

Economic and Rate Impact Analysis of Clean Energy Development in North Carolina

2015 Update

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Background



- In 2007, North Carolina established the Renewable Energy and Energy Efficiency Portfolio Standard (REPS), the first of its kind in the Southeast.
- REPS requires electric power suppliers to meet a increasing amount of retail consumers energy demand through a combination of renewable energy resources and reduced energy consumption.
- RTI International and ScottMadden Management Consultants performed an independent analysis of the economic and rate impacts of clean energy development in NC associated with the REPS on behalf of the North Carolina Sustainable Energy Association (NCSEA).
- Special thanks to **Paul Qunilan** (SM), **Ryan Callihan** (RTI), and **Zach Oliver** (RTI) for their great contributions to the analysis and final report.



- **Retrospective Economic Impact Analysis**
 - Years 2007 to 2014
 - Analyze changes in consumer, utility and government spending.
 - Estimate the direct and indirect economic impacts of clean energy development in North Carolina since 2007.

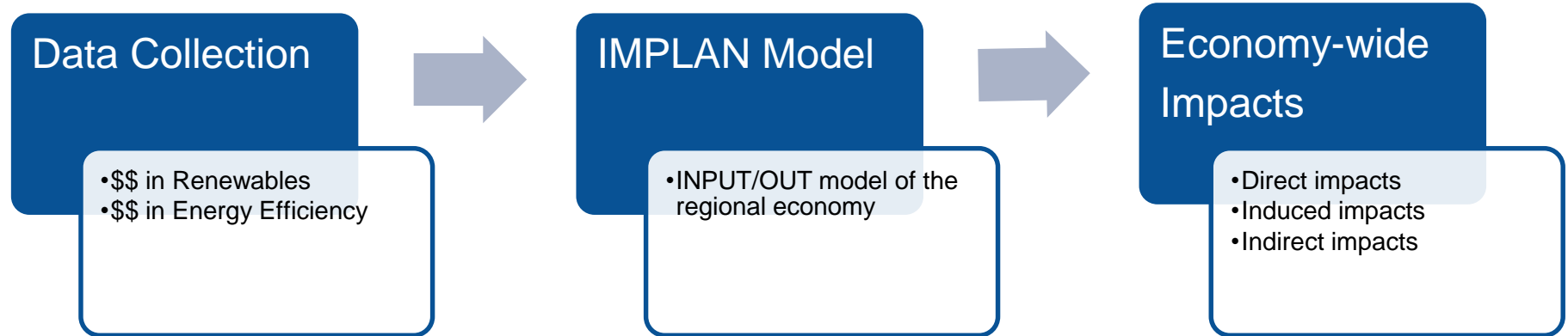
- **Potential Rate Impact of Clean Energy Policies**
 - Years 2008 to 2029
 - Estimate the rate savings by comparing two alternative energy policy scenarios.
 - Compliance Portfolio (REPS)
 - Conventional Portfolio (no REPS)

Key Findings

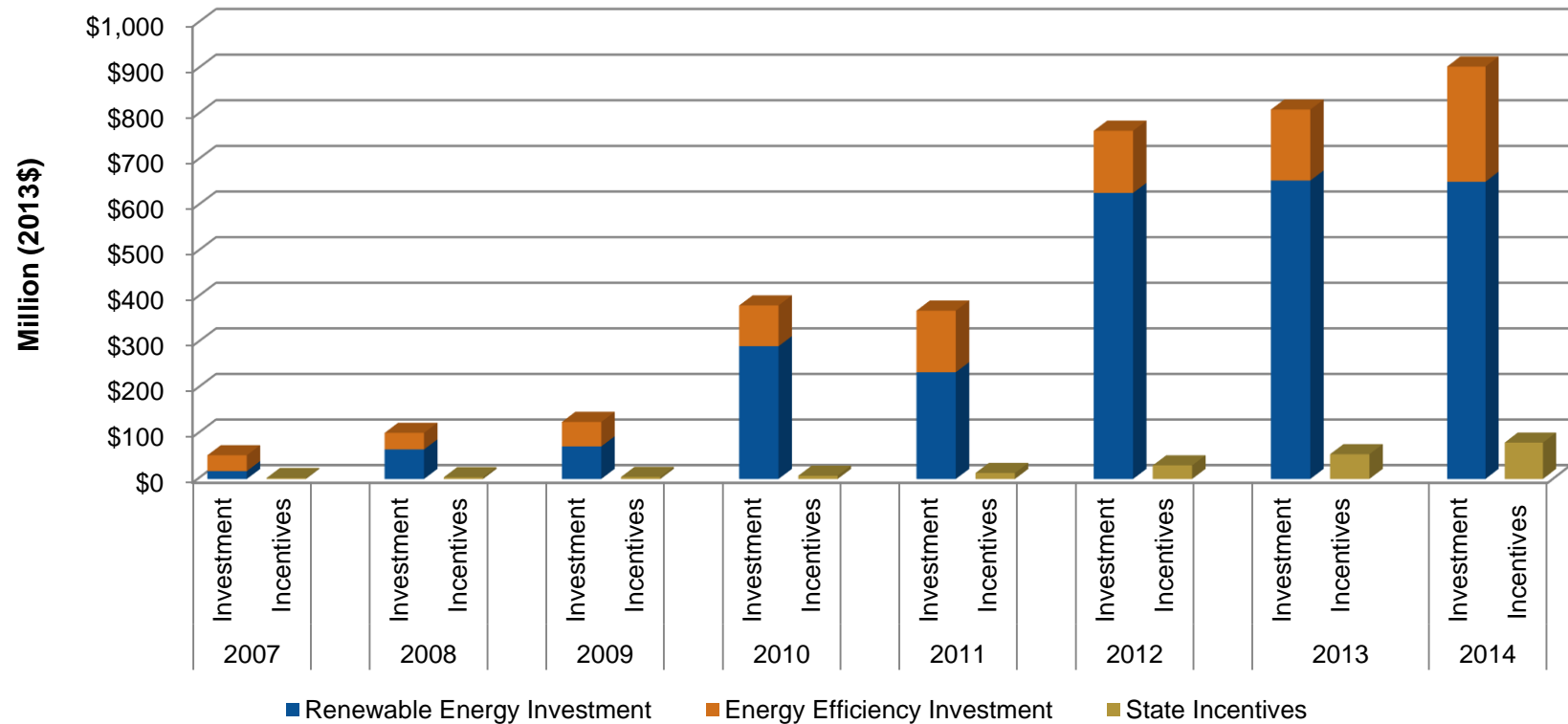
- Nearly \$3.5 billion investment in clean energy development over last seven years.
- Renewable energy investments continue to grow annually.
- Clean energy development contributed \$4.2 billion to gross state product between 2007 and 2014.
- Supported 44,549 annual full-time equivalents, in new jobs.
- REPS is expected to provide a net-present value of \$651 million in savings between 2008 and 2029.
- Over the 21-year period since the start of the clean energy policies in North Carolina, rates are expected to be lower than they would have been had the state continued to only use existing, conventional generation sources.

Retrospective Economic Impact Analysis

Economic Impact Methodology



Clean Energy Investment in North Carolina, 2007-2014

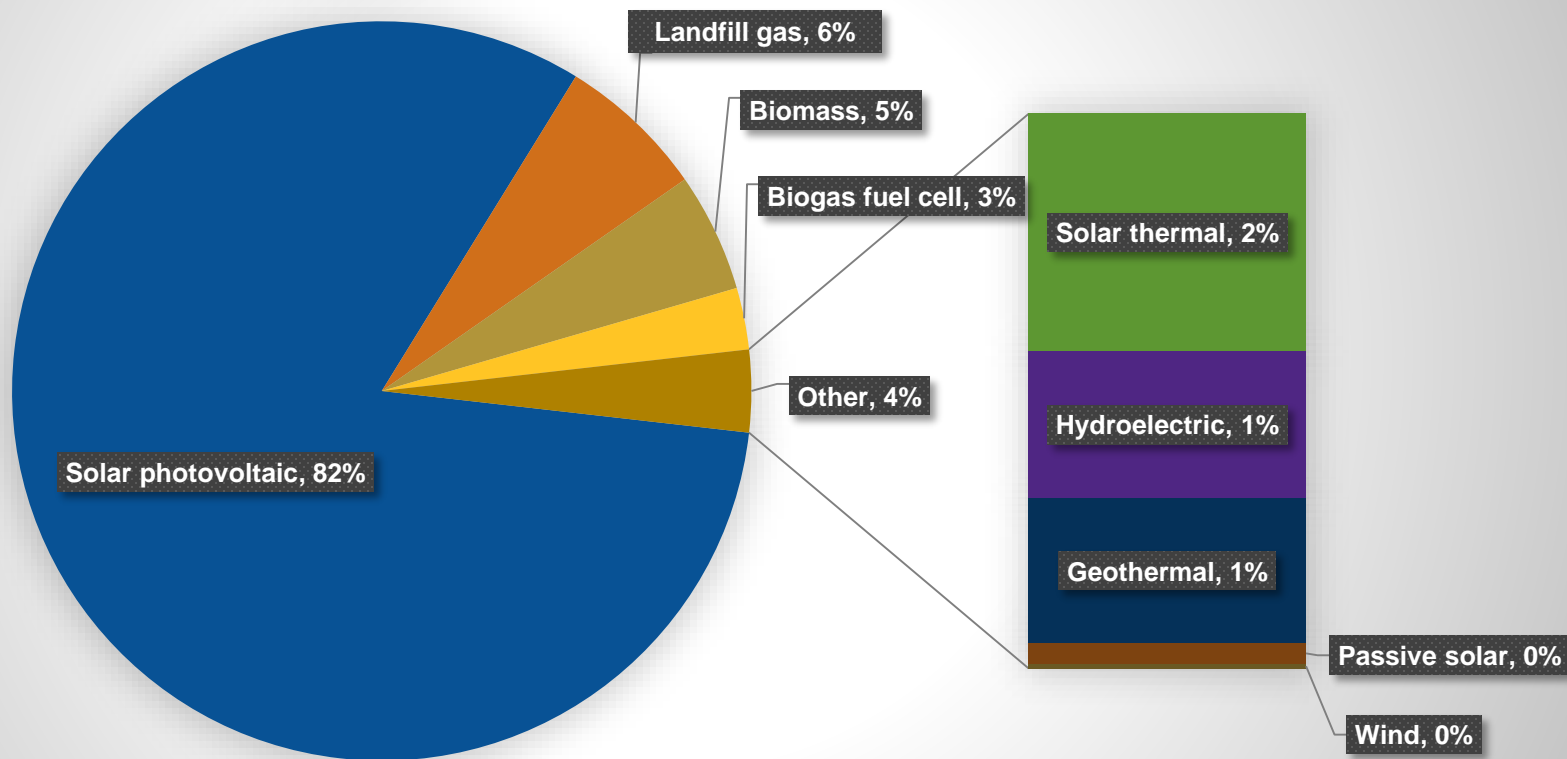


Total clean energy investment = \$3.5 billion

Total state incentives = \$196 million (~5% of investment)

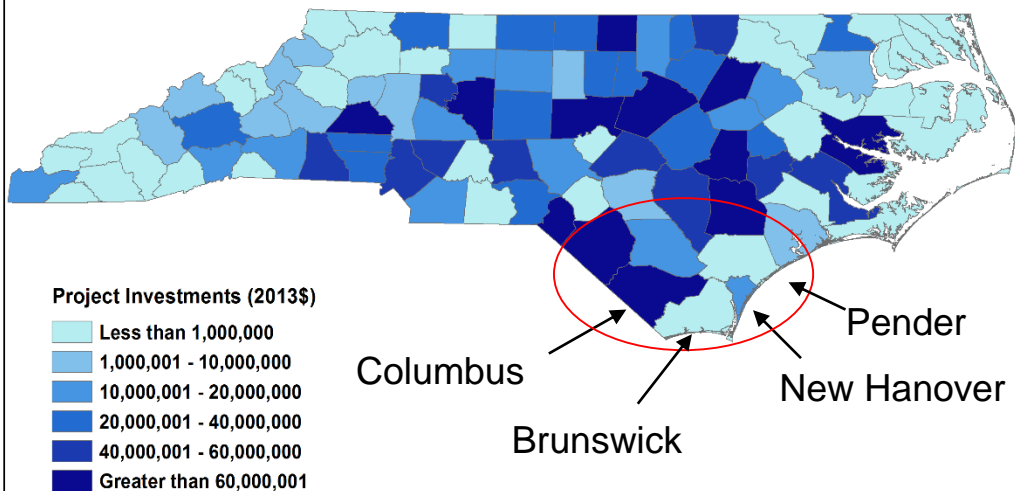
Direct Spending in Clean Energy Development by Technology, 2007–2014

Renewable Energy Direct Investment = \$2.6 billion



Distribution of Renewable Energy Projects Valued at \$1 Million or Greater across North Carolina Counties

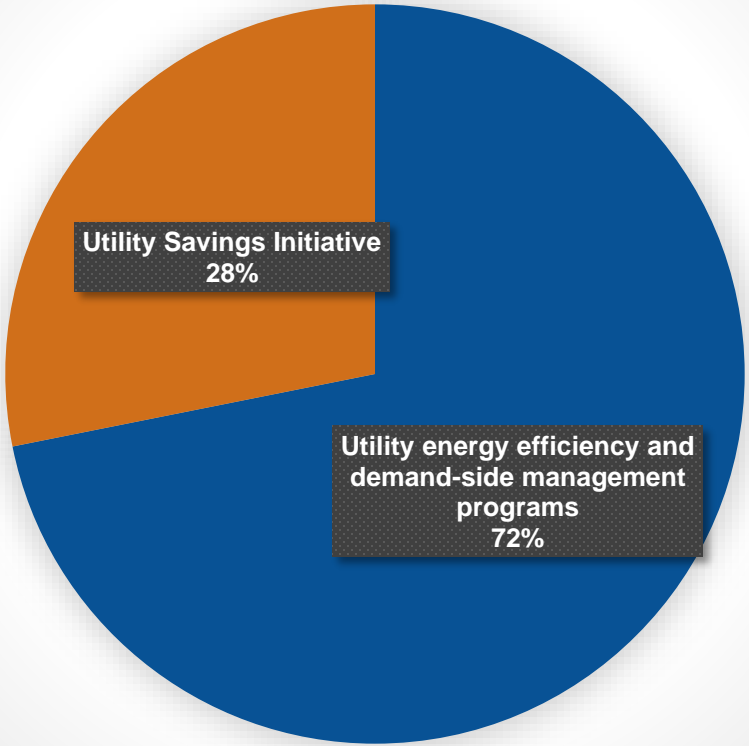
Major Investments in Renewable Energy Across North Carolina Counties



Cape Fear Counties	RE Investment (Million \$)
Brunswick	-
Columbus	69.9
Pender	-
New Hanover	15.0
Bladen	19.8
Duplin	123.1
Onslow	4.8
Sampson	45.9
Total	278.5

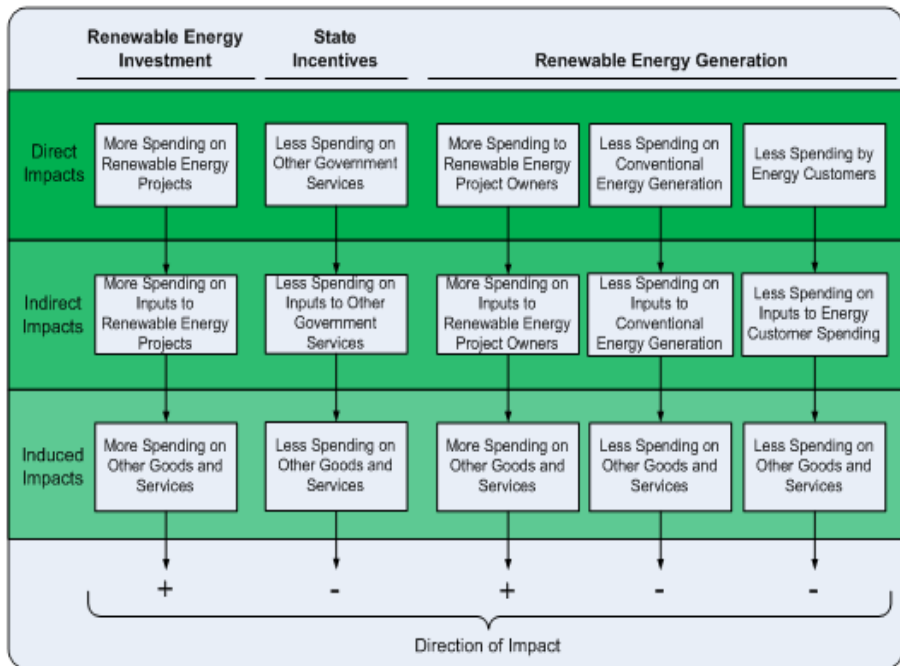
Direct Spending in Clean Energy Development by Technology, 2007–2014

Energy Efficiency Direct Investment = \$86 million

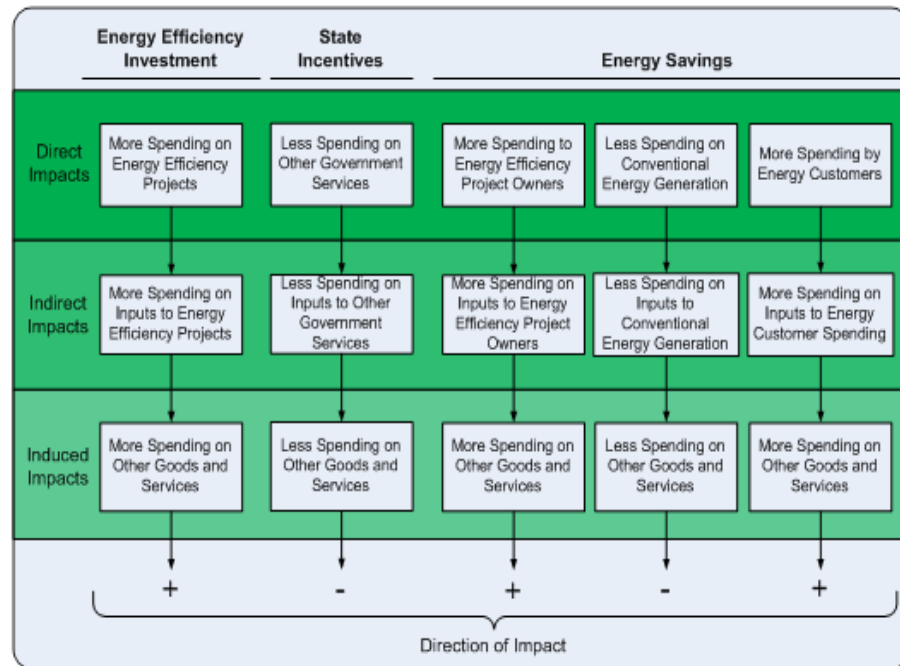


Direct, Indirect and Induced Impacts

Renewable Energy Impacts



Energy Efficiency Impacts



Total Economic Impacts, 2007-2014

	Total Output ^a (Million, 2013\$)	Gross State Product ^b (Million, 2013\$)	Employment (Full-Time Equivalents)	Fiscal Impacts (Million, 2013\$)
Direct economic impact from clean energy development	3,472.8	2,086.6	19,671	213.4
Direct economic impact from change in government spending ^c	-165.7	-83.5	-1,219	-3.3
Secondary economic impact	3,001.2	2,194.8	26,096	59.1
Total Economic Impact ^d	6,308.3	4,197.9	44,549	269.1

^aTotal output refers to revenue received by North Carolina individuals and businesses.

^bGross state product represents the total value added.

^cDirect economic impact from change in government spending refers to the in-state impact of \$195.6 million in state clean energy incentives, less \$29.9 million that would have otherwise procured goods and services from out of state.

^dSums may not add to totals because of rounding.

Rate Impact Analysis

Methodology Overview

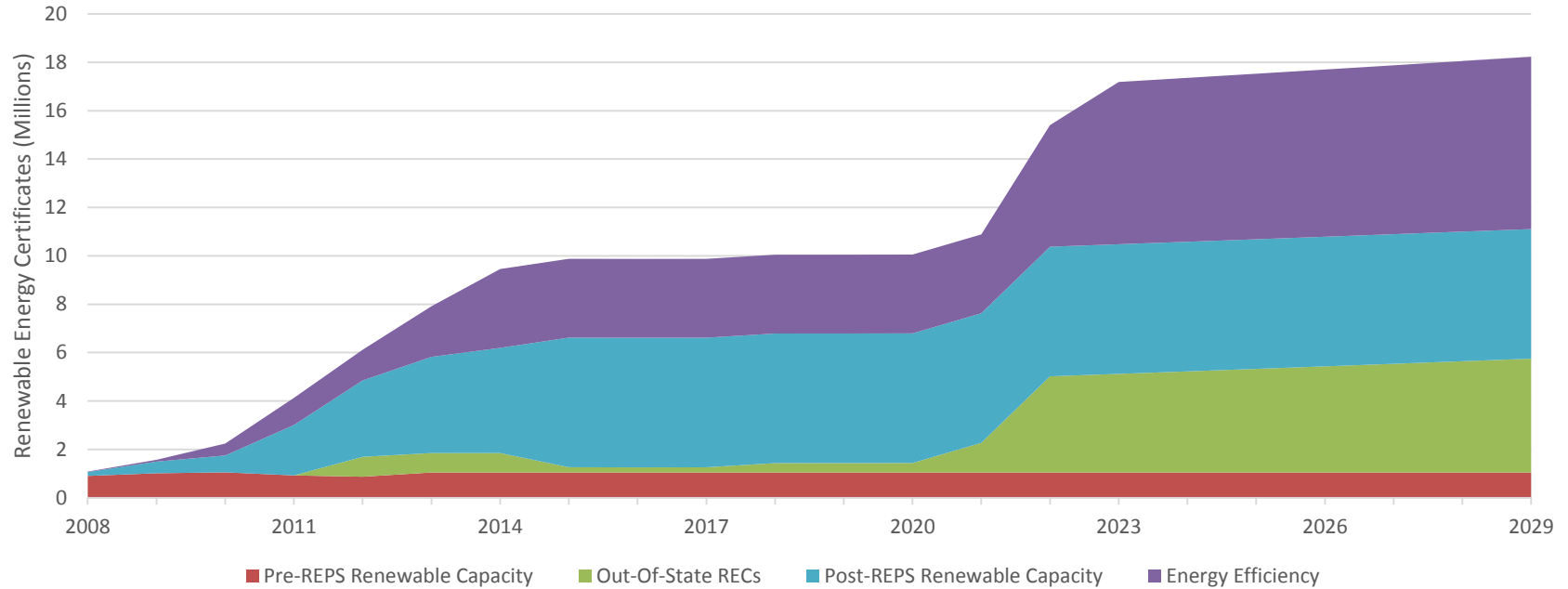
- The purpose of this analysis is to understand the rate impact of the North Carolina Renewable Energy and Energy Efficiency Portfolio.
- The analysis developed a Compliance Portfolio to generate renewable energy certificates (RECs) for compliance with the NC REPS. The Portfolio includes existing renewable generation (i.e. operational before 2008), out-of-state RECs, energy efficiency savings, and new renewable generation (i.e., operational 2008 or later)
- The ratepayer expense of the Compliance Portfolio includes (1) construction and maintenance costs for generation beginning operations in 2008 or later; (2) costs for energy efficiency savings implemented in 2008 or later; and (3) purchase of out-of-state RECs
- The rate impact is calculated by comparing the cost of the Compliance Portfolio to the costs of a Conventional Portfolio. The Conventional Portfolio offsets generation from new renewable capacity and energy efficiency savings with new conventional combined cycle natural gas facilities.



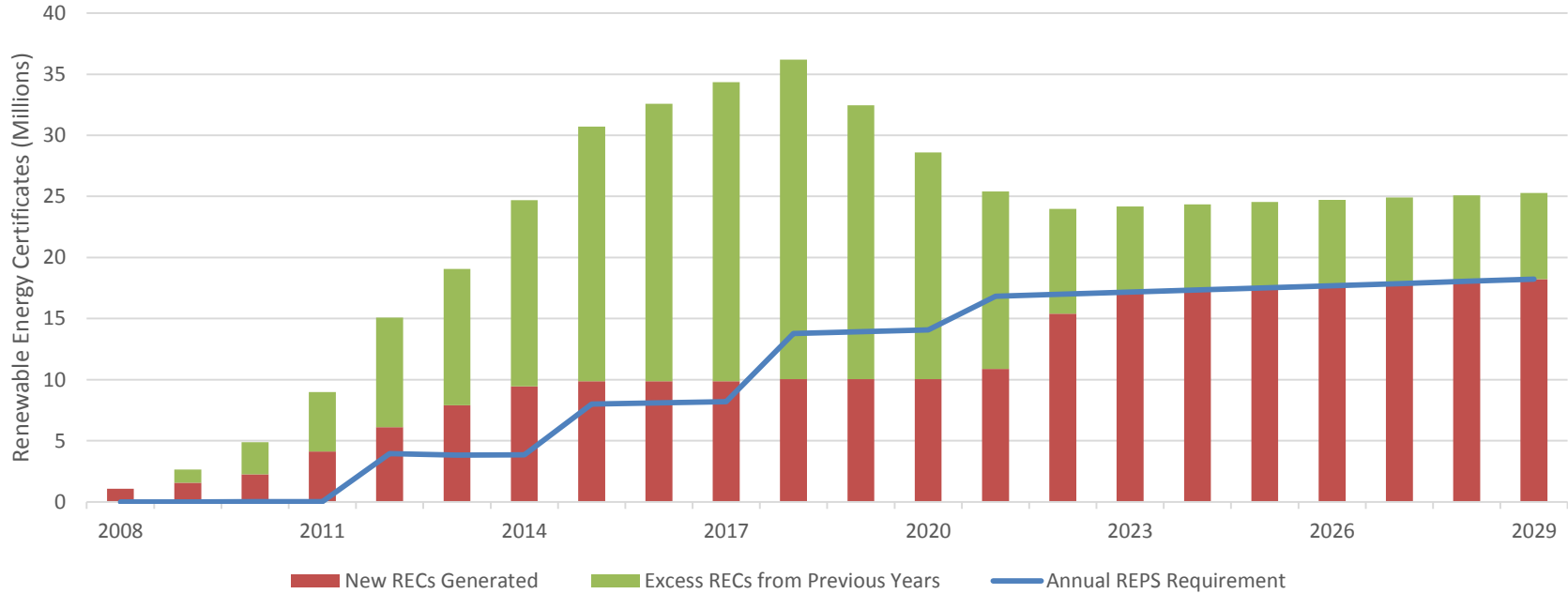
Scenario Comparison

- Compliance Portfolio - existing clean energy policies are in place throughout the study period.
 - Assumes renewable energy certificates (RECs) from actual renewable energy and energy efficiency measures in place through 2014.
 - In future years, the analysis used the least-cost resources to meet remaining REPS requirements.
- Conventional Portfolio – where only the energy policies prior to 2007 are in place. REPS does not exist.
 - Assumes that new conventional combined cycle natural gas capacity is used to replace incremental electricity needs in the future.

Renewable Energy Certificates (RECs) Generated in Compliance Portfolio



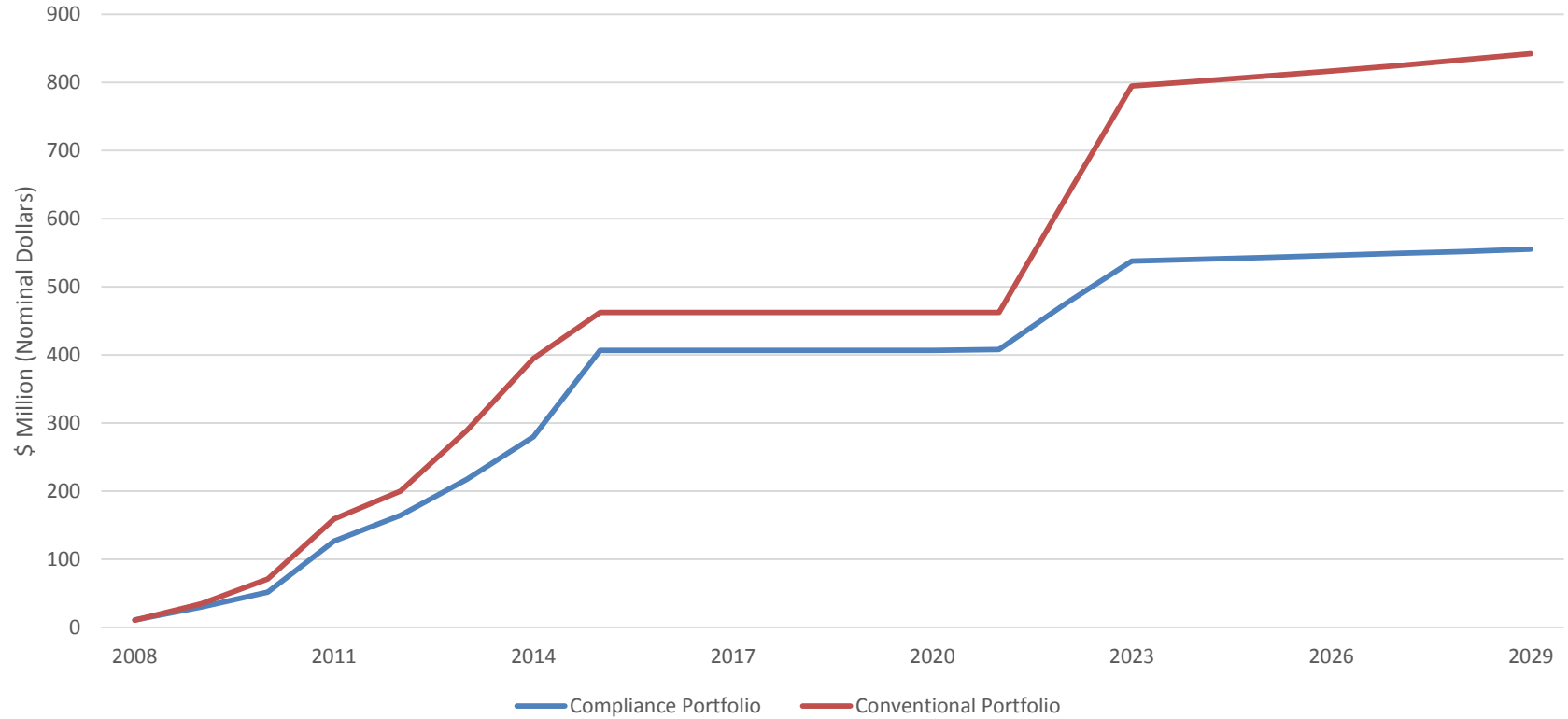
Compliance Portfolio Renewable Energy Certificates Compared to REPS Requirement



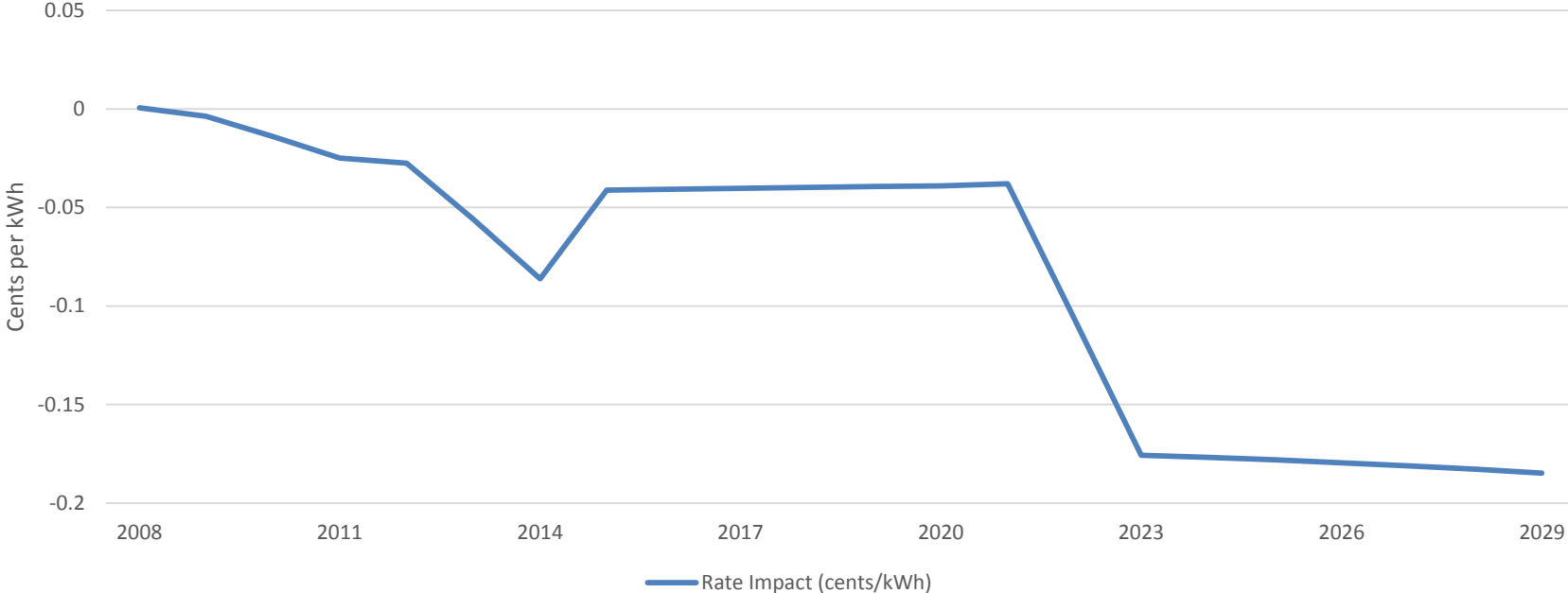
Levelized Cost Assumptions for 2013 (Nominal Dollars)

Resource	Capacity Factor	Installed Cost (\$/MW)	Technology Decline Rate	Fixed O&M (\$/kW-yr)	Variable O&M (\$/MWh)	Fuel Heat Rate (Btu/kWh)	Fuel Costs (\$/mmBtu)
Biomass Co-firing	70%	\$461	0%	\$0.00	\$0.00	12,000	\$2.38
Dedicated Biomass	80%	\$3,799	0%	\$108.17	\$5.39	13,500	\$2.38
Hydropower	45%	\$3,027	0%	\$14.47	\$0.00	—	\$0.00
Landfill Gas	85%	\$2,053	0%	\$148.48	\$0.00	11,428	\$0.00
Natural Gas (Conventional Combined Cycle)	70%	\$862	0%	\$13.49	\$3.69	7,050	\$3.73
Poultry Litter	90%	\$3,880	0%	\$104.86	\$10.49	13,000	\$5.24
Solar PV (<10 kW)	16%	\$6,235	5%	\$25.28	\$0.00	—	\$0.00
Solar PV (10-100 kW)	16%	\$4,705	5%	\$25.28	\$0.00	—	\$0.00
Solar PV (>100 kW)	16%	\$2,941	5%	\$25.28	\$0.00	—	\$0.00
Solar Thermal	42%	\$4,457	3%	\$68.87	\$0.00	—	\$0.00
Swine Waste	75%	\$5,243	0%	\$238.12	\$0.00	—	\$0.00
Onshore Wind	30%	\$2,152	0%	\$40.50	\$0.00	—	\$0.00

Cost of Compliance Portfolio Compared with Conventional Portfolio



Rate Impact of Compliance Portfolio in Cents per kWh Compared with Conventional Portfolio



Key findings

- The net present value of the Renewable Energy and Energy Efficiency Portfolio Standard savings compared to a conventional portfolio equals \$651 million. The analysis finds the greatest annual savings occur in 2029, when the portfolio provides \$287 million in savings.
- Over the 21-year period since the start of the clean energy policies in North Carolina, rates are expected to be lower than they would have been had the state continued to only use existing, conventional generation sources.

More Information

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