

# The Economics of Maine's Renewable Portfolio Standard

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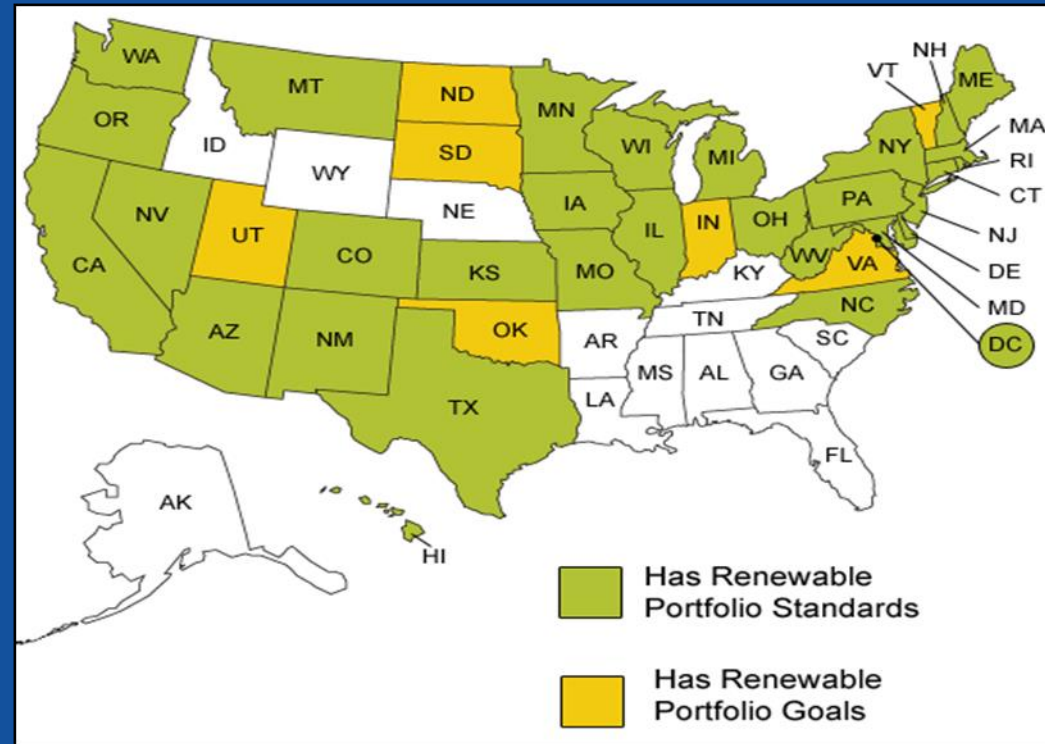
Augusta, Maine

# Objectives

- To gain a better understanding of the potential benefits and costs of renewable portfolio standards (RPS); and
- To understand the ways in which Maine's RPS may affect our state economy and environment.
- Specifically, I will:
  - Focus on Class I RECs;
  - Briefly review two recent studies making various economic claims.

# Introduction to RPS (in general)

States with RPS standards or goals as of 2012



Source: US Energy Information Association, 2012.  
<http://www.eia.gov/todayinenergy/detail.cfm?id=4850>

# Introduction to Maine's RPS

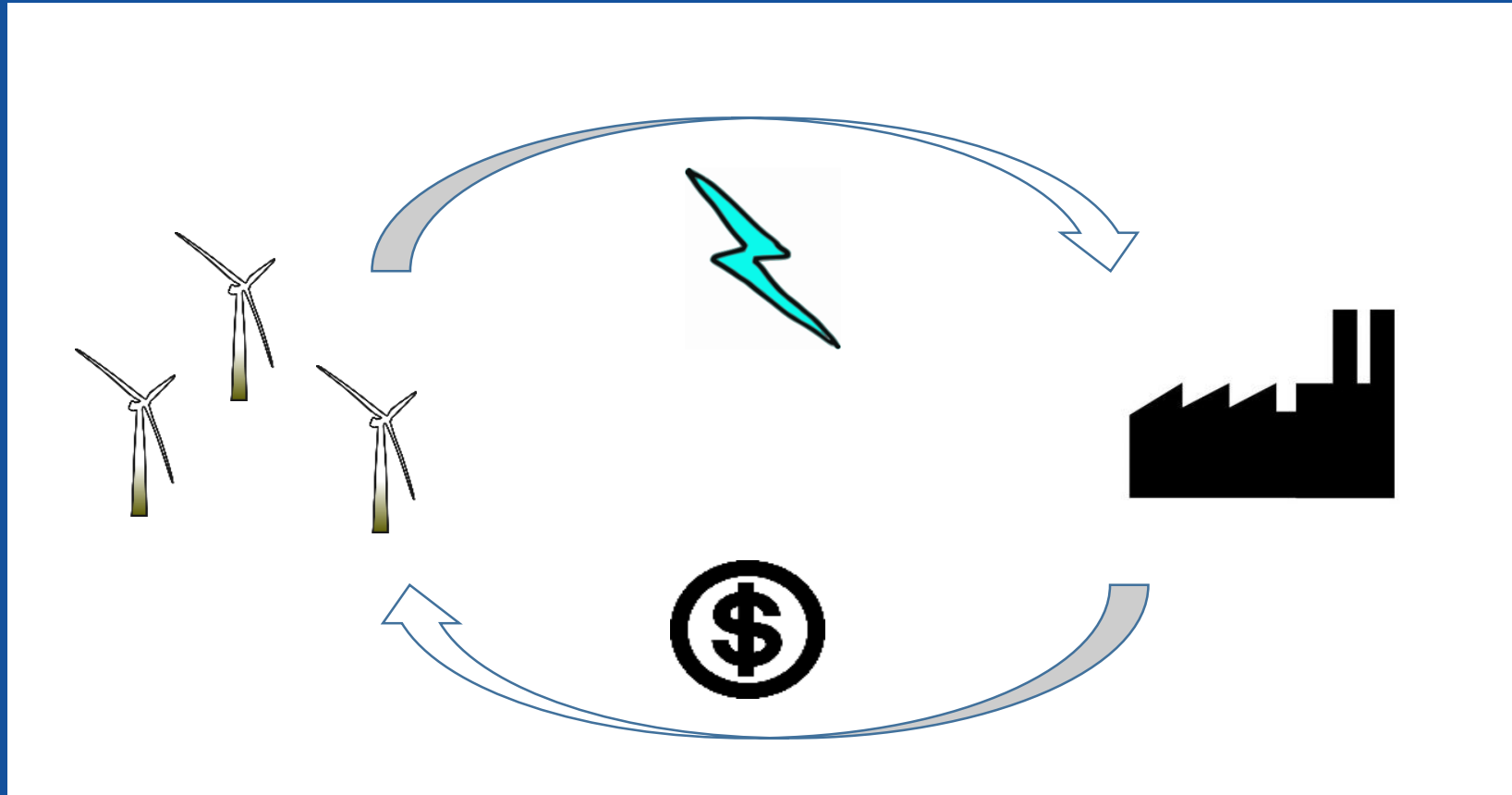
## Class II Standard

- At least 30% of retail electricity sales by “eligible renewable and certain energy-efficiency resources.”
  - Not truly a “binding constraint.”
  - Item: Only “small” facilities with no greater than 100 MW\*
- \*(except for wind)

## Class I Standard

- Goal: To increase new renewable energy capacity by 10% by 2017.
- Staggered implementation.
- One percent new renewable energy capacity in 2008, then increase 1 percent each year.
- Three additional goals for wind power.

# The Market for Renewable Energy Certificates (simplified)



# How the Market for RECs works (reality)

## Demand and Supply Side

- All MWhs are not created equal!
- Each state in the NE Pool has different standards as to what they can “accept” to satisfy the RPS (geography, technology, size, vintage).
- Each REC generated may only be sold in certain markets.

## Pricing

- Pricing varies widely from state to state, even within the same pool.
- Pricing is so complex that the final prices are determined by brokers, and sometimes not until the sale is final.

# Do the Benefits Outweigh the Costs?

## Four Categories of Benefits:

- “Homegrown” energy
- Investment and increased employment
- Revenue for generators
- Avoided Emissions and Improved Air Quality

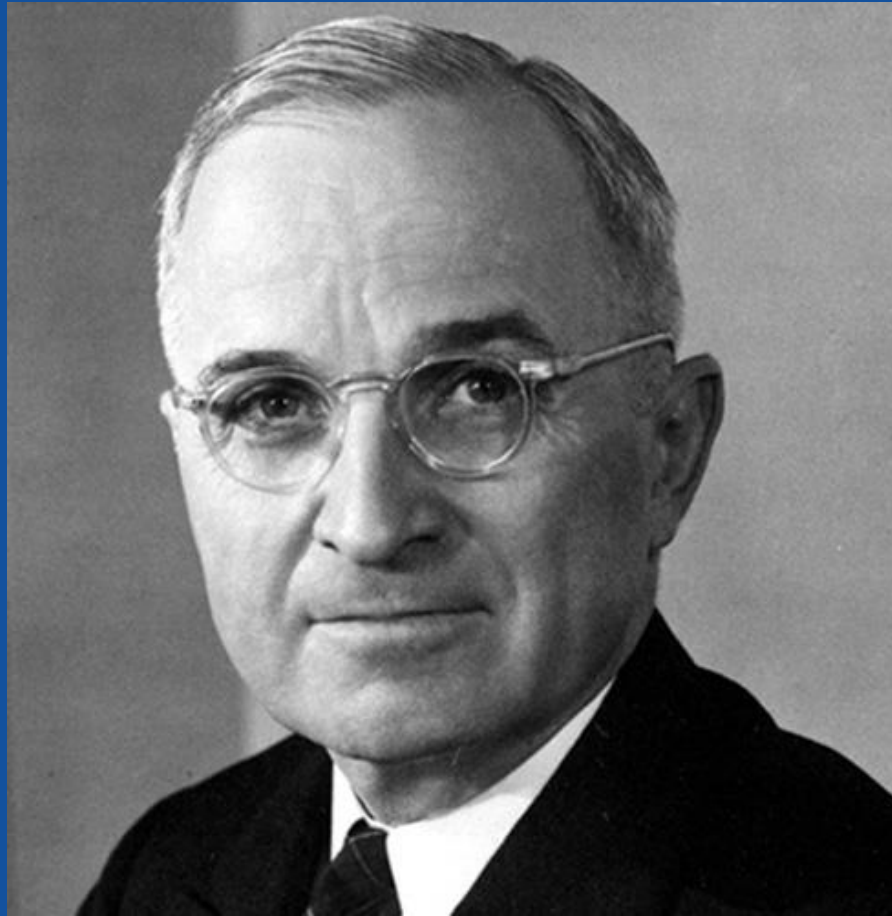
## Three categories of costs:

- Increased Residential, Commercial, and Industrial Costs
- Ripple Effect
- “Deterrence Effect”

	Beacon Hill Institute / Maine Heritage Policy <sup>1</sup> (amounts for 2017 only)	London Economics <sup>2</sup> (amounts over time unless otherwise specified)
Effect on Jobs	Lower employment by 995 jobs (820 – 1,165)	<b>Reduce</b> 129 jobs as a result of increased electricity prices. <b>Create</b> 11,700 jobs in construction (wind only; staggered over time)
Effect on Disposable Income	Reduce disposable income by \$85 million ( <i>note: translates to 0.1 percent</i> )	Reduce disposable income by \$12 million to residential customers
Effect on Investment	Decrease investment by \$11 million	Increase by \$560 million (wind only; staggered over time)
Effect on Average Electricity Bill	Households: + by \$80/year (8%) Commercial: + by \$615/ yr (10%) Industrial: + by \$14,300/yr (16%)	Retail rates increase by 1.9% in 2017 (1.07 – 2.62, depending upon assumptions)
Effect on GSP	Not calculated	Reduce by 0.06 percent (impact on consumers); increase by 2% (increase in investment)
Effect on Emissions	<b>Reduction</b> of 145,600 metric tons of CO2 annually, but an <b>increase</b> of SOx and NOx (with backup).	Reduction of 1.1 million tons of CO2, 1,629 NOx and 96 tons of SO2 annually, valued at \$13 million (wind only)



“What the world needs...



... is a one-handed economist.”

-My dad, misquoting Harry Truman.

# Potential Ratepayer Costs of Maine's RPS

- Idea here is that power generators are going to have to pay a higher price for electricity, and the higher prices will “pass through” to consumers.
- Cost of compliance is ultimately determined by price of the RECs that electricity producers had to buy (in turn determined by demand, supply, cost of generation).
- In 2013, total cost of compliance (Class I and II) was about 0.17 cents per KWh, between 1.2 and 1.4 percent of the typical price per kilowatt hour. <sup>3</sup>
- Estimated that as RPS ramps up, cost of compliance will be about 1.9% of the typical consumer's bill. <sup>4</sup>

# “Ripple Effects” of Higher Electricity Costs

- Higher price will “pass through” to consumers, reducing disposable income. This, in turn, could ripple through the economy to decrease demand for consumer goods.
- Ultimate effect depends on several things:
  - Sensitivity of current Maine consumer to higher electricity rates;
  - Elasticity of electricity consumption in each sector.
- Electricity bills are a small component of household income (~0.1%),<sup>5</sup> but may affect some households more than others.

# Deterrence Effect of Higher Electricity Rates

- Maine does have high residential and commercial electricity rates, but relatively low residential and commercial monthly bills (compared to the rest of the nation).<sup>6</sup>
- Electricity and heating costs are important factors in location decisions, but heating costs swamp the costs of electricity in percentage of utility bills.
- Focus should be on decreasing heating costs (increasing energy efficiency) to a higher degree than decreasing electricity costs.
- Rest of New England also has RPS standards or goals!

# Benefits: Increased Investment

- Difficult to pinpoint the exact driver behind increased investment.
- Investment in renewable energy sources has increased by \$900 million from 2009-2013 and is projected to grow by an additional \$1.9 billion from 2014 – 2023.<sup>7</sup>
- REC revenues alone are not enough to “single-handedly... fully remunerate an investor,” but they do cover a substantial portion of the gap between market revenues and levelized costs.<sup>8</sup>
- Dollars invested in Maine can generate a multiplier effect, by which increased income ripples through the economy.

# Benefits: “Homegrown Energy”

- Increases the multiplier: money earned by locally-owned institutions is more likely to stay within the state.
- Increases in local tax revenue.
- Increases in local employment.
- Defer transmission expenses.
- Develop networks within the community (“cluster effects”).

# Benefits: Avoided Emissions

- By displacing energy generation from more conventional sources, each MWh of generation by renewable sources has the potential to reduce emissions of carbon dioxide, nitrogen oxides, and sulfur dioxide.
- Complete analysis depends on type of renewable source, backup power used and capacity rates.
- Aside from greenhouse gas emissions, emissions from conventional energy generation have been associated with respiratory, cardio-vascular, and other health issues.

# Conclusion

- Devil is in the assumptions (see appendix)!
- RPS will likely raise rates, but by how much depends on numerous factors. Need to protect those citizens most vulnerable to rate increases, and promote adoption of electricity-saving technologies.
- Deterrence effect (especially compared to rest of New England) likely overstated.
- New wind generation likely to hit “diminishing marginal returns” – but when?
- What will happen to price of RECs in the future?
- Benefits in terms of avoided emissions alone may be significant.



# Addendum (added March 26, 2015)

- Recent data from the Maine PUC shows that the average price of Maine RECs has fallen to approximately \$5 / MWh (lowest in New England by far, and 20% of what the average prices were in the London Economics report).
- Possible implications:
  - To the extent that Maine retail suppliers use Maine-grown RECs to satisfy the RPS, the price of compliance will be low.
  - However, to the extent that Maine resource generators sell their RECs in Maine, their revenue will also be low. Others, who can sell their RECs in other states, will reap the rewards.
  - Need more information about percentage of Maine RECs sold in Maine.

Thank you!

# References

1. Maine Heritage Policy Center and Beacon Hill Institute for Public Policy Research. 2012. "The Economic Impact of Maine's Renewable Portfolio Standard," *Path to Prosperity* 10(6).
2. London Economics International. 2012. "MPUC RPS Report 2011 - Review of RPS Requirements and Compliance in Maine." Boston, MA: London Economics.
3. Maine Public Utilities Commission. 2014. "2013 Average Price by Component." <http://www.maine.gov/mpuc/electricity/>.
4. London Economics International. 2012.
5. Presenter's calculations using data from MPUC website and Bureau of Economic Analysis.
6. Electricity Local. 2015. "Maine Electricity Rates and Consumption." <http://www.electricitylocal.com/states/maine/>.
7. Pew Charitable Trusts. 2014. Maine's Renewable Portfolio Standard Drives Clean Energy Economy. <http://www.pewtrusts.org/en/about/news-room/news/2014/12/08/maines-renewable-portfolio-standard-drives-clean-energy-economy>.
8. London Economics International. 2012.

# Assumptions in the Beacon Report

- Used STAMP model (not used outside of Beacon Institute);
- Used estimates of costs that are in excess of EIA calculations;
- Modeled as a sales tax, not electricity cost increase;
- Used computable general equilibrium model, which assumes full employment;

- Forecasts of energy demand are unusually high;
- Model was actually for a national RPS, not Maine's specifically;
- Applied model to six states (none in New England) and averaged the effect of the prices changes to determine elasticity.
- Assumed renewable energy always needs (conventional) backup system in place, constantly idling.

# Assumptions used in London Economics Report

- Tested three different scenarios: price of RECs stayed same as in 2010; increased; and decreased;
  - Used Maine-specific output multipliers in the Bureau of Economic Analysis RIMS model;
  - Assumes consumers do not react to higher prices by changing electricity consumption patterns;
- Assumes half the wind projects in the IQ are completed at estimated costs and 35% of investment stays in Maine.