

EPA's Proposed Clean Power Plan

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111d Georgia Stakeholder Meeting
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Atlanta, Georgia

Outline

Timeline

4 Building Blocks

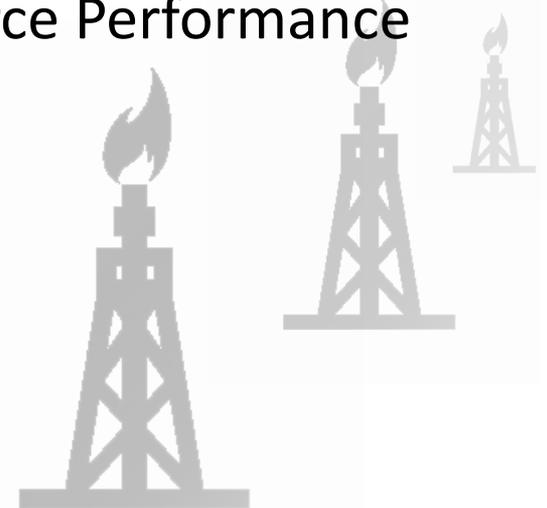
Georgia State Emission Goals

Georgia Emission Goals in Context



Background

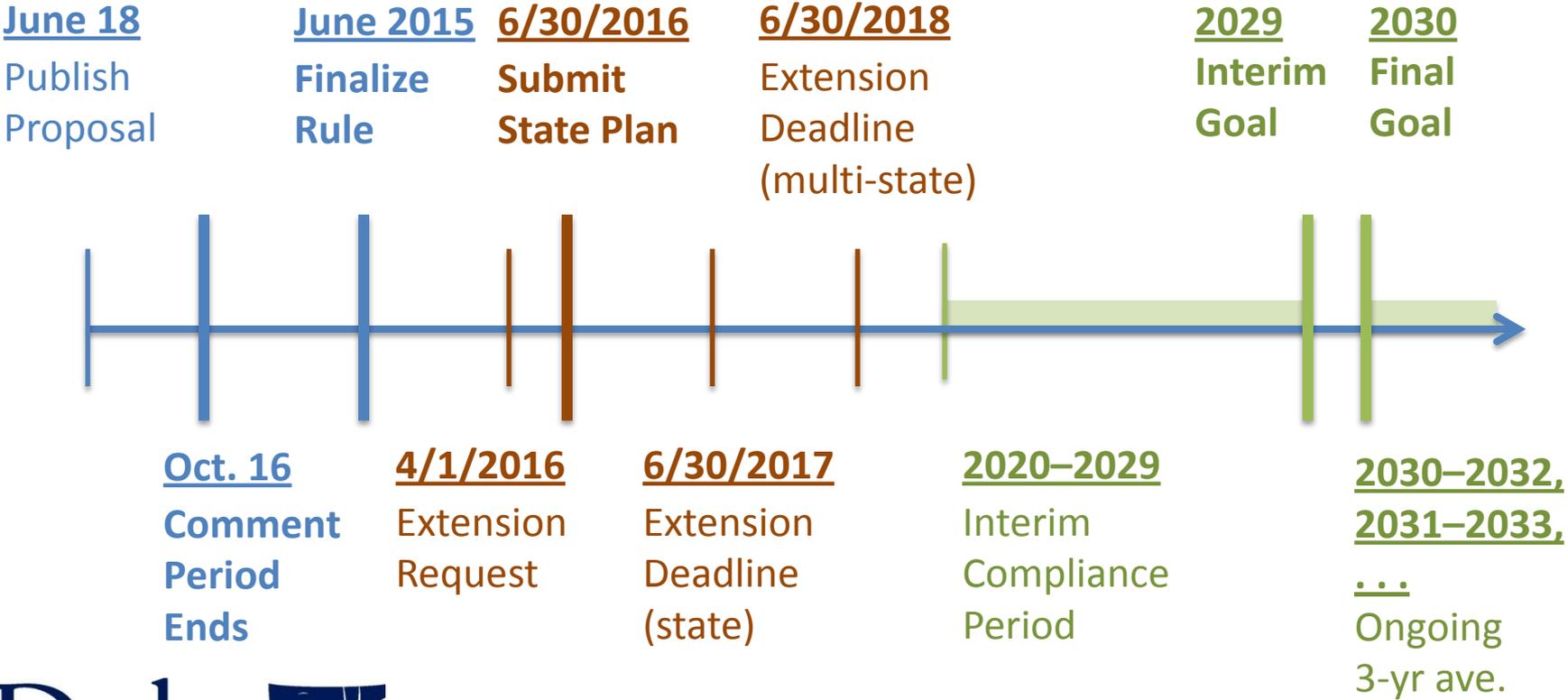
- **Greenhouse gas regulation**
- **New v. Existing Sources**
- **Section 111(d) trigger**
 1. Pollutant not regulated as hazardous or criteria pollutant, and
 2. Source would be covered by New Source Performance Standards if new.



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

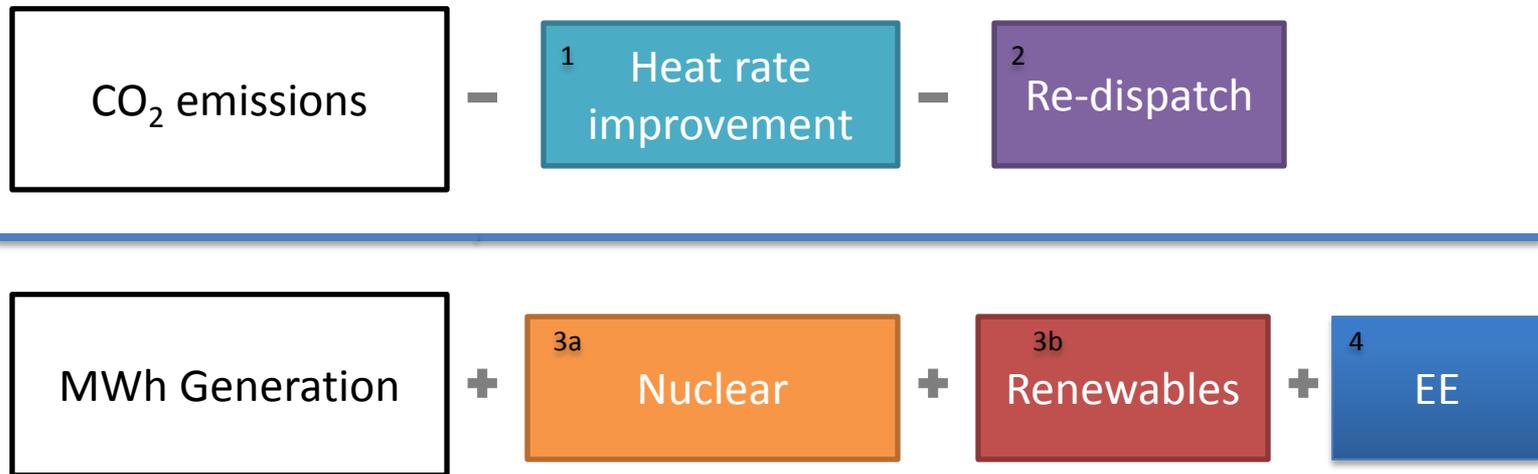
Timeline



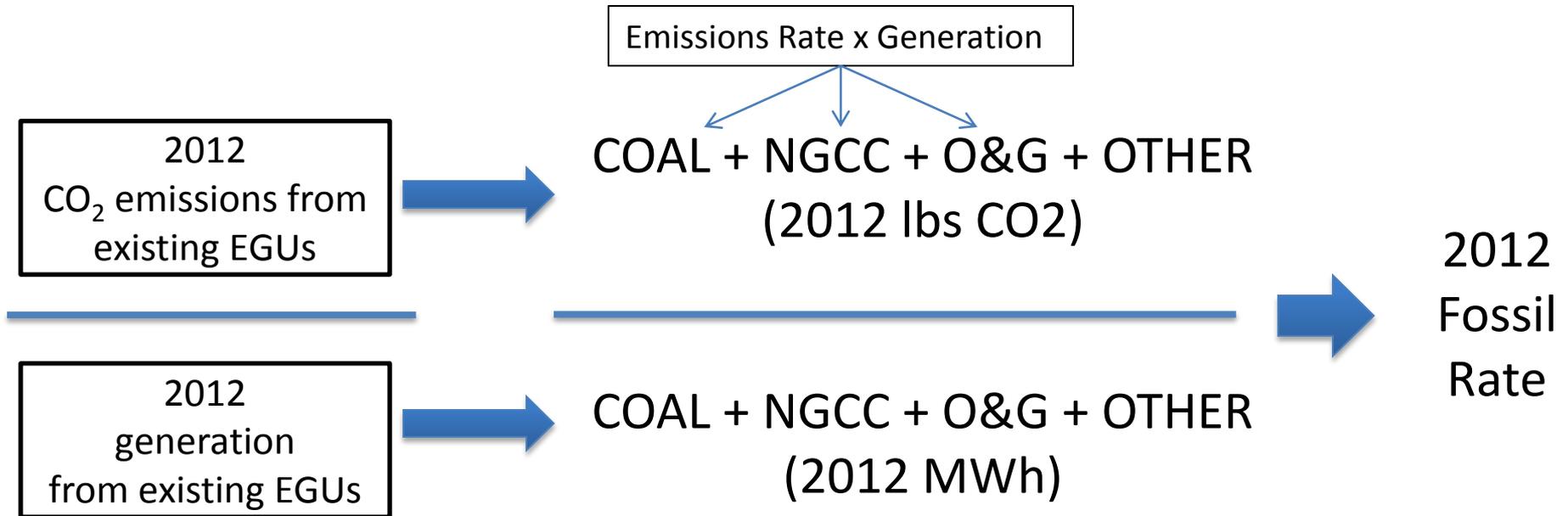
BUILDING BLOCKS

Building Blocks

2012 Fossil Units



2012 Fossil Rate Calculation



Georgia's 2012 Fossil Rate: 1,598 lbs/MWh

| Southeastern 2012 Fossil Rates lbs CO ₂ /MWh | |
|---|-------|
| Kentucky | 2,166 |
| Mississippi | 1,185 |

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

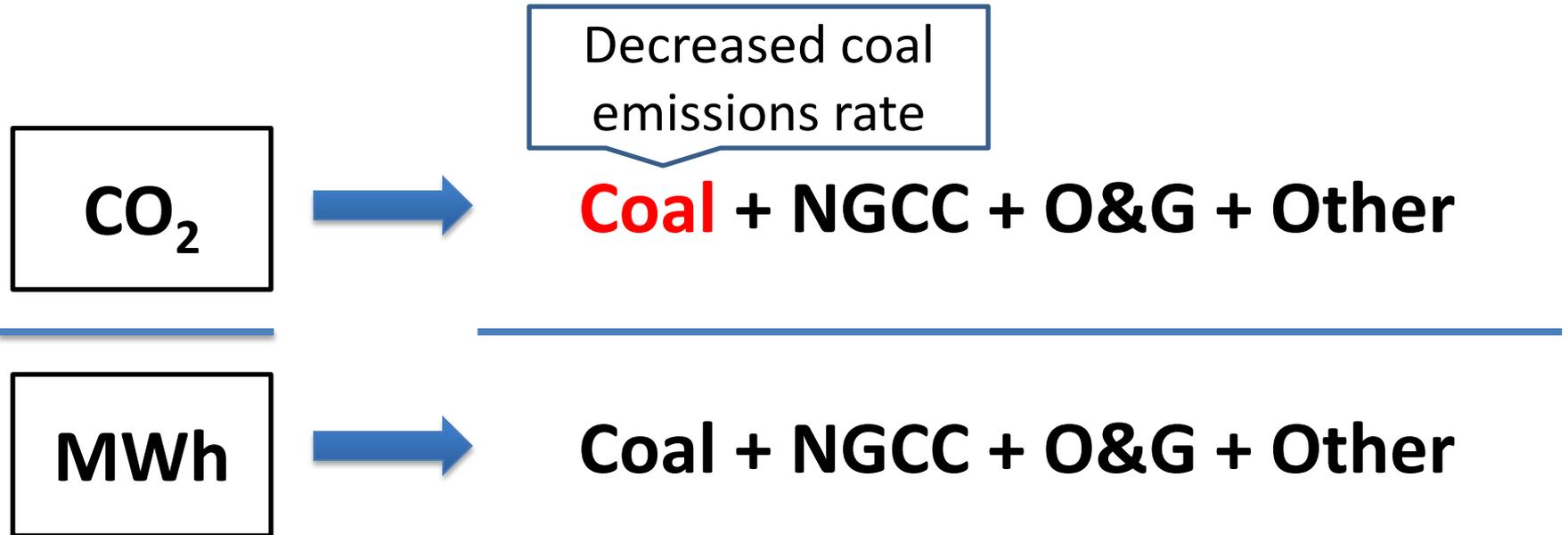
Notes

- Decreases coal emissions without adjusting generation

Building Block #1

GA Rate After Heat Rate Improvement:

1527 lbs/MWh



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 fossil steam units to existing NGCC.• Increase utilization up to 70% of capacity.• Reduce CO₂ | | | |

Building Block #2

Re-dispatch Natural Gas

Up to 70% utilization reasonable for existing & under construction NGCC

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

For 2012 NGCC units, EPA calculates average state CF and assumes re-dispatch up to 70% CF

For NGCC units under construction, assumed to have 55% CF and re-dispatches up to 70% CF

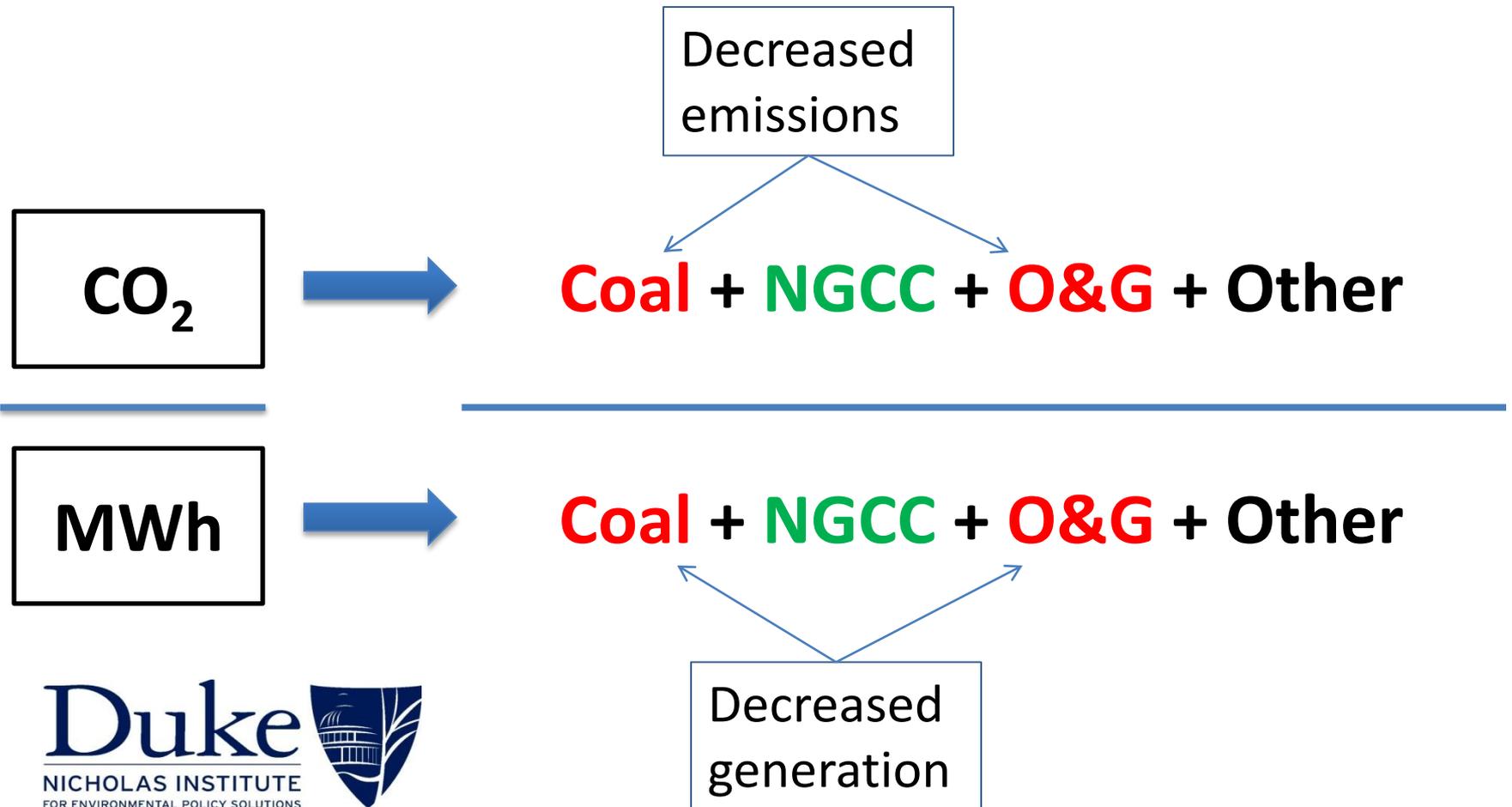
- NGCC under construction generation and emissions at 55% CF added to “other” category
- Not all states had 2012 NGCC or NGCC under construction

Reduce coal and O&G steam generation proportionally

GA Emissions Rate: Block 2

GA Rate After Re-Dispatch: 1296 lbs/MWh

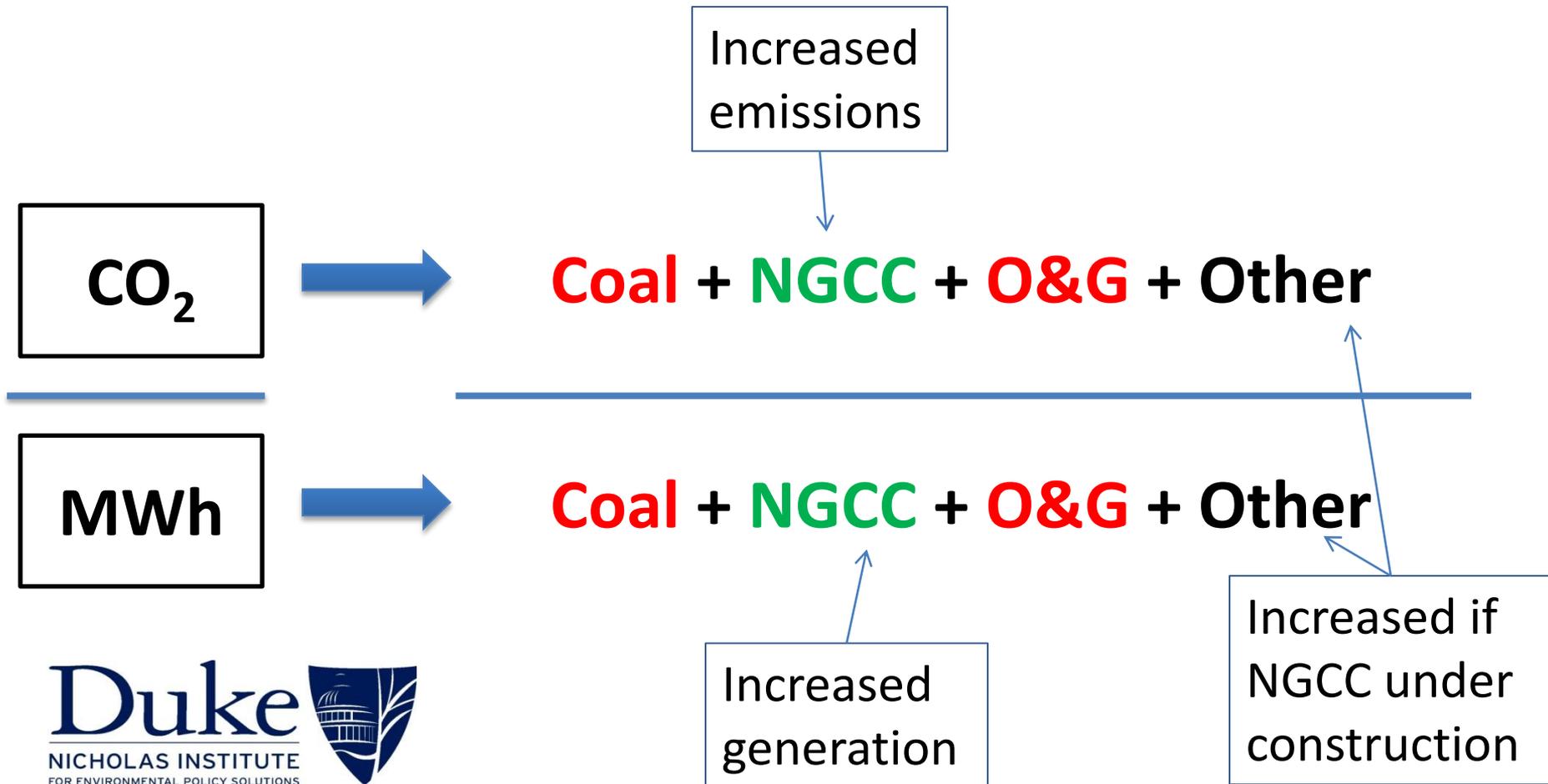
No NGCC under construction



GA Emissions Rate: Block 2

GA Rate After Re-Dispatch: 1296 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 retirements could increase emissions.

At-Risk Nuclear

- *Based on AEO 2014, projecting 5.7 GW retirements*
- *6% existing capacity @ 90% CF*
- *If 2012 existing capacity 1000 MW, generation from 60MW @ 90% CF*

Under-construction nuclear

- *Decisions made prior to proposal, thus zero incremental cost*
- *Generation assuming 90% CF*
- *If 1000 MW capacity under construction, 1000 MW generation @ 90% CF*

GA Emissions Rate: Block 3a

GA 2012 Rate with At Risk Nuclear and Nuclear Under Construction: 1041 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 fossil steam units 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 → Regional 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*

GA Emissions Rate: Block 3b

**GA 2012 Rate with Renewable Energy: 926
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 |
|--|---|---|---|---|
| <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"> • RE MWh reasonable 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. | <ul style="list-style-type: none"> • Total EE savings. • Assumes annual increases in EE savings. • Annual increase is the annual incremental EE as a % of sales. |



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

GA Emissions Rate: Block 4

GA Rate with Energy Efficiency: 834 lbs/MWh

2029 Cumulative EE 9.83% of BAU

CO₂



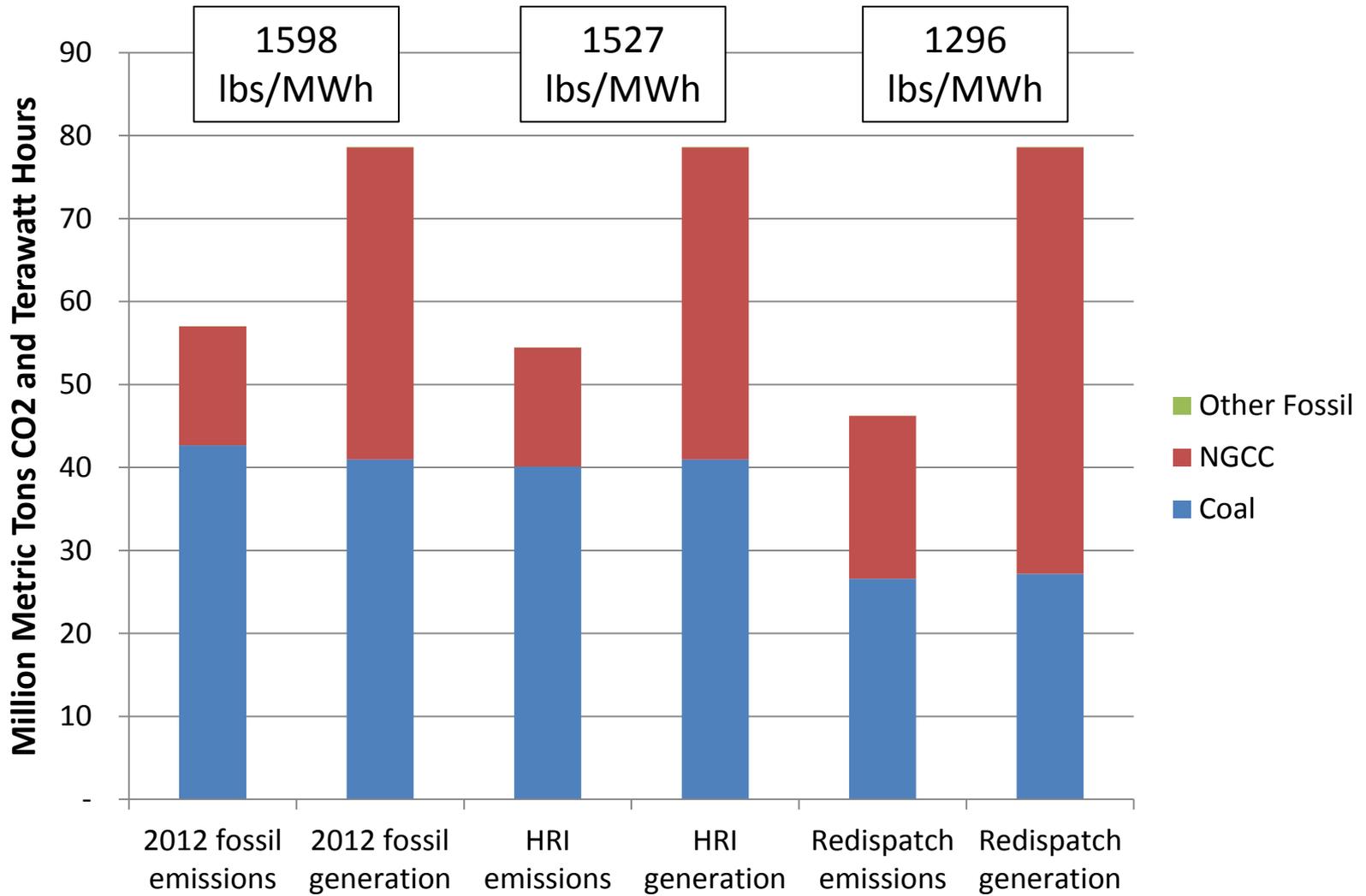
Coal + NGCC + O&G + Other

MWh

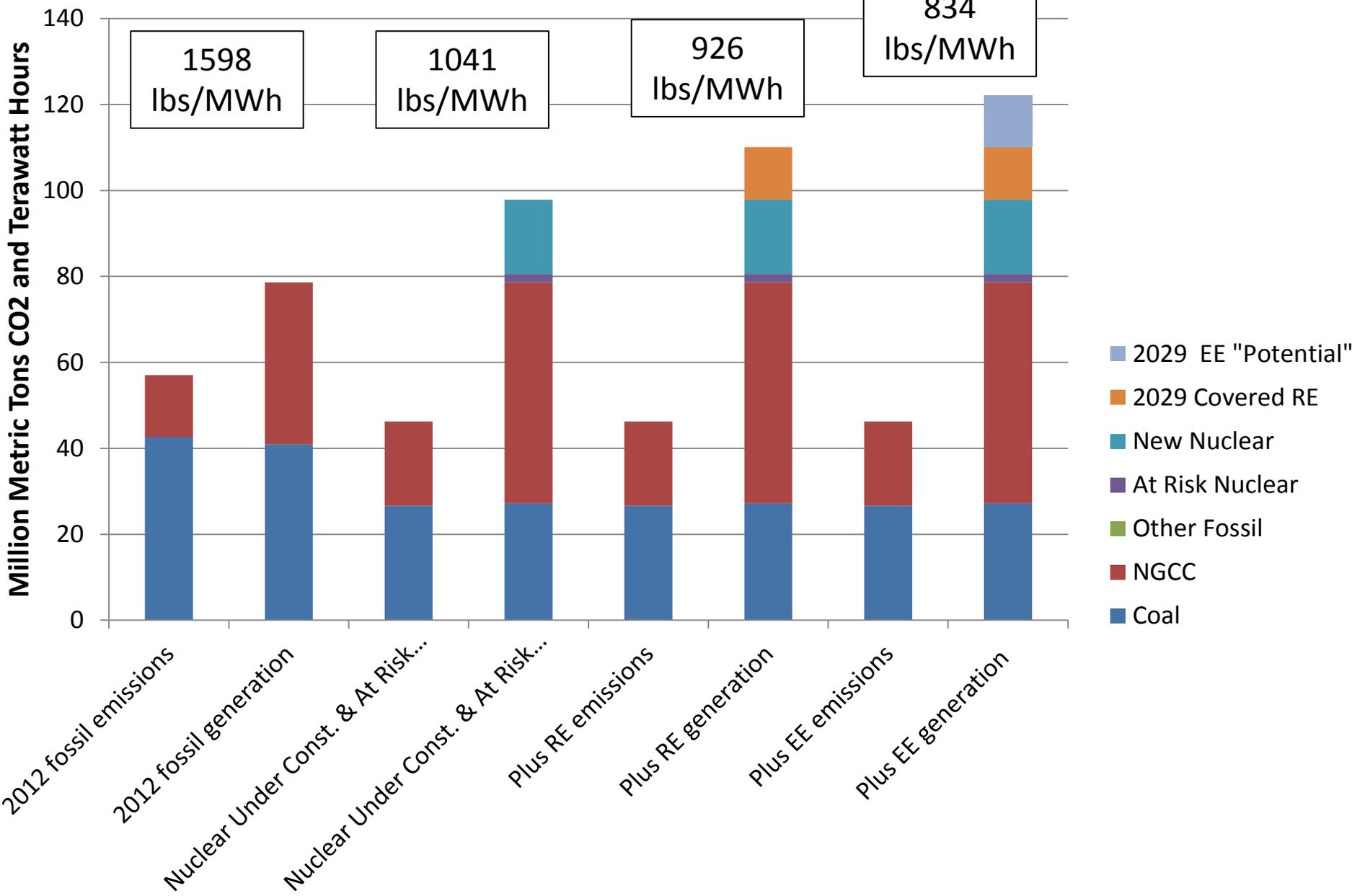


Coal + NGCC + O&G + Other
At Risk Nuc + Nuc Under Const.
+ RE + EE

GA Building Blocks 1 & 2



GA 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.

Georgia Emission Goals

| 2020 (lbs/ MWh) | 2021 (lbs/ MWh) | 2022 (lbs/ MWh) | 2023 (lbs/ MWh) | 2024 (lbs/ MWh) | 2025 (lbs/ MWh) | 2026 (lbs/ MWh) | 2027 (lbs/ MWh) | 2028 (lbs/ MWh) | 2029 (lbs/ MWh) |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 966 | 951 | 933 | 914 | 895 | 876 | 857 | 846 | 839 | 834 |

Interim Goal: 891 lbs/MWh

Final Goal: 834 lbs/MWh

State Emission Goals

Goals in Context

| 2012 Affected Fossil | EPA Building Blocks | GA Interim Goal | GA Final Goal | Today's Adjusted Rate |
|---------------------------|--|--------------------------|--------------------------|------------------------|
| 1598 lbs. ----- MWh | <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">-</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">1 Heat rate improvement</div> <div style="margin-right: 10px;">-</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">2 Dispatch shifts</div> <div style="margin-right: 10px;">+</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Nuclear</div> <div style="margin-right: 10px;">+</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">RE</div> <div style="margin-right: 10px;">+</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">4 EE</div> </div> | 891 lbs. ----- MWh | 834 lbs. ----- MWh | ? lbs. ----- MWh |



State Emission Goals

Goals in Context

| 2012 Affected Fossil | Today's Adjusted Rate |
|-----------------------|-----------------------|
| 1598 lbs. — MWh | ? lbs. — MWh |



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

State Emission Goals

Georgia Goals in Context

Coal retirements/conversions: ~3 GW

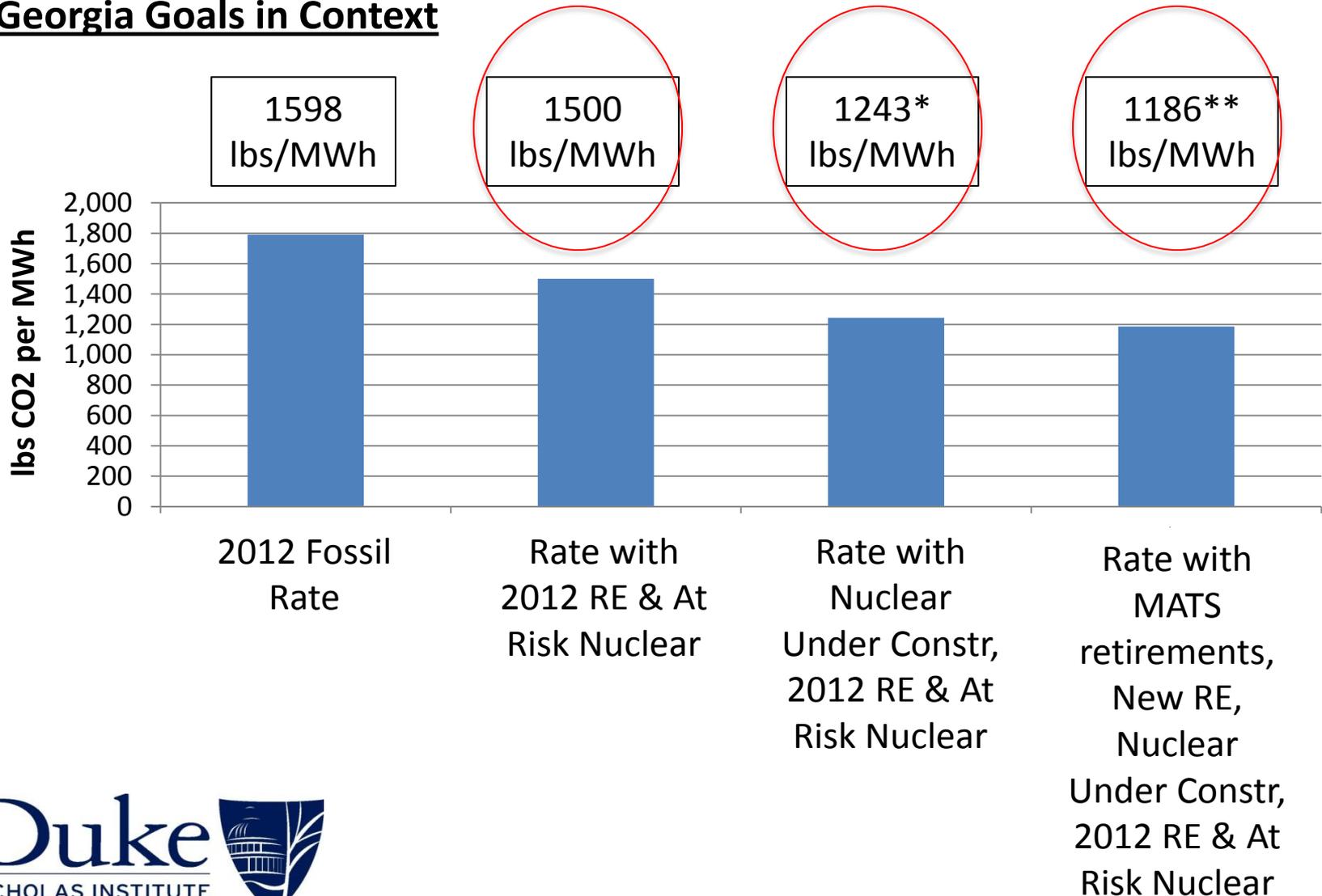
Vogtle 3 & 4: Displace existing fossil?

Renewable additions:

- Georgia Power 725 MW solar commitment
- Georgia Power 90 MW solar military bases
- Georgia Power 250 MW wind PPA

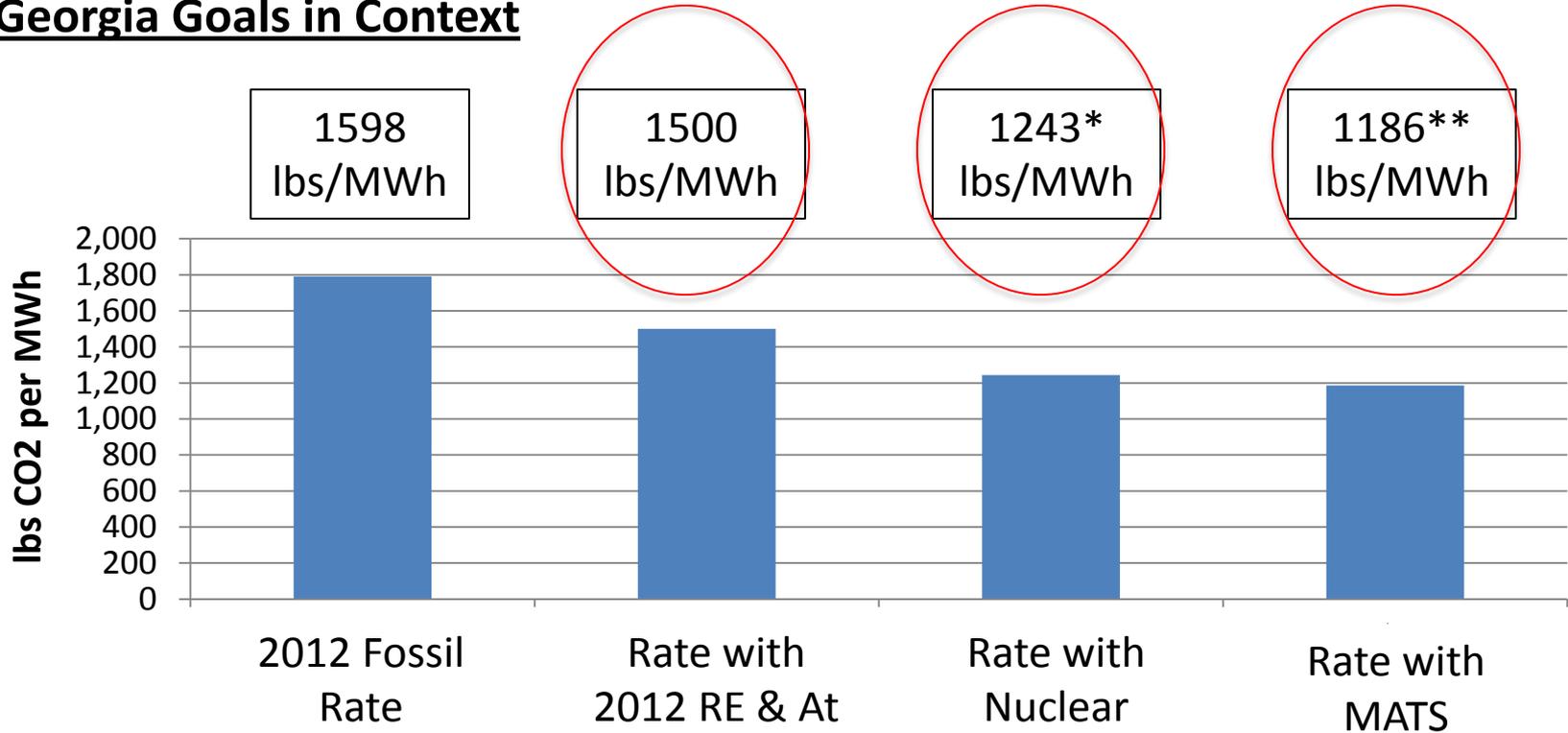
State Emission Goals

Georgia Goals in Context



State Emission Goals

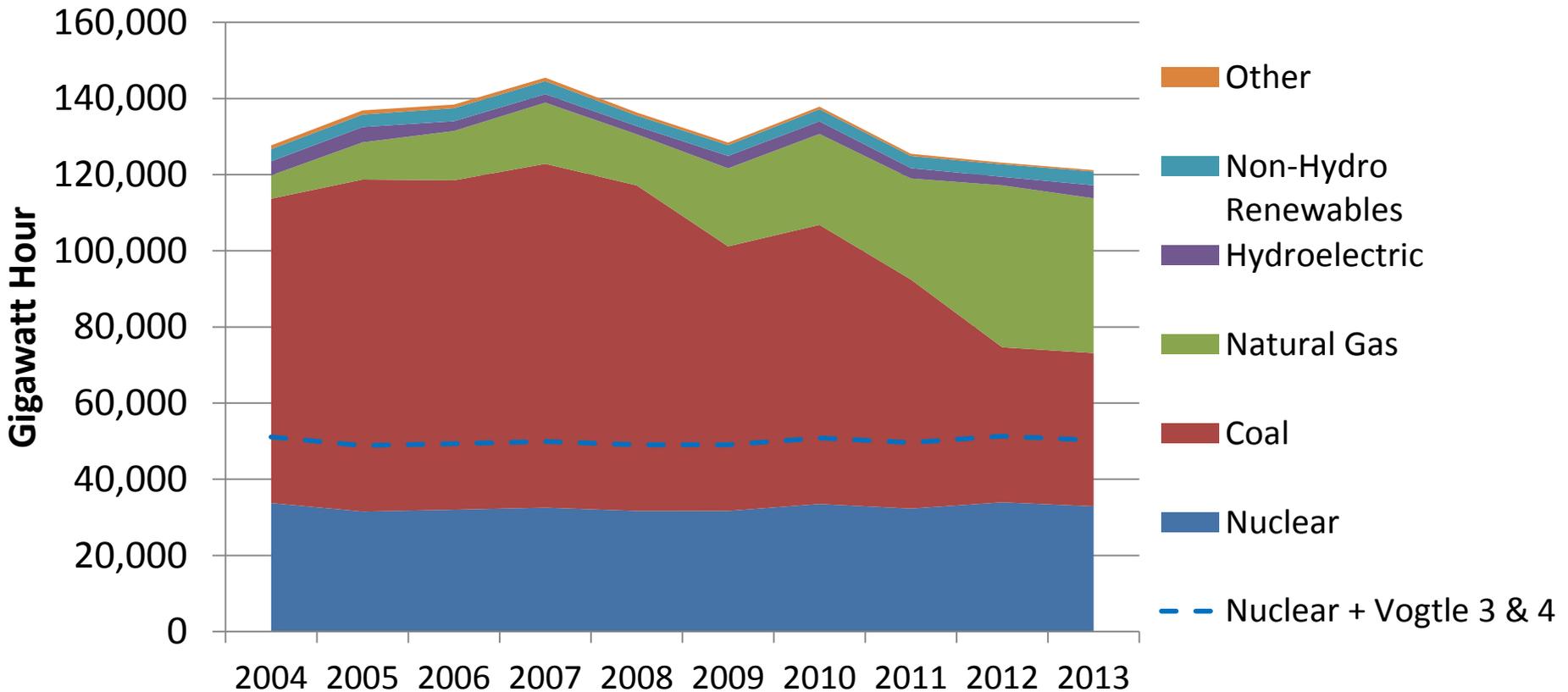
Georgia Goals in Context



Note: Rate estimate with nuclear under construction does not adjust dispatch of other units; nuclear under construction output added to denominator. Impact of MATS retirements estimated by removing all retiring units from emissions rate equation. Impact of planned renewables estimated by adding to denominator without adjusting dispatch of other units. These assumptions are a simplification and may not represent actual or projected changes in emissions rate.

State Emission Goals

GA Goals in Context



QUESTIONS

Contact Information

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