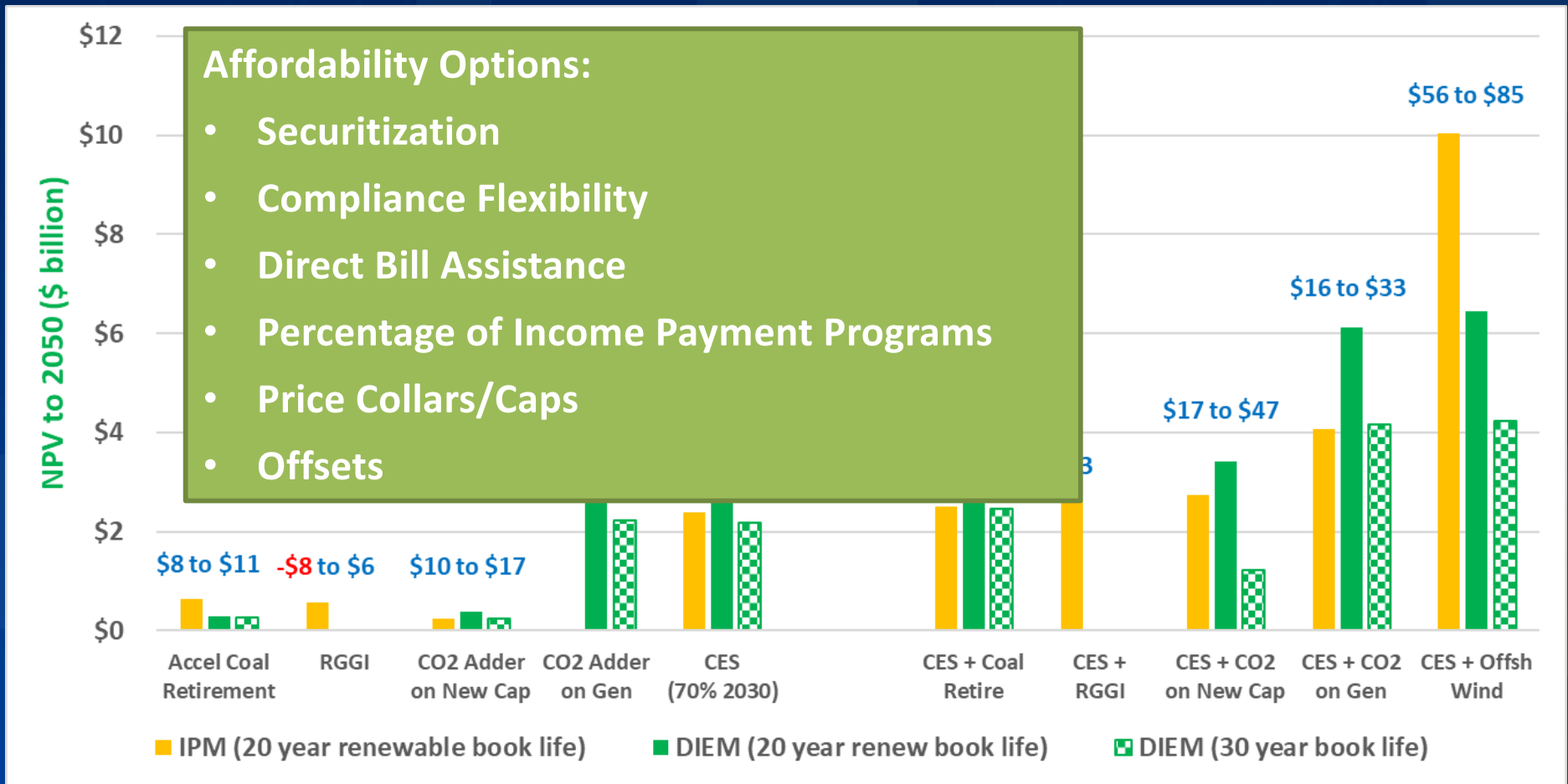
# Policy Costs in Net Present Value

(\$ billion through 2050 and \$ per ton reduced)



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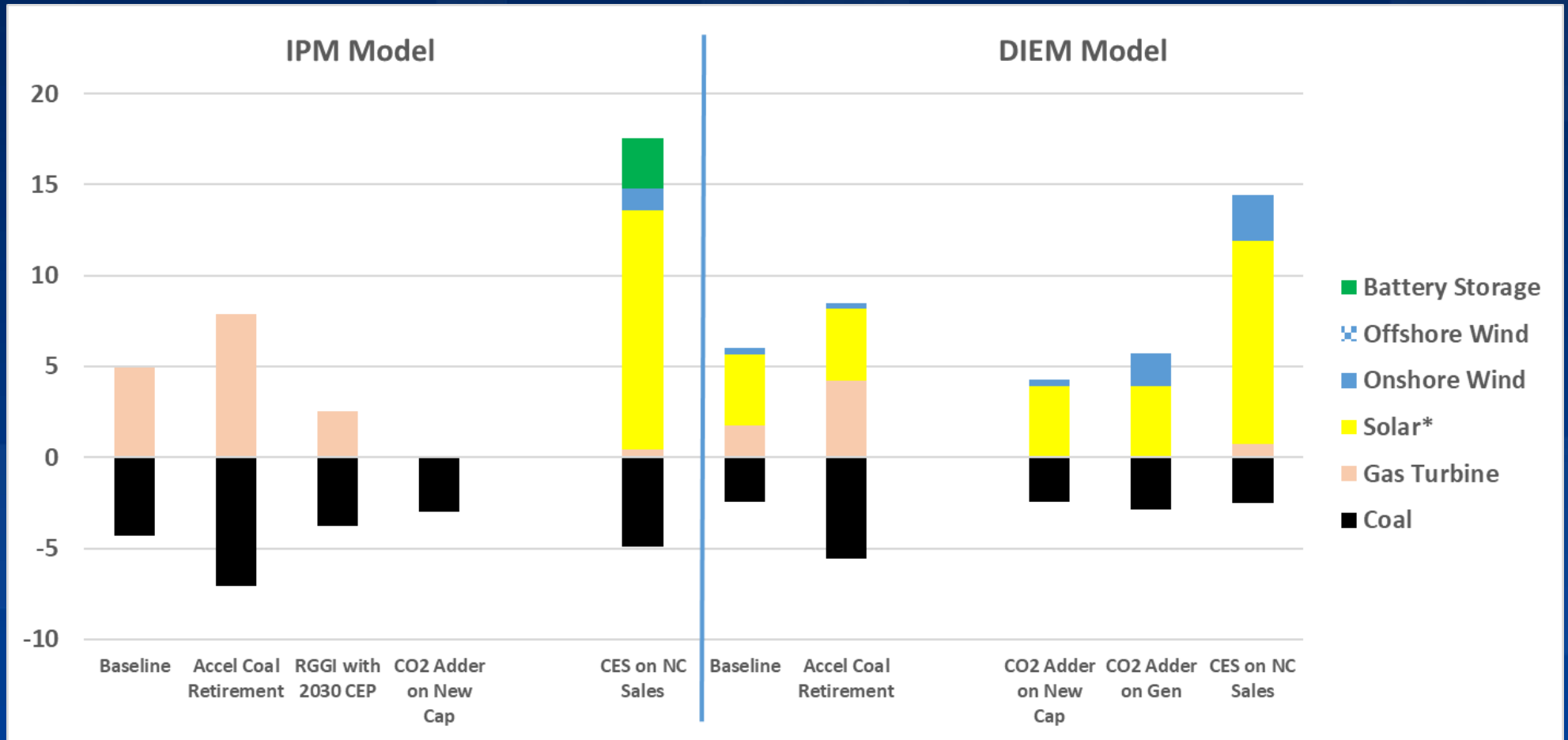
(\$ billion through 2050 and \$ per ton reduced)



# Local Air Pollution in 2030 (mmt)

Category	Policy Cases	IPM Model		DIEM Model	
		NOx	SO2	NOx	SO2
	<b>Baseline</b>	<b>15.6</b>	<b>4.6</b>	<b>13.9</b>	<b>4.1</b>
<b>Standalone</b>	Accelerated Coal Retirement	7.7	0.8	9.5	0.8
	RGGI with 3% decline per year to 2030	12.1	3.4		
	RGGI with 2030 CEP target	10.2	2.8		
	RGGI w/2030 CEP target & EE	9.9	2.7		
	CO2 Adder on New Capacity	15.7	4.7	13.3	4.2
	CO2 Adder on Generation			3.4	0.0
	CO2 Adder on Generation w/import adjust			4.0	0.0
	CO2 Adder on Generation - USA wide			5.0	0.0
	CES on NC Retail Sales	11.4	3.5	9.9	2.7
	CES on USA-wide Retail Sales			3.1	0.1
<b>Combination</b>	CES + Coal Retirement	5.6	0.5	7.2	0.8
	CES + RGGI	7.6	1.5		
	CES + RGGI + Offshore Wind	7.1	1.3		
	CES + Carbon Adder on New Capacity	11.7	3.5	9.2	2.5
	CES + Carbon Adder on Generation	3.3	0.0	2.4	0.0
	CES + Offshore Wind	11.4	3.3	8.0	2.0

# Changes in NC Capacity by 2030 (GW)



\* Solar PV excludes required installations under HB 589

# NC Generation in 2030 (TWh)

Policy Cases	IPM Model			DIEM Model			
	Fossil	Non-emitting	Net Imports	Fossil	Non-emitting	Net Imports	
<b>Standalone</b>	Baseline	67	65	21	59	73	20
	Accel Coal Retirement	56	65	33	56	73	23
	RGGI with 2030 CEP	55	65	34			
	CO2 Adder on New Cap	63	65	25	57	73	22
	CO2 Adder on Gen				35	78	40
	CES on NC Sales	57	99	-1	46	98	8
<b>Combination</b>	CES + Coal Retire	46	99	9	43	98	10
	CES + RGGI	49	99	6			
	CES + RGGI + Offsh Wind	48	99	7			
	CES + CO2 on New Cap	57	99	-2	46	98	9
	CES + CO2 on Gen	39	99	14	29	98	26
	CES + Offsh Wind	56	99	-1	43	98	10

# Change in Generation by 2030 (difference from baseline generation in 2023)

