Renewable Portfolio Standard

Analysis for the State of North Carolina

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Outline of Discussion

- Our Goal
- Key Findings
- Renewable and Energy Efficiency Potential
- Electric Rate Impact
- Other Potential Costs and Benefits

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Our Goal

Provide an objective view of the issues related to a possible Renewable Portfolio Standard for North Carolina.

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Three Key Findings

- **North Carolina has sufficient renewable resources to meet a 5% RPS requirement for new renewable generation.**
- **It would be difficult to meet a 10% RPS with only new North Carolina renewable supply resources.**
- **Inclusion of energy efficiency would enable the State to achieve a 10% RPS and would reduce consumers' overall electricity bill.**

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Three Key Findings

North Carolina has sufficient renewable resources to meet a 5% RPS requirement for new renewable generation.

- Less than 1% increase in retail electricity rates
- Doubles current level of renewables
- Potential job creation and property tax benefits

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Three Key Findings

It would be difficult to meet a 10% RPS with only new North Carolina renewable supply resources.

- Must include wind in both the west and off-shore locations and larger hydroelectric generation
- If these additional resources can be developed, a 3.6% estimated rate increase, at most, by the 10th year

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Three Key Findings

Inclusion of energy efficiency would enable the State to achieve a 10% RPS and would reduce consumers' overall electricity bill.

- Energy efficiency could easily meet one-quarter of RPS
- Both a 5% RPS and a 10% RPS with energy efficiency could produce net savings of about half a billion dollars over 20 years
- Less than 1% increase in rates, but average bill decreases due to less usage overall

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Renewable Resource Overview

North Carolina has over 2,000 MW of renewable generation already.

- Equal to 4% to 5% of the State's current energy needs

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New Renewable Resource Potential in North Carolina

- **Technical potential for over 12,000 MW of new in-state renewable supply resources**
  - Strong logging and farming sectors – fuel for additional renewable generation
  - Good wind resources, but development may be more challenging
- **Practical potential is as much as 3,400 MW**
  - Maximum amount that could reasonably be expected to be implemented

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New Renewable Resource Potential in North Carolina

Resources	Technical Potential (MW)	Practical Potential (MW)	Practical Energy Potential (GWh)*
Landfill Gas	240	150	1,000
Biomass (Wood and Ag. Crops Waste)	2,270	1,100	8,700
Co-Firing	*1,875*	*384*	*2,500*
Poultry Litter	175	105	800
Hog Waste	116	93	600
Wind (on-shore)* **	9,600	1,500	3,900
Wind (off-shore)	N/A	N/A	N/A
Hydro** **	508	425	1,700
Solar PV	N/A	N/A	N/A
Total In-State Potential	**12,909**	**3,373**	**16,700**

**Energy estimate rounded to nearest hundred GWh.*
***Co-firing is a subset of the Biomass assessment.*
****Includes wind development in the western mountains.*
***** Includes hydroelectric generation larger than 10 MW.*

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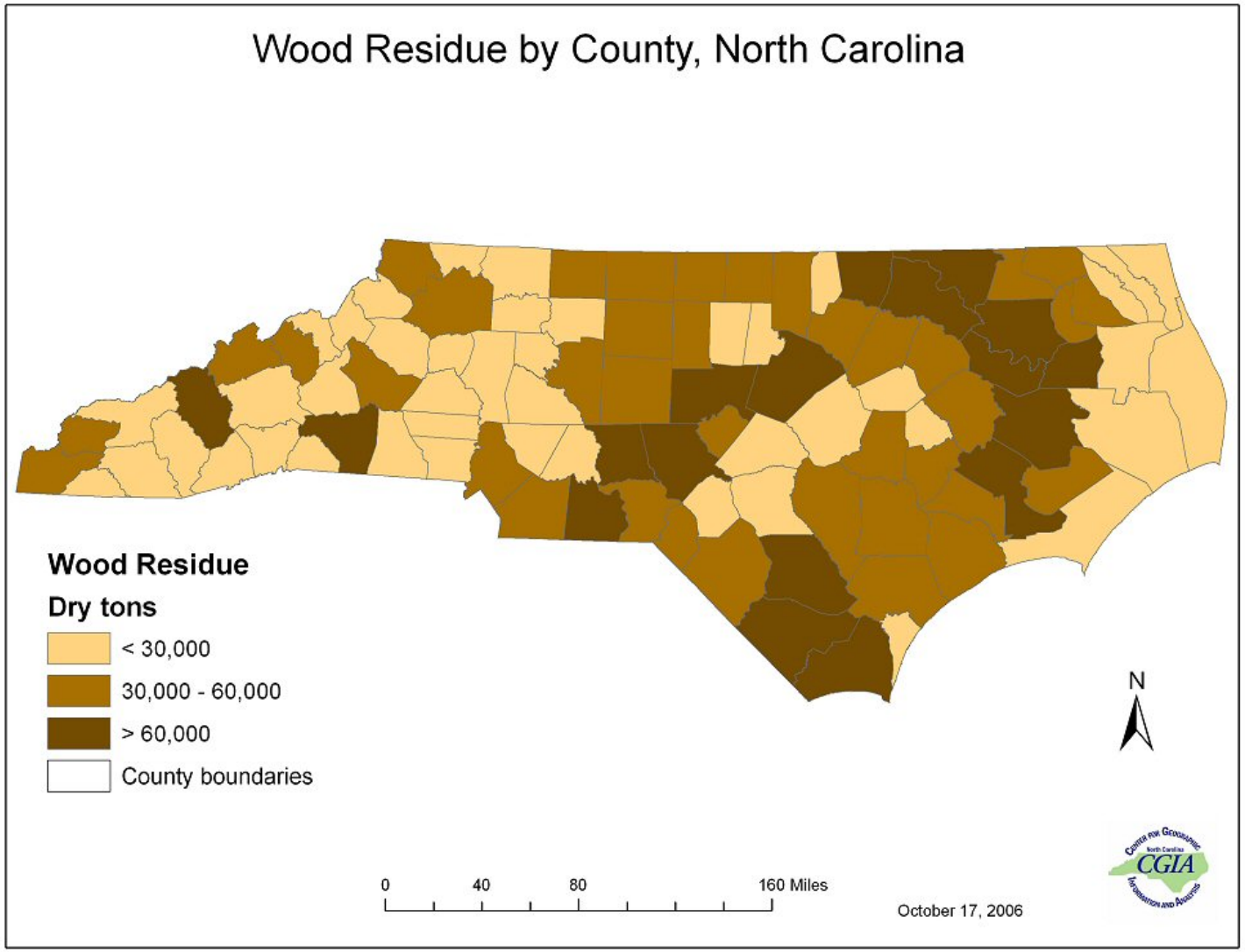
Biomass (Wood) Across the State



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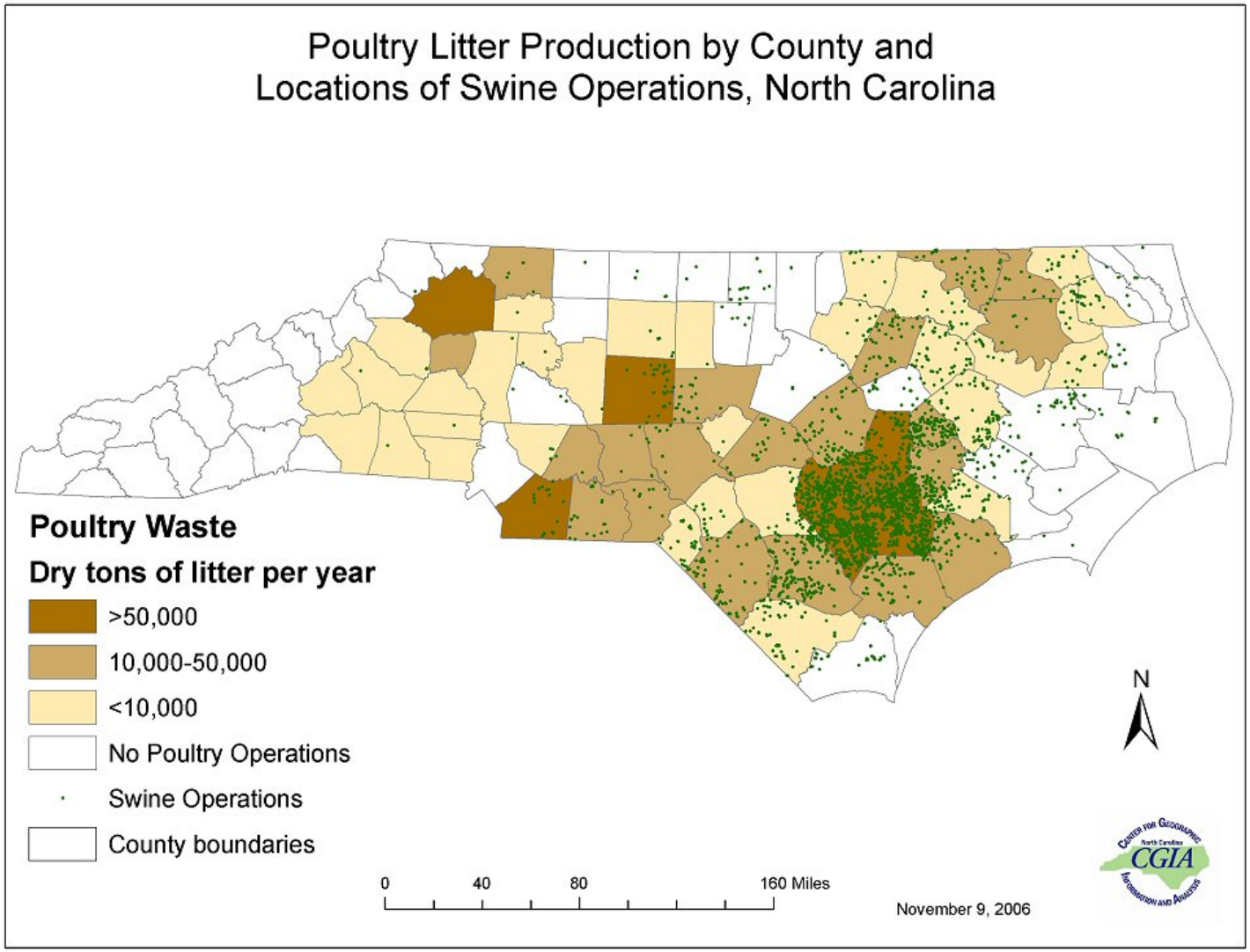
Poultry Litter and Hog Waste More Concentrated



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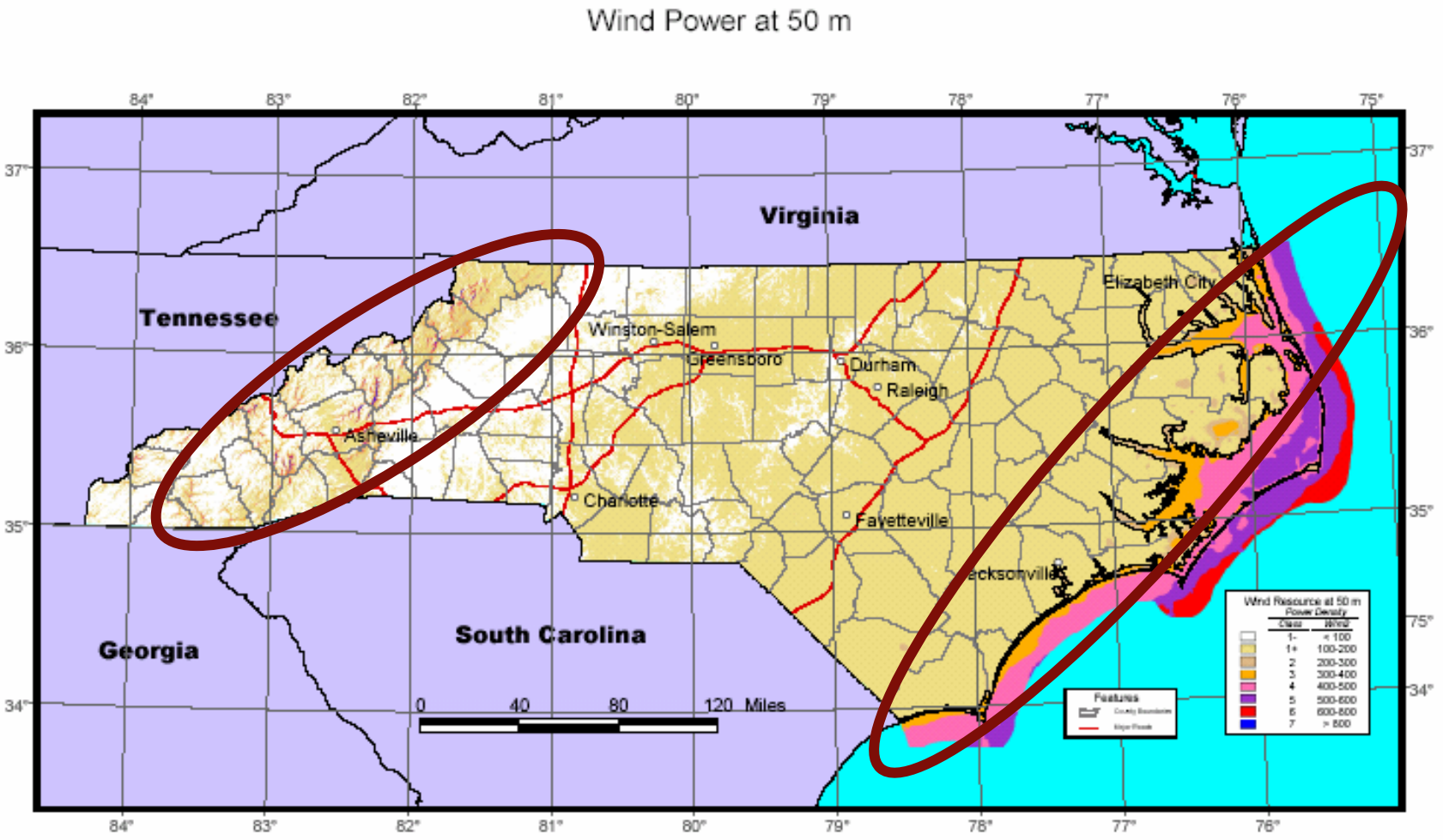
Wind in the West and Eastern Coastline



Source: TrueWind Solutions

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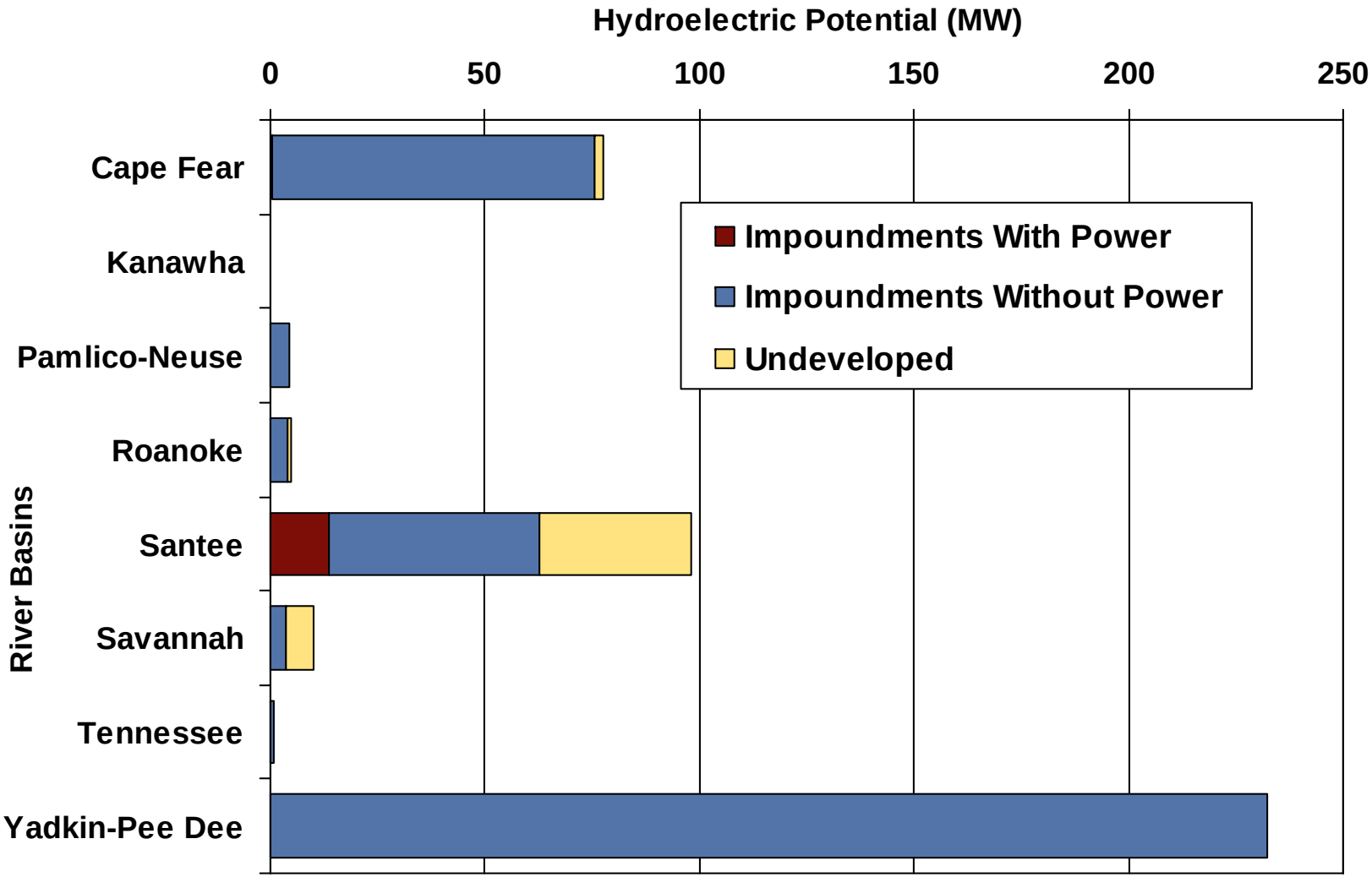
Hydroelectric Potential by River Basins



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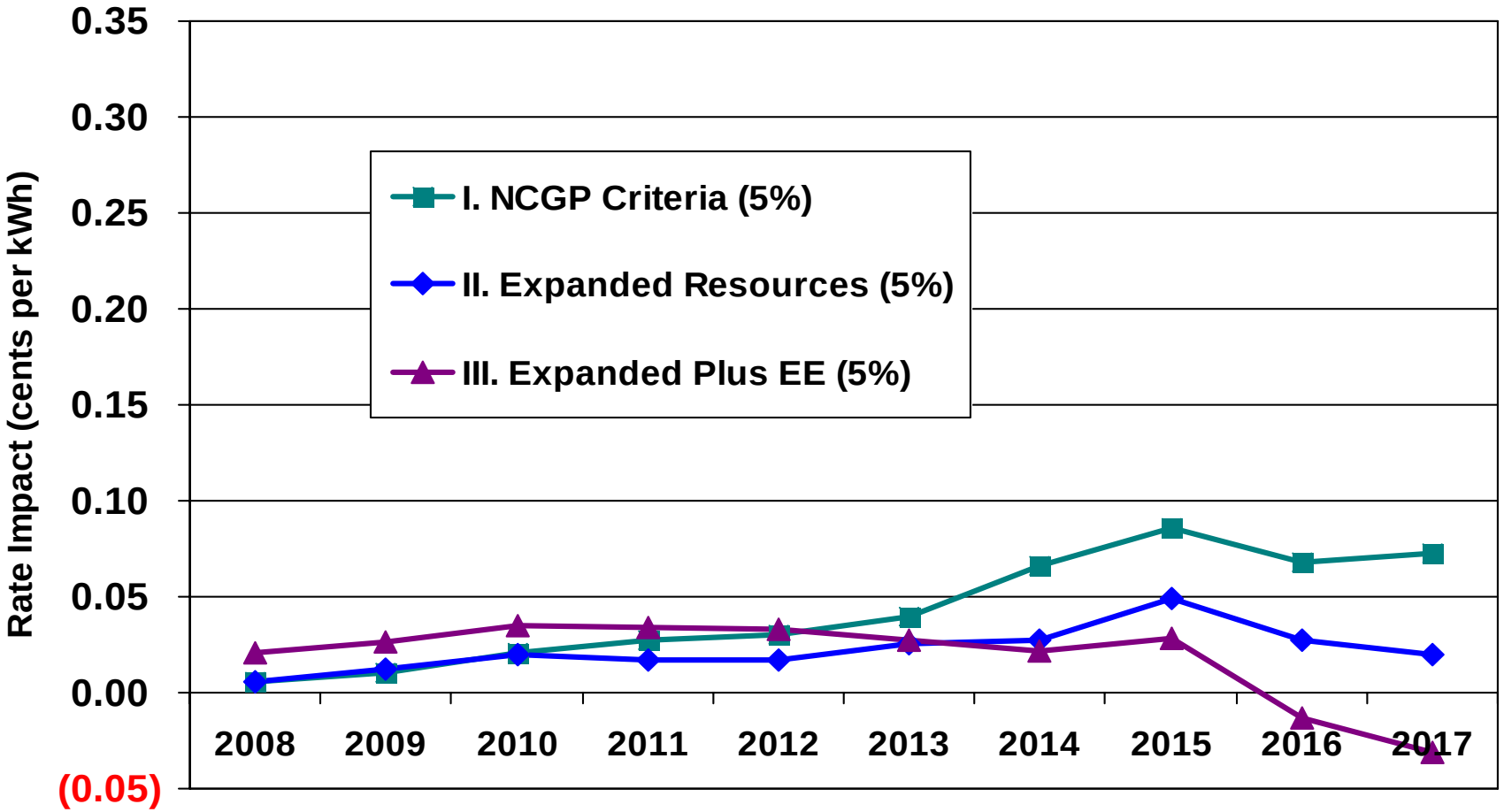
Range of Rate Impacts for 5% RPS is -0.3% to 0.9% by 2017*



**Assumes average electricity rates of 8.5 cents per kWh by 2017*

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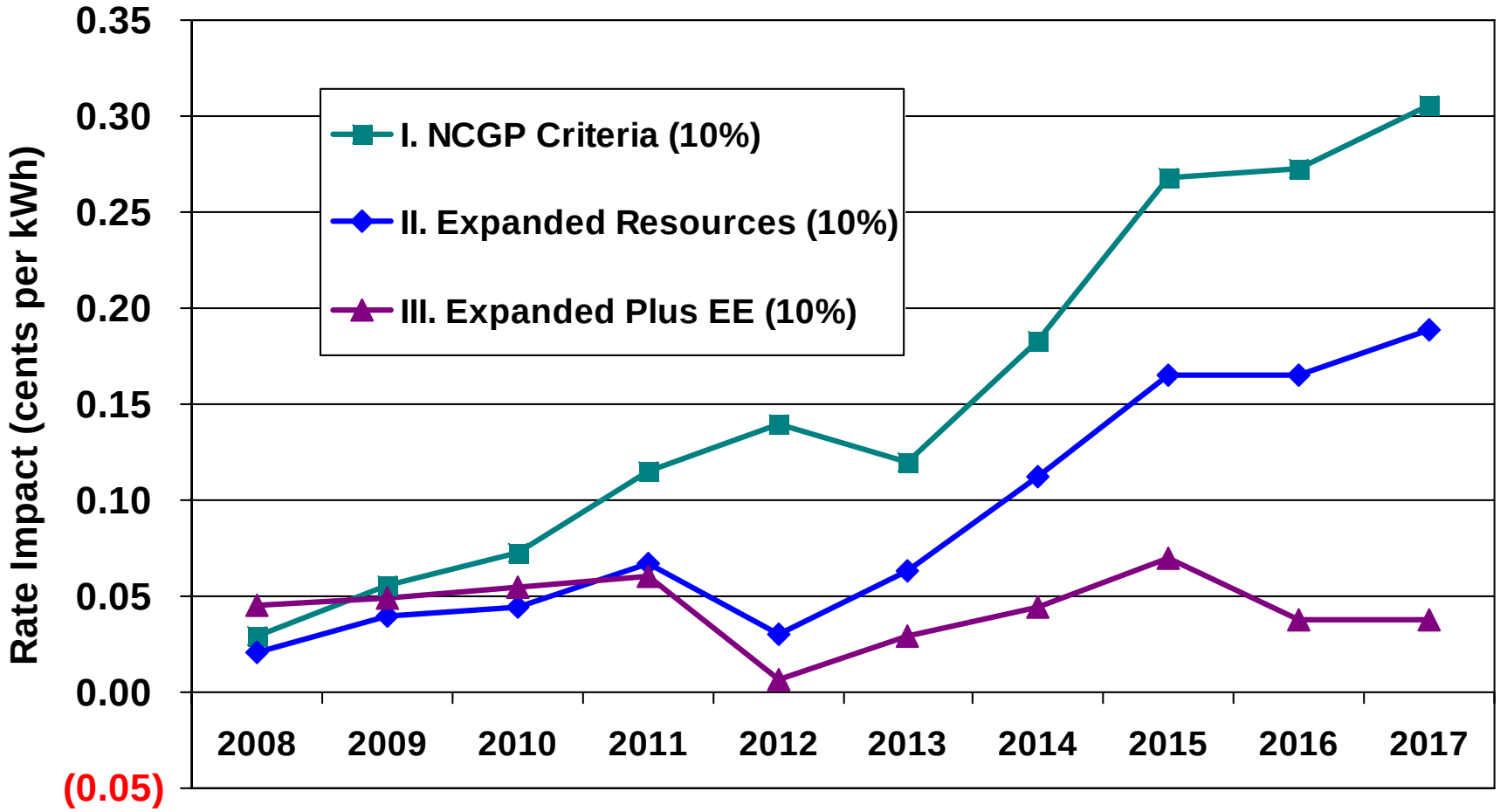
Range of Rate Impacts for 10% RPS is 0.4% to 3.6% by 2017*



**Assumes average electricity rates of 8.5 cents per kWh by 2017*

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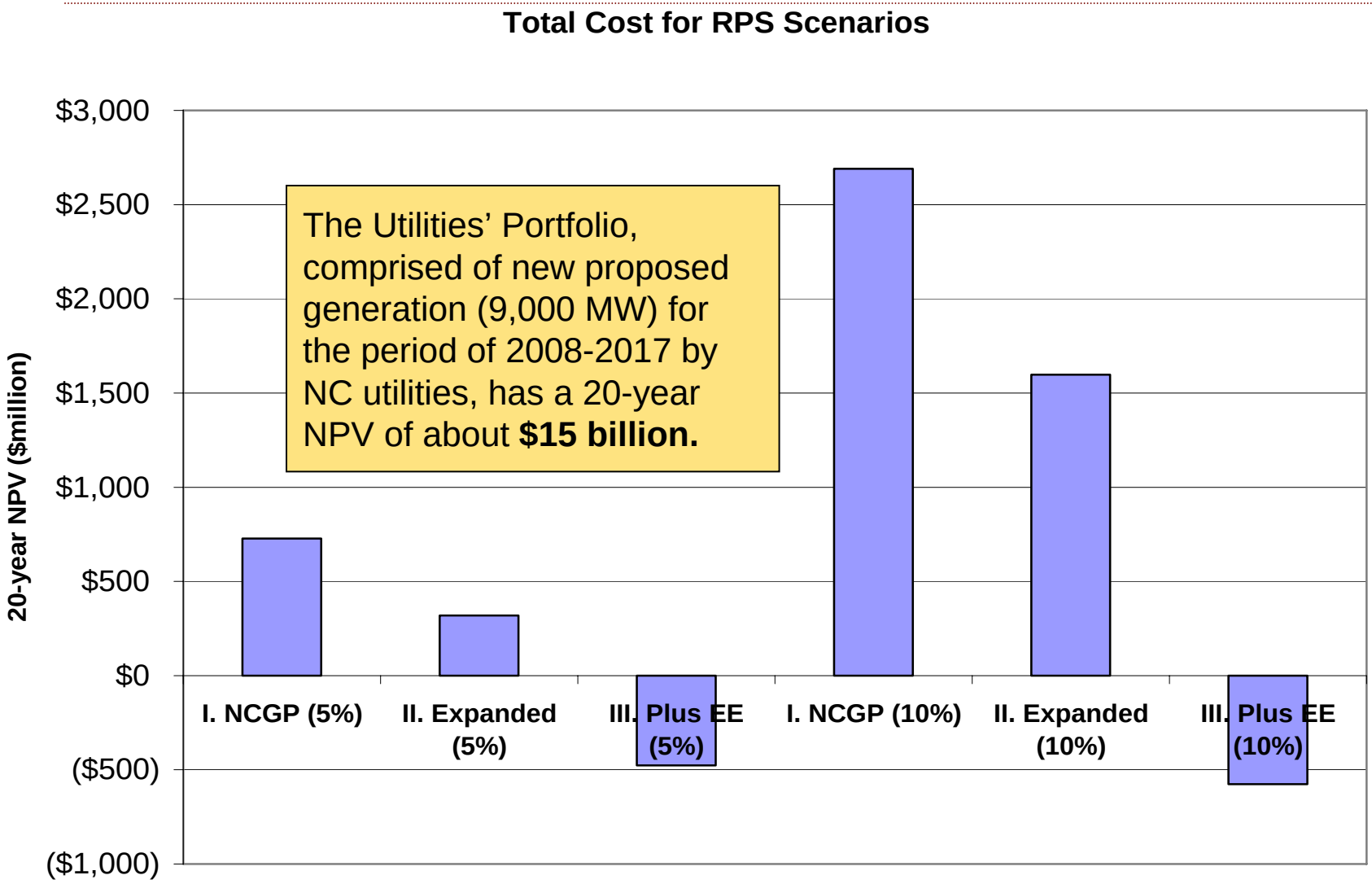
Total Incremental Cost/Savings (NPV) Over 20 Years



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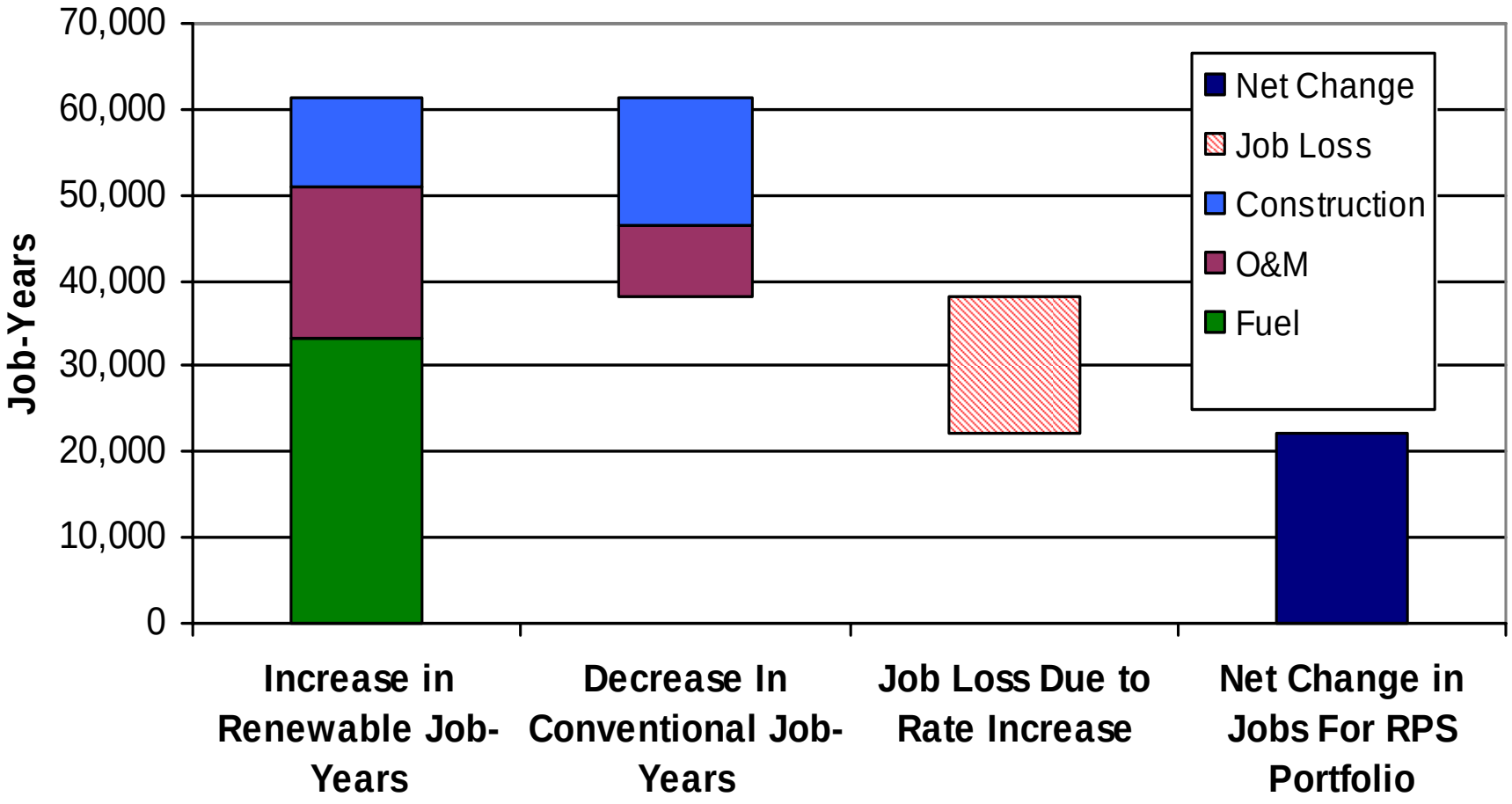
Jobs: 5% RPS Without Energy Efficiency*



**Job-years for O&M and Fuel assume 20 years of operation. Electricity rate impact assumed over 20 years.*

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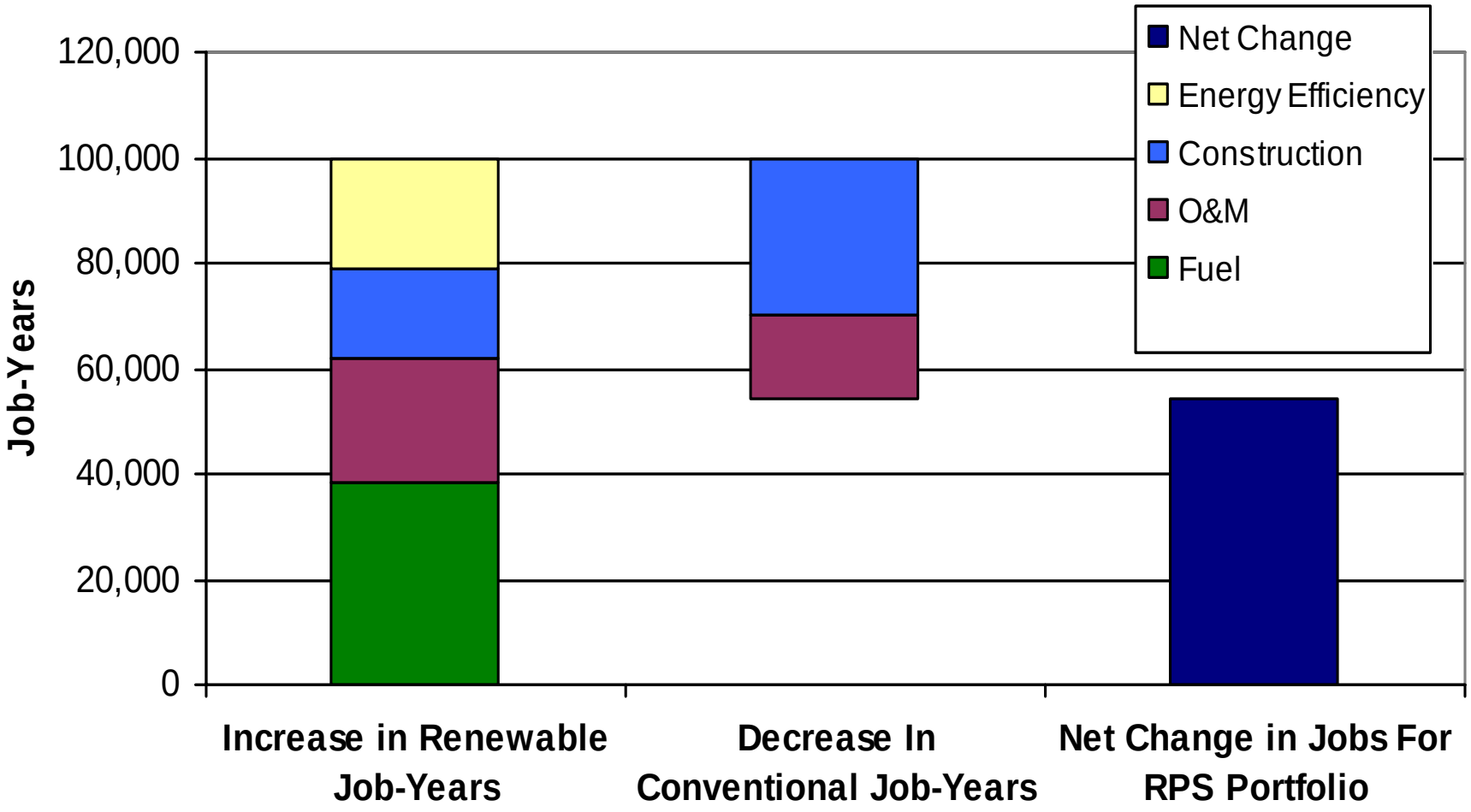
Jobs: 10% RPS With Energy Efficiency*



**Job-years for O&M and Fuel assume 20 years of operation. No electricity rate impact or job losses because overall electricity bill decreases.*

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Key Environmental Benefits

- **Energy efficiency would have the greatest positive impact**.
- The annual **displacement of Carbon Dioxide**, once a 5% or 10% RPS is achieved, could total at least 7.3 to 13.6 million tons per year, respectively.
- **Potential displacement of emissions related to air quality and health**, such as Nitrogen Oxides, Sulfur Dioxide, particulate matter, and mercury.
- Renewable generation facilities either **do not produce waste or the waste products are more benign** than from coal and nuclear fuels.
- Renewable energy resources **do not have significant environmental impact from fuel extraction** in contrast to the extraction impacts of coal, oil, natural gas, and nuclear fuel.

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Conclusions

- There should be sufficient renewable resources within the State to meet a 5% RPS requirement for new renewable generation.
- The State would have difficulty meeting a more aggressive 10% RPS with only new renewable resources located within North Carolina.
- Inclusion of energy efficiency would enable the State to achieve a 10% RPS and reduce average electricity bill.
- An RPS would produce direct economic and environmental benefits to the State.
- An RPS may enable the State to avoid the development of 1,000 MW or more of baseload conventional generation.

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The full RPS Report is available on the North Carolina Utilities Commission website: www.ncuc.net