

EPA's Proposed Clean Power Plan

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Charleston, S.C.

Outline

4 Building Blocks

State Emission Goals

Emission goals in context

State 111(d) Plan

Background

- **Greenhouse gas regulation**
- **New v. Existing Sources**
- **Section 111(d) trigger**
 1. Pollutant not regulated as hazardous or criteria pollutant, and
 2. Source would be covered by New Source Performance Standards if new.

Clean Power Plan

- **111(d) Proposal**
- **30% reduction from 2005 by 2030**
- **Three aspects**
 - State emission goals (interim and final)
 - State 111(d) plans
 - Compliance with goals

Timeline



June 18
Publish
Proposal

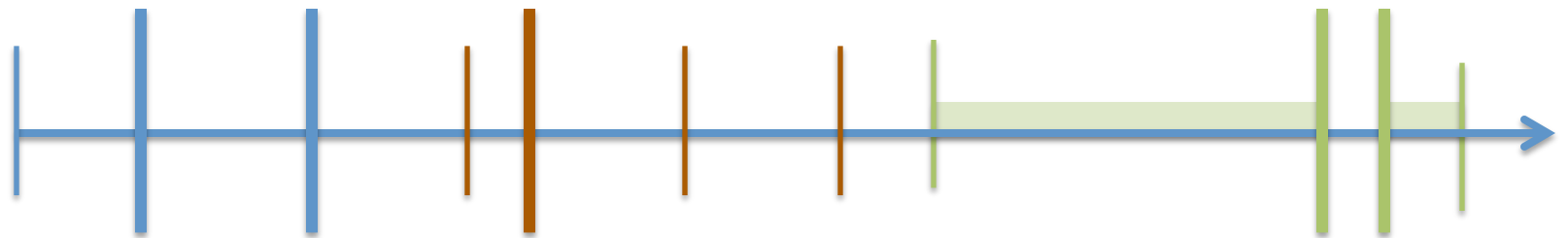
June 2015
Finalize
Rule

6/30/2016
Submit
State Plan

6/30/2018
Extension
Deadline
(multi-state)

2029
Interim
Goal

2030
Final
Goal



Oct. 16
Comment
Period
Ends

4/1/2016
Extension
Request

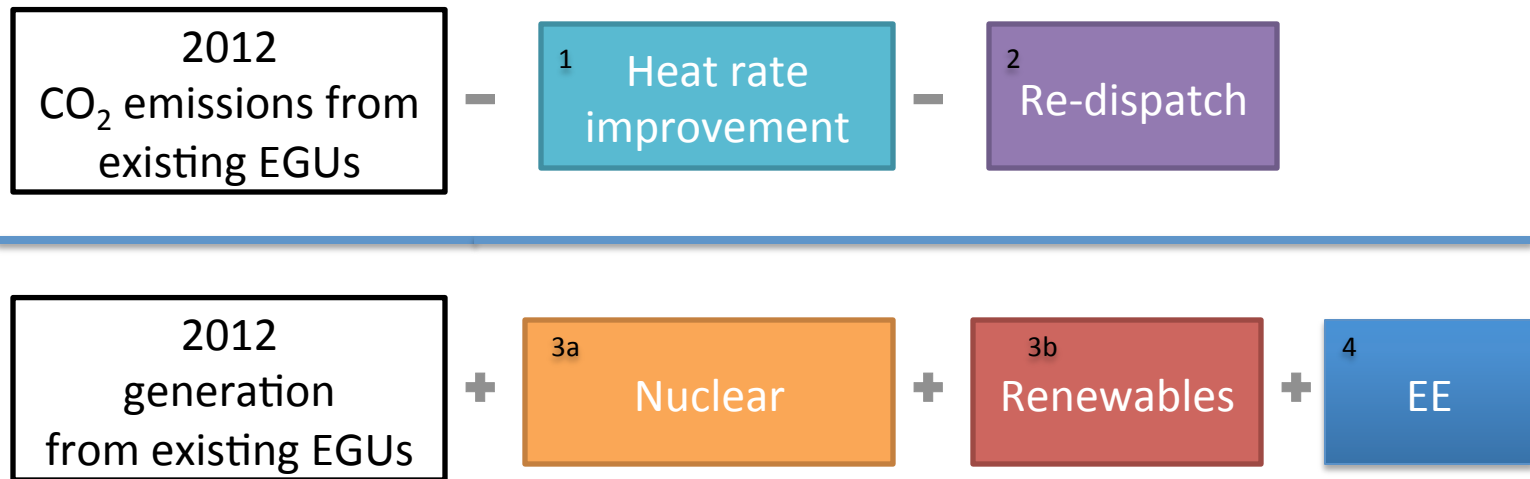
6/30/2017
Extension
Deadline
(state)

2020–2029
Interim
Compliance
Period

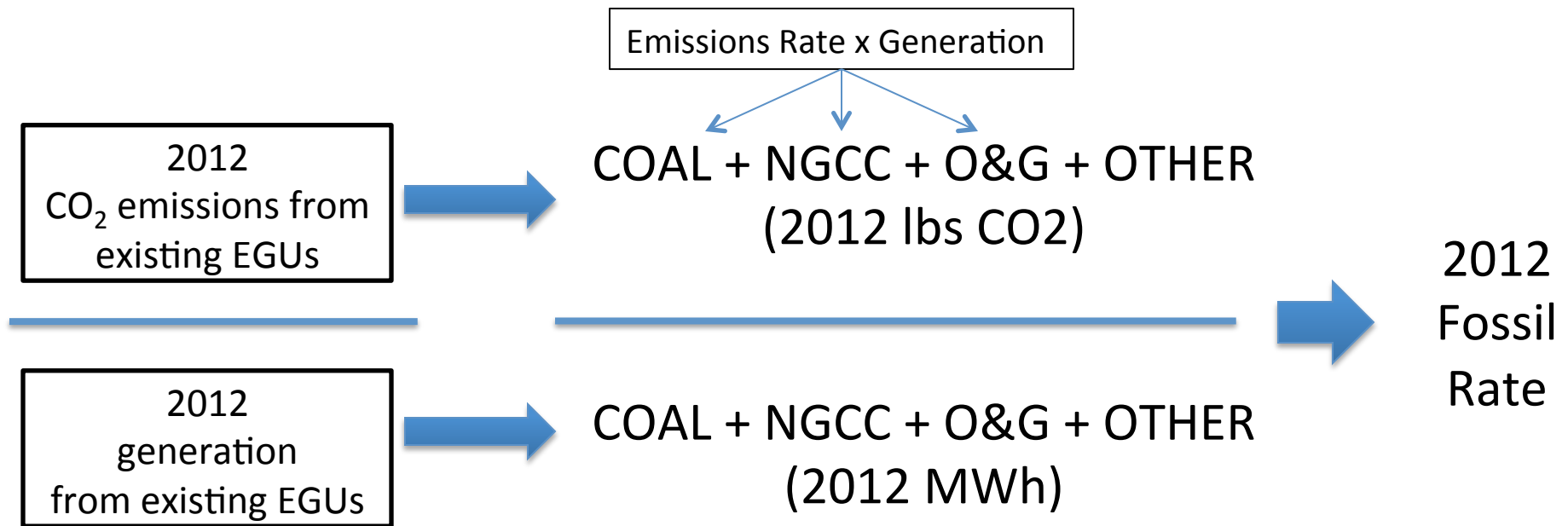
2030–2032
3-yr ave.

BUILDING BLOCKS

Building Blocks



2012 Fossil Rate Calculation



Example 2012 Fossil Rates lbs CO ₂ /MWh	
Kentucky	2,166
Mississippi	1,185
South Carolina	1,791

Building Blocks

Heat Rate Improvement	Re-dispatch Natural Gas	Nuclear	Renewables	Energy Efficiency
<ul style="list-style-type: none">• 6% HRI• Existing coal units• Reduce CO₂				

Building Block #1

Heat Rate Improvement

6% HRI Rationale

O&M and Equipment upgrades

- 11 year hourly time series data → 4%
- Sargent & Lundy → 2%

Example

2000 lbs. / MWh * (1 – 6%) = 1880 lbs. / MWh

Notes

- Decreases coal emissions without adjusting generation

Building Block #1

SC Rate After Heat Rate Improvement:

1699 lbs/MWh

Decreased coal
emissions rate

CO₂



Coal + NGCC + O&G + Other

MWh



Coal + NGCC + O&G + Other

State Emission Goals

Heat Rate Improvement	Re-dispatch Natural Gas	Nuclear	Renewables	Energy Efficiency
<ul style="list-style-type: none">• 6% HRI• Existing coal units• Reduce CO₂	<ul style="list-style-type: none">• Re-dispatch from coal to existing NGCC.• Increase utilization up to 70% of capacity.• Reduce CO₂			

Building Block #2

Re-dispatch Natural Gas

70% CF existing & under construction NGCC

- 2012 NGCC dispatch data
- ~10% NGCC units 70+% CF, ~20% units peak times

Under construction NGCC assumed to have 55% CF prior to re-dispatch

- Under construction, testing, site prep by Jan 2014

Reduce coal and O&G steam proportionally

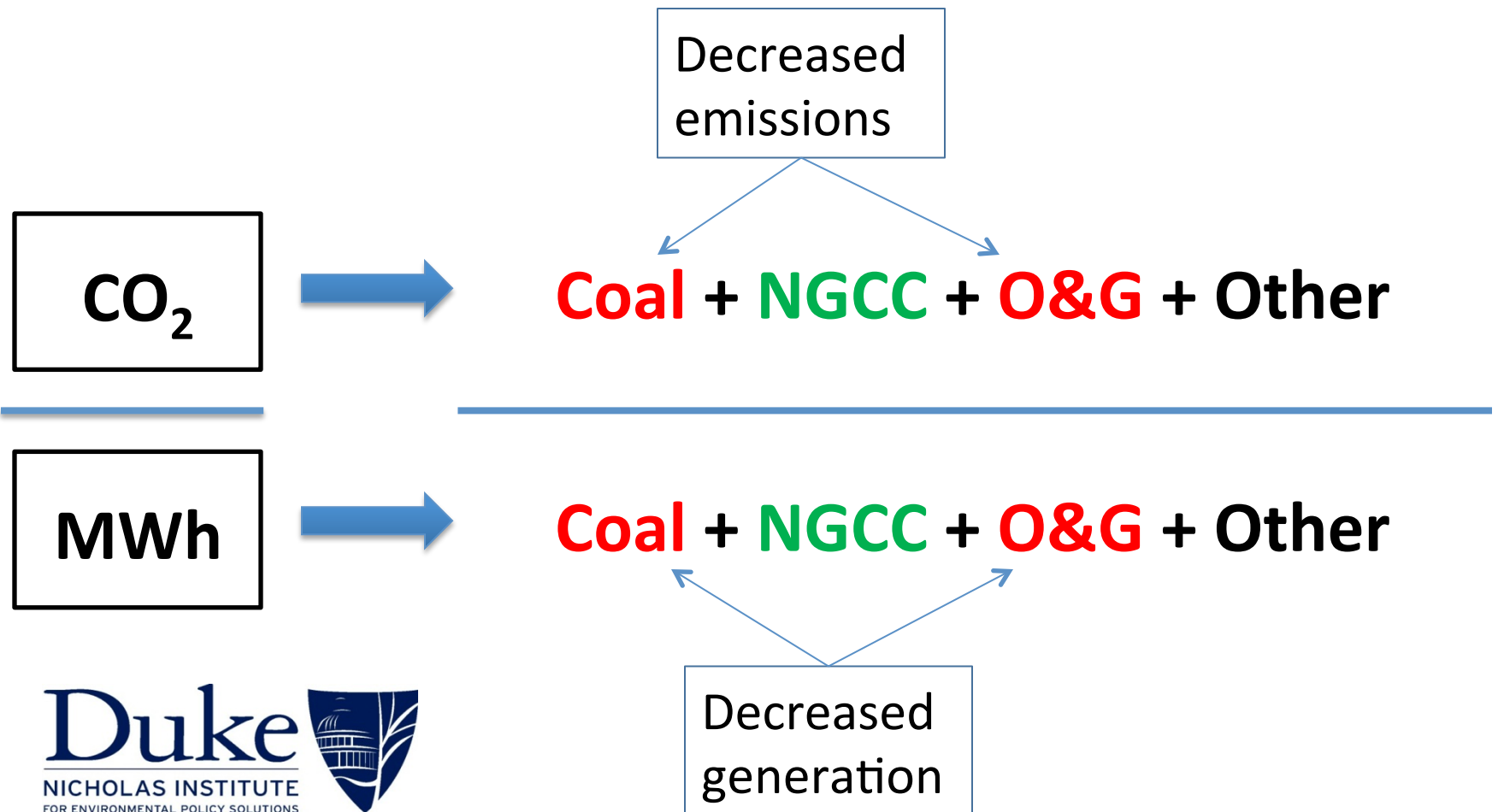
NGCC under construction 55% CF added to other emissions and generation

- Not all states had 2012 NCGG or NGCC under construction

SC Emissions Rate: Block #2

SC Rate After Re-Dispatch: 1514 lbs/MWh

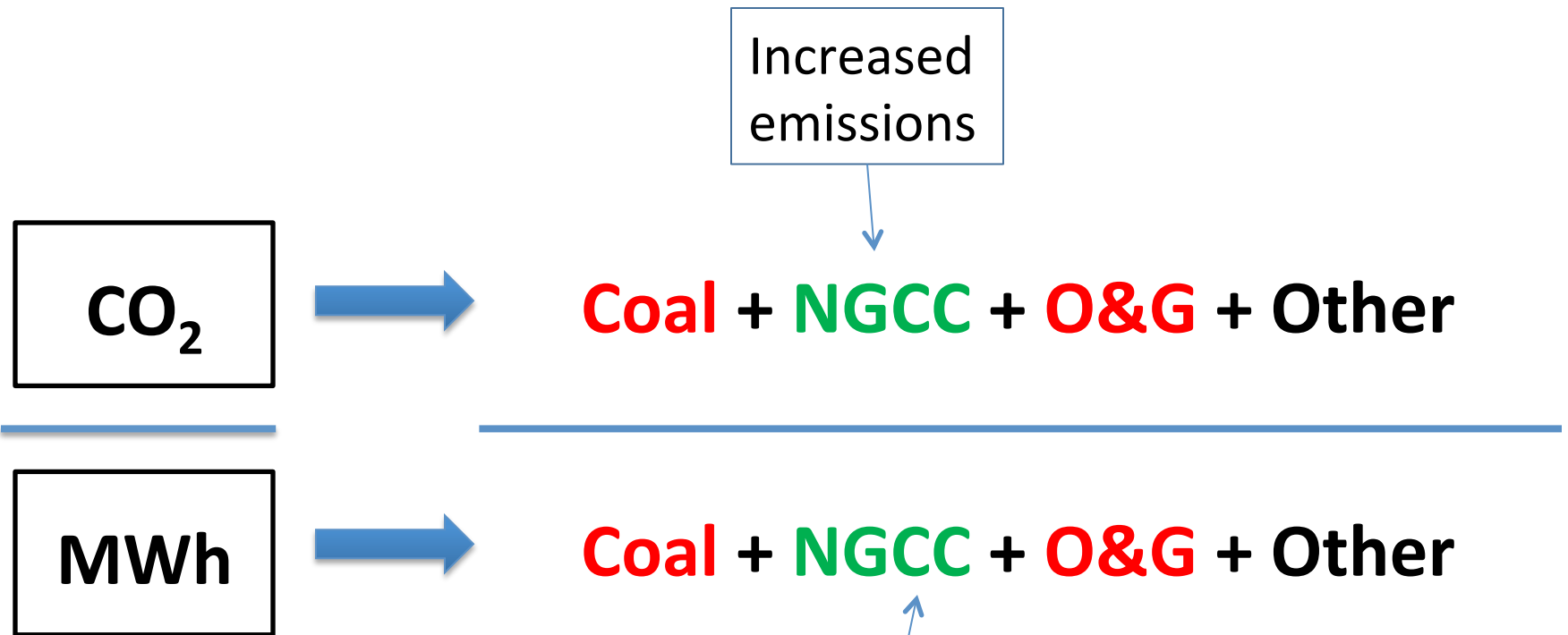
No NGCC under construction



SC Emissions Rate: Block #2

SC Rate After Re-Dispatch: 1514 lbs/MWh

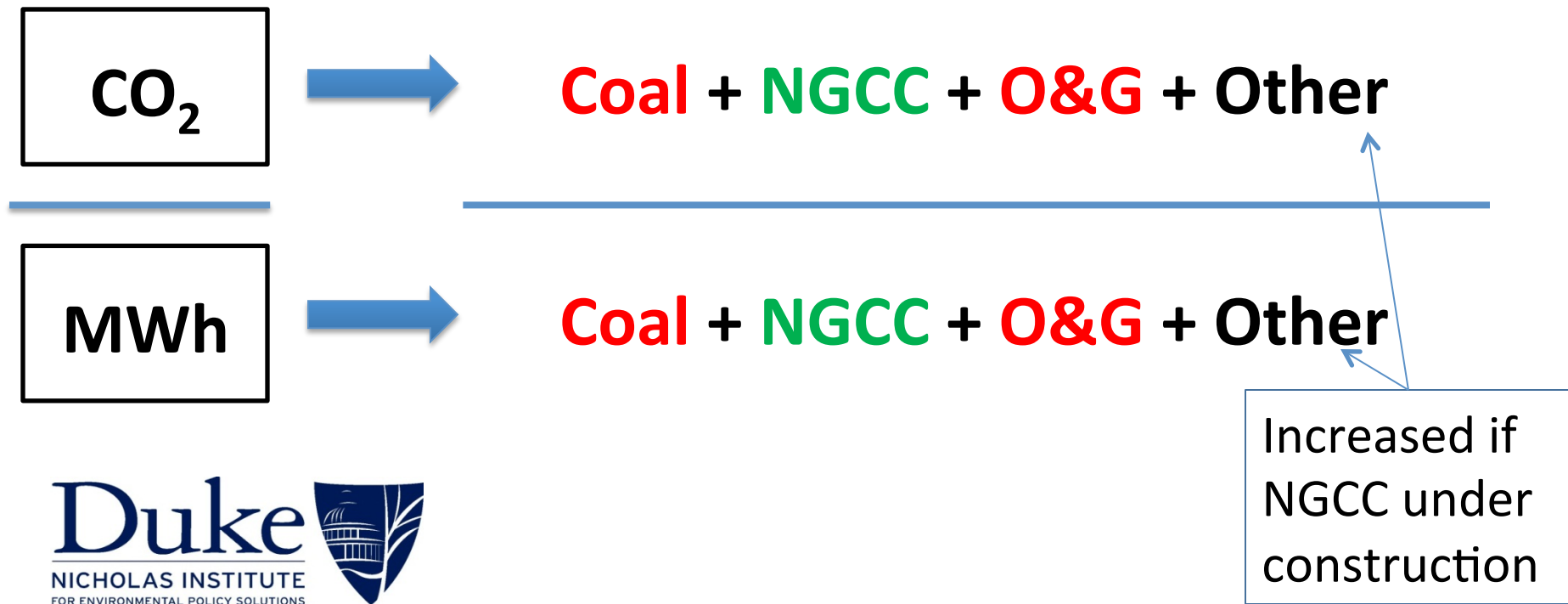
No NGCC under construction



SC Emissions Rate: Block #2

SC Rate After Re-Dispatch: 1514 lbs/MWh

No NGCC under construction



State Emission Goals

Heat Rate Improvement	Re-dispatch Natural Gas	Nuclear	Renewables	Energy Efficiency
<ul style="list-style-type: none"> • 6% HRI • Existing coal units • Reduce CO₂ 	<ul style="list-style-type: none"> • Re-dispatch from coal to existing NGCC. • Increase utilization up to 70% of capacity. • Reduce CO₂ 	<p><u>At-Risk Capacity</u></p> <ul style="list-style-type: none"> • 6% of 2012 nuclear capacity • Add MWh <p><u>Units Under Construction</u></p> <ul style="list-style-type: none"> • Not operating in 2012. • Add MWh. 		

Building Block #3a

Nuclear Generation

Existing nuclear is zero carbon and the potential for retirements could increase emissions

- *Based on AEO 2014*
- *EIA projects 5.7 GW retirements*

EPA At-Risk Nuclear: 6% existing capacity @ 90% CF

- *If 2012 existing capacity 1000 MW, generation from 60MW @ 90% CF*

New Nuclear effective emissions reduction

Decisions made prior to proposal, thus zero cost

- *Generation assuming 90% CF*
- *If 1000 MW capacity under construction, 1000 MW generation @ 90% CF*

SC Emissions Rate: Block #3a

SC 2012 Rate with At Risk Nuclear and Nuclear Under Construction: 1005 lbs/MWh

CO₂



Coal + NGCC + O&G + Other

MWh



Coal + NGCC + O&G + Other
At Risk Nuc + Nuc Under Const.

State Emission Goals

Heat Rate Improvement	Re-dispatch Natural Gas	Nuclear	Renewables	Energy Efficiency
<ul style="list-style-type: none"> • 6% HRI • Existing coal units • Reduce CO₂ 	<ul style="list-style-type: none"> • Re-dispatch from coal to existing NGCC. • Increase utilization up to 70% of capacity. • Reduce CO₂ 	<p><u>At-Risk Capacity</u></p> <ul style="list-style-type: none"> • 6% of 2012 nuclear capacity • Add MWh <p><u>Units Under Construction</u></p> <ul style="list-style-type: none"> • Not operating in 2012. • Add MWh. 	<ul style="list-style-type: none"> • Reasonable RE MWh given state starting place and regional potential. • Regional 2029 RE target, based upon regional ave. 2020 RPS. • Regional growth factor: yearly RE growth 2017–2029 to reach RE target. • Each state grows its RE at regional growth factor. 	



Building Block #3b

Renewable Generation

Average RPS in 2020 each region → Region target in 2029

For each region, determined RE growth rate 2017 to 2029 to reach target

- *Assume 2012 RE generation in 2017*

Apply regional growth factor to each state from 2017

- *Assume 2012 RE generation in 2017*
- *Until state reaches Regional Target (%) or 2029*

SC Emissions Rate: Block #3b

**SC 2012 Rate with Renewable Energy: 866 lbs/
MWh**

Southeast region target: 10% by 2029

Southeast growth rate 13%/yr

CO₂



Coal + NGCC + O&G + Other

MWh



**Coal + NGCC + O&G + Other
At Risk Nuc + Nuc Under Const.**

+ RE

State Emission Goals

Heat Rate Improvement	Re-dispatch Natural Gas	Nuclear	Renewables	Energy Efficiency
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Building Block #4

EPA determined 1.5% incremental EE is target

- Projected in 12 states

EE target based on *cumulative* savings

- EPA determined BAU energy demand
 - 2017 to 2029 EIA regional growth rates
- Increased states existing incremental EE from 2017 at 0.2%/yr until 1.5%/yr
 - If 2012 incremental EE 0.4%, 2017 incremental EE 0.4%, increases to 0.6% in 2018
- Determined cumulative EE savings vs. BAU accounting for measure life
 - 10 yr average via distribution
- Apply % cumulative savings to 2012 generation/sales

SC Emissions Rate: Block #4

SC Rate with Energy Efficiency: 772 lbs/MWh

2029 Cumulative EE 10.23% of BAU

CO₂



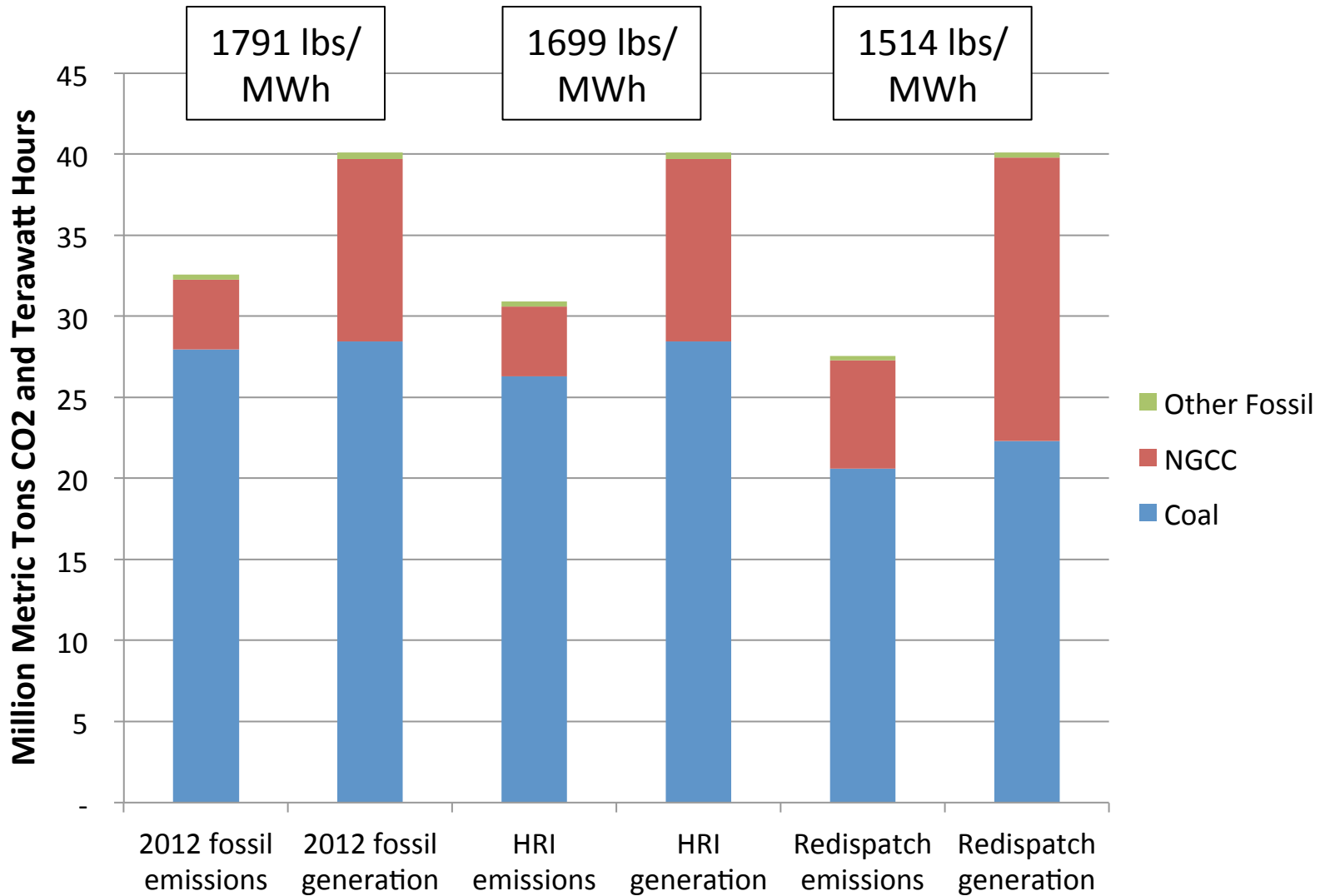
Coal + NGCC + O&G + Other

MWh

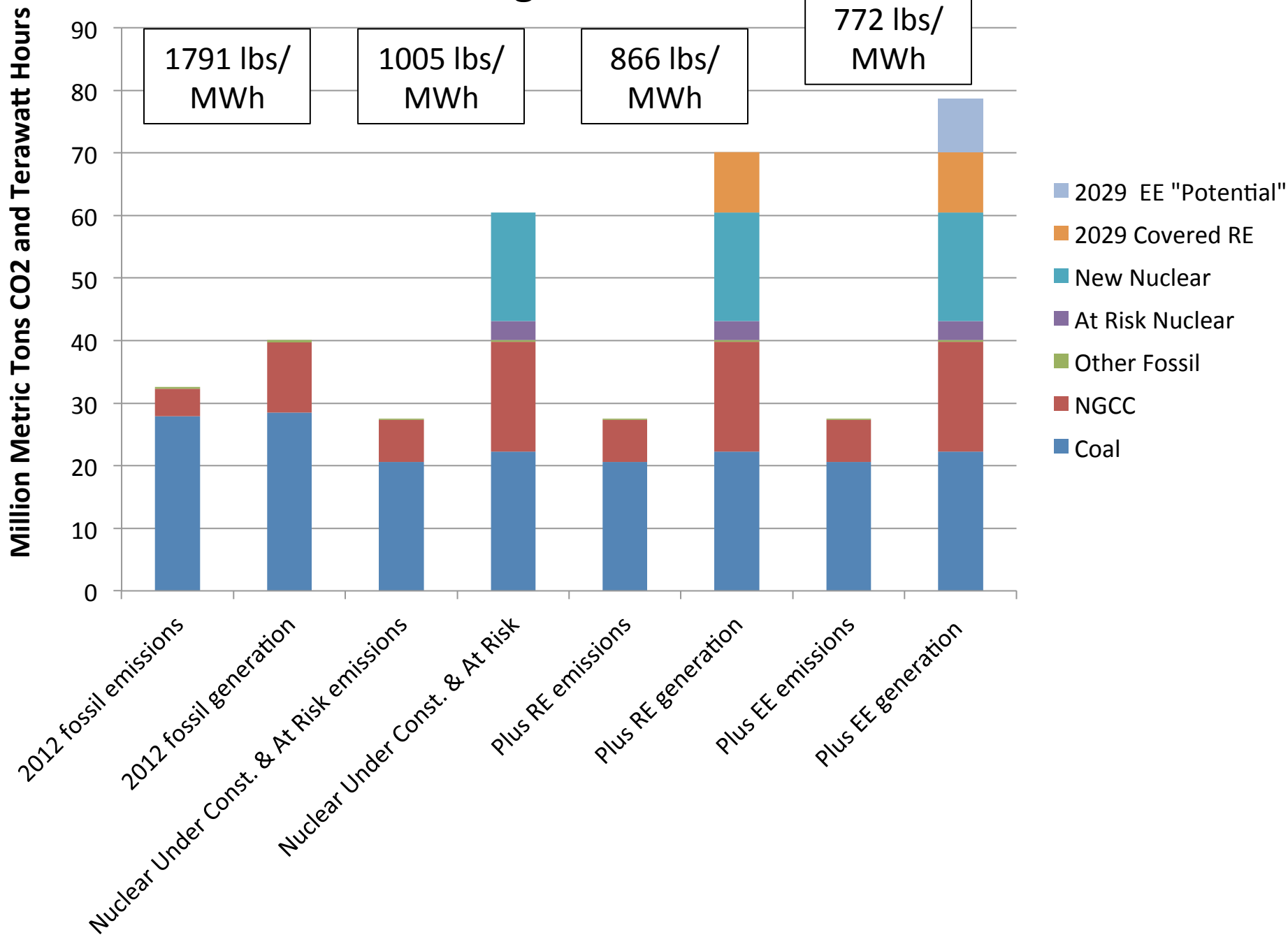


Coal + NGCC + O&G + Other
At Risk Nuc + Nuc Under Const.
+ RE + EE

SC Building Blocks 1 & 2



SC Building Blocks 3 & 4



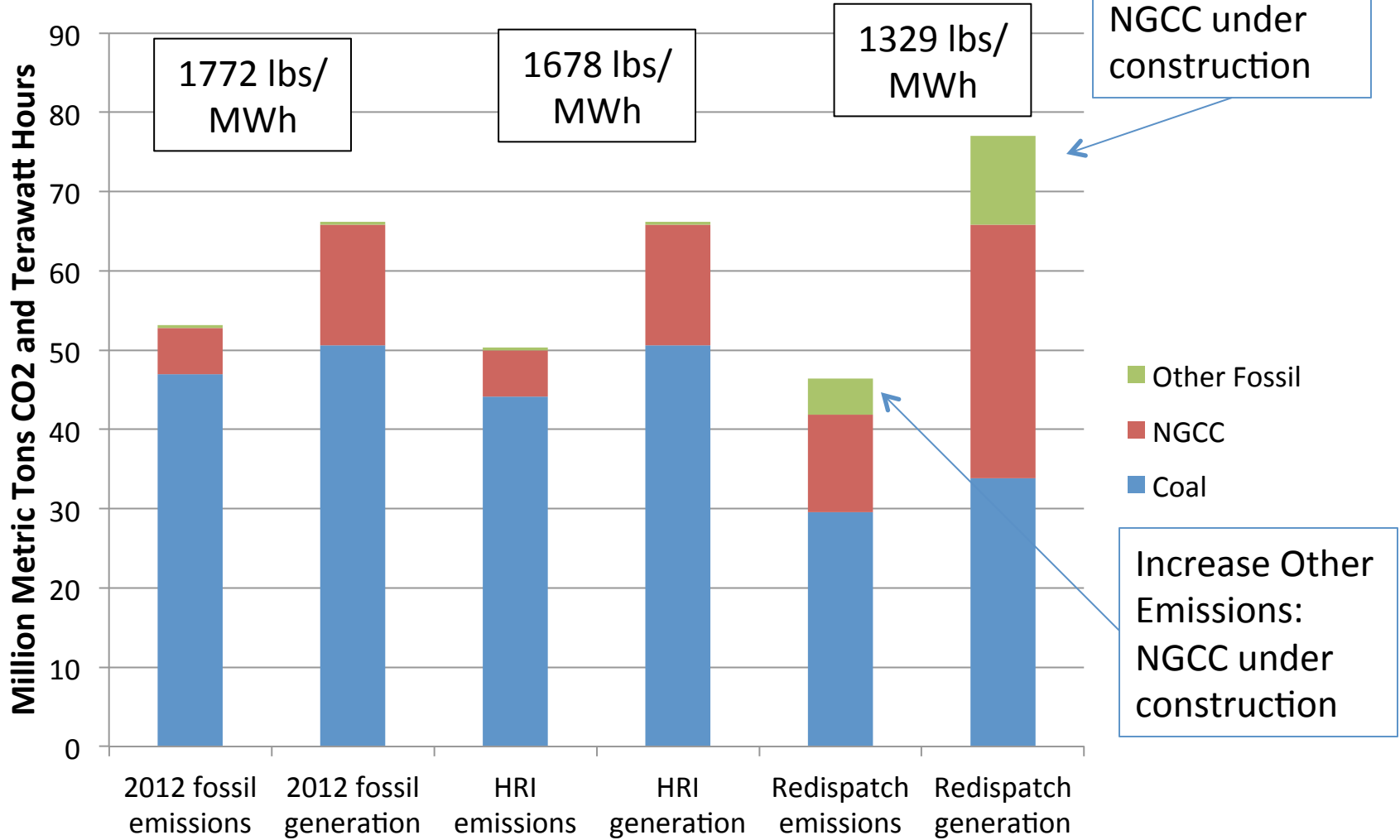
2nd Example: NC

NC 2012 Fossil Rate 1772 lbs/MWh

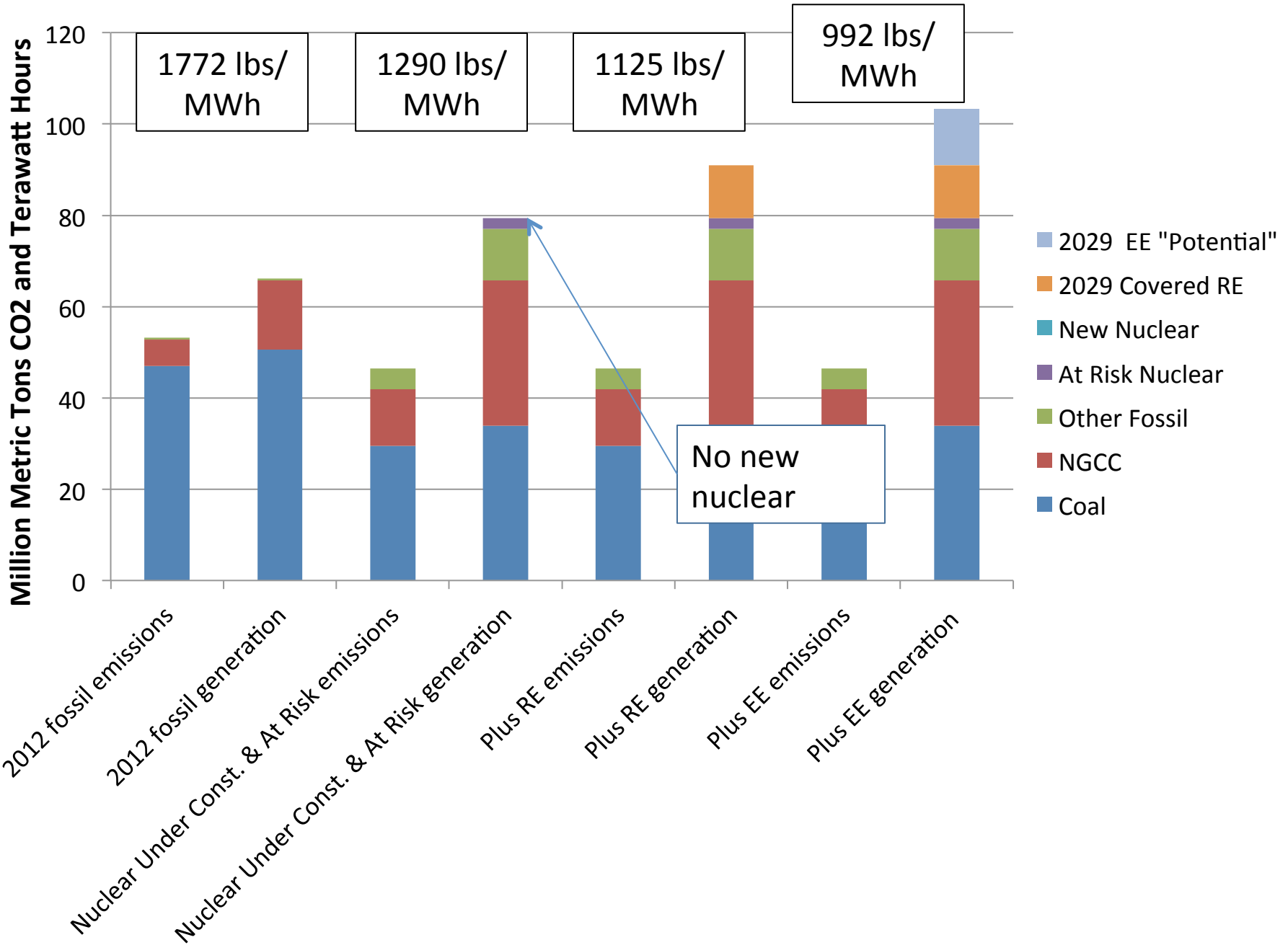
No nuclear under construction

NGCC under construction

NC Building Blocks 1 & 2



NC Building Blocks 3 & 4



STATE EMISSION GOALS

State Emission Goals

Interim Goal

- 10-year ave. adjusted emission rates (2020–2029)
- Compliance measured in 2030
- Annual reporting, milestones, corrections.

Final Goal

- 2029 adjusted rate.
- Plan must show 1-yr achievement by 2030.
- Start measuring compliance after 2032 on 3-yr rolling average.

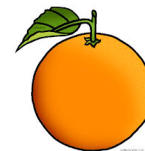
Maintenance After 2030

- Showing that measures for final goal stay in place is enough.

State Emission Goals

Goals in Context

2012 Affected Fossil	EPA Building Blocks	S.C. Interim Goal	S.C. Final Goal	Today's Adjusted Rate
1791 lbs. MWh	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">- Heat rate improvement</div> <div style="text-align: center;">- Dispatch shifts</div> </div> <hr style="border: 1px solid blue;"/> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">+ Nuclear</div> <div style="text-align: center;">+ RE</div> <div style="text-align: center;">+ EE</div> </div>	840 lbs. MWh	772 lbs. MWh	? lbs. MWh



State Emission Goals

Goals in Context

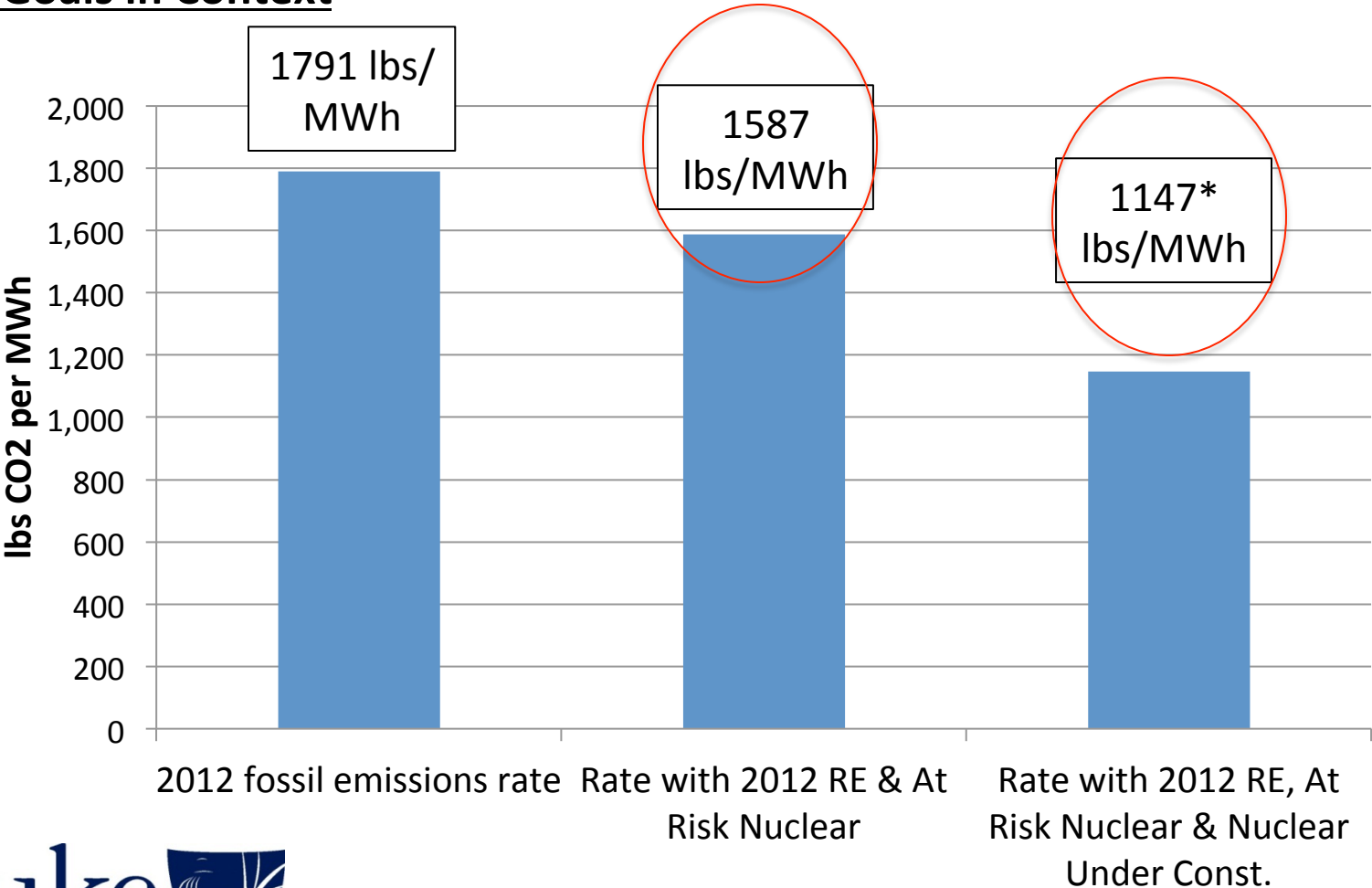
2012 Affected Fossil	Today's Adjusted Rate
1791 lbs. ----- MWh	? lbs. ----- MWh



- 6% of existing 2012 nuclear capacity.
- Nuclear under construction
- MATS retirements
- RE generation, plans
- Energy Efficiency

State Emission Goals

S.C. Goals in Context



State Emission Goals

Nuclear Construction

	2012 Fossil Rate	2012 Rate with 2012 RE, at Risk Nuclear, Nuclear Under Construction	State Final Goal Blocks 1,2,3	State Final Goal Blocks 1-4
South Carolina	1,791	1147	866	772
Georgia	1,598	1,243	926	834
Tennessee	2,015	1,581	1,322	1,163

State Emission Goals

MATS Retirements

	2012 Fossil Rate	2012 Rate with 2012 RE, at Risk Nuclear, Nuclear Under Construction	Rate with MATS retirements , additional RE, 2012 RE, at Risk Nuclear, Nuclear Under Const.	State Final Goal
Alabama	1,518	1,444	1,388	1,059
Mississippi	1,185	1,130	1,130	692
Virginia	1,438	1,302	1,244	692
Georgia	1,598	1,243	1,195	834
Kentucky	2,166	2,158	2,160	1,763
South Carolina	1,791	1,147	1,105	772
North Carolina	1,772	1,647	1,624	992
Tennessee	2,015	1,581	1,509	1,163
Florida	1,238	1,199	1,191	740

Note: Impact of MATS retirements estimated by removing all retiring units from emissions rate equation. This is a gross simplification and may not represent actual changes in emissions rate. The goal in showing this data is to point out that MATS retirements impact a state's emissions rate and should be accounted for when determining what a state needs to do to comply with the proposed rate.

State Emission Goals

Renewable Energy

- New Renewable Energy additions/commitments
 - NC solar additions
 - GA solar commitment, wind PPA

Energy Efficiency

- Cumulative efficiency over compliance period.

STATE 111(d) PLAN

State 111(d) Plan

- **Plan projects** achievement of state interim and final emission goals.
- **Can convert** from rate- to mass-based goals.
- **Can use** building blocks and other strategies.
- **All measures** relied on are federally enforceable.
- **Credit only for** reductions from affected EGUs

State 111(d) Plan

Flexibility

- **Compliance obligation:** EGUs, state, others.
- **Measures:** Building Blocks, new NGCC and nuclear units, biomass, T&D efficiency, integrated renewables, etc.
- **Timing:** When measures implemented.
- **Form:** Rate- or mass-based standard.
- **Implementation tools:** State policy, PUC orders, markets, multi-state cooperation.

State 111(d) Plan

12 Plan Components

- Identify affected entities.
- Describe geographic scope of plan.
- Demonstrate the plan will achieve interim and final goals.
- Provide milestones and corrective measures.
- Identify monitoring, recordkeeping, reporting requirements. . . .

4 Evaluation Criteria

- Enforceable measures.
- Timely emission performance.
- Quantifiable and verifiable emission performance
- Reporting and corrective action.

State 111(d) Plan

EGU Emission Limits

EGUs achieve emission limits. EGUs hold compliance obligation.

- Each EGU must reach a set emission rate.
- State allows emission averaging among EGUs. No extra-EGU measures.

Portfolio Approach + Enforceable Measures

EGU emission limits + other enforceable measures (EERS, RPS). EGUs and other entities hold obligation.

- Rate-based market with EE/RE credits from mandatory EE/RE programs.
- EGU limits + EE/RE program state uses to administratively adjust state performance level toward goal.

State Commitment Approach

EGU emission limits + other enforceable measures (EERS, RPS). EGUs and state hold obligation. EE/RE not in plan or fed enforceable. But state liable.

- EGU limits + EE/RE state responsibility.

Portfolio Approach + Complementary Measures

EGU emission limits + complementary measures (EE, RE) (not enforceable).

- RGGI—mass-based market w/ complementary RPS and EE programs. Not federally enforceable.

Contact Information

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