Energy Policy and the Environment: Challenges and Opportunities

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Universities Addressing Florida's Energy Needs

UF | Public Utility Research Center
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"Leadership in Infrastructure Policy"

www.purc.ufl.edu

Public Utility Research Center

Research

Expanding the body of knowledge in public utility regulation, market reform, and infrastructure operations (e.g. benchmarking studies of Peru, Uganda, Brazil and Central America)

Education

Teaching the principles and practices that support effective utility policy and regulation (e.g. PURC/World Bank International Training Program on Utility Regulation and Strategy offered each January and June)

Service

Engaging in outreach activities that provide ongoing professional development and promote improved regulatory policy and infrastructure management (e.g. in-country training and university collaborations)

The Body of Knowledge on Infrastructure Regulation

Center for Economic Forecasting and Analysis

- **CEFA Mission**

  The FSU Center for Economic Forecasting and Analysis (CEFA) specializes in conducting economic research and performing economic analyses to examine public policy issues across a spectrum of research areas. CEFA provides advanced research and training in the areas of energy, aerospace, and environmental economics, and economic development, among other areas. FSU CEFA also serves as a foundation for training students on applied economics, using modeling software and other econometric and statistical tools.

- **Key Areas of Expertise:**
  - Sustainable Energy
  - High Tech Economic Research
  - Environmental/Natural Resources
  - Economic Development
  - Economics
  - Economic Impact Analysis
  - Econometrics

Acknowledgement

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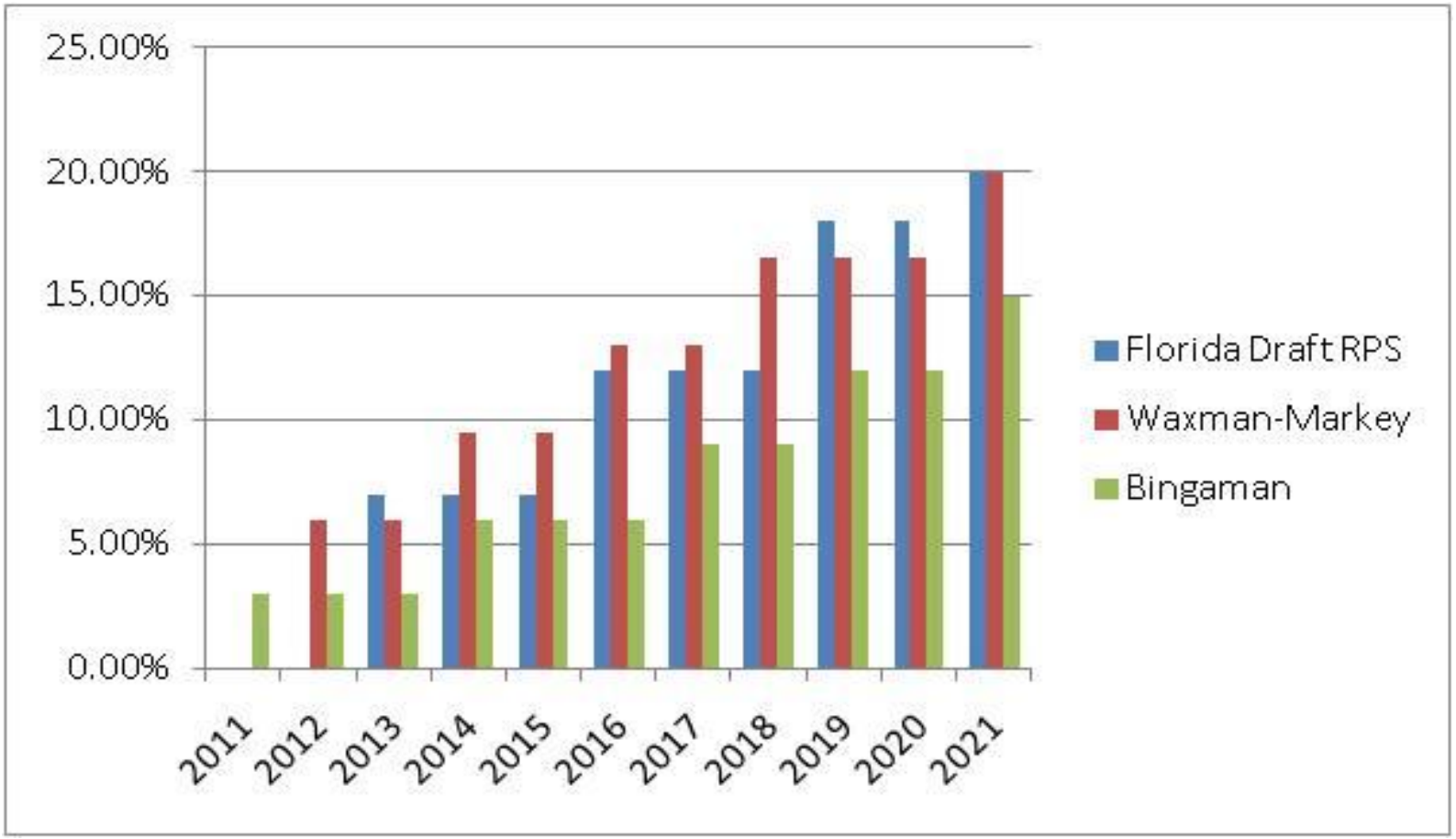
Energy and Environmental Policy

- Policy goal to address the externalities associated with the emission of CO_2
- Two components of the policy
  - Energy component implemented primarily through energy portfolio standards
  - Emissions component implemented primarily through some kind of monetization of cost of emissions

Generation Portfolio Standards

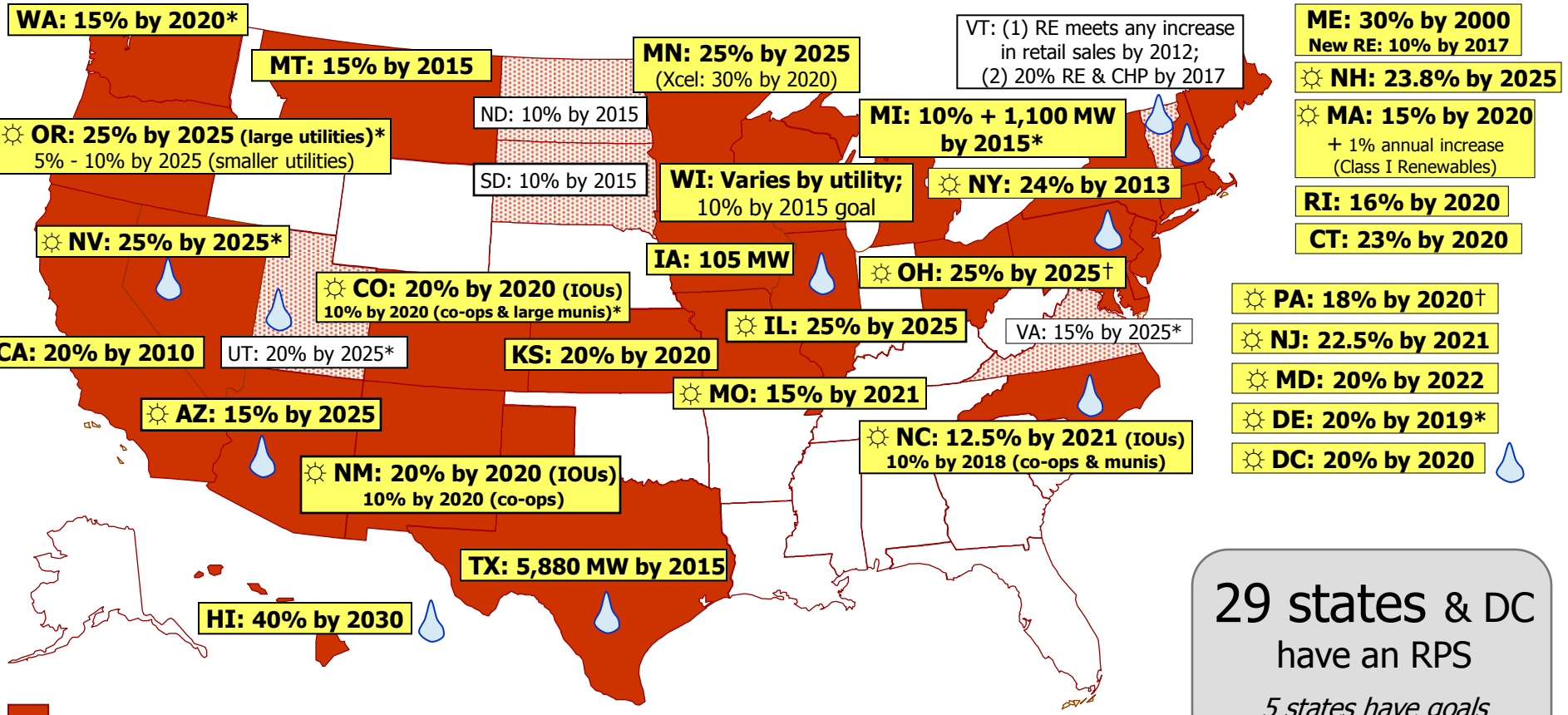
- Renewable Portfolio Standard
  - Requires utilities to supply a portion of electricity from renewable sources
  - May also be met through implementation of energy efficiency measures
- Clean Energy Standard
  - Expands the scope of the RPS to additional technologies
  - Often inconsistent with the classification of energy efficiency measures

Comparative RPS Policy



Renewable Portfolio Standards

www.dsireusa.org / September 2009



29 states & DC have an RPS

5 states have goals

State renewable portfolio standard

State renewable portfolio goal

Solar water heating eligible

Minimum solar or customer-sited requirement

Extra credit for solar or customer-sited renewables

† Includes separate tier of non-renewable alternative resources

Challenges of Implementation

- No global definition of alternative energy sources (e.g. waste coal in Pennsylvania)
- Whether to incorporate preferences for particular technologies (e.g. carve outs for solar or wind)
- Whether to limit credit for energy efficiency measures
- Price controls on RECs

Feed-in Tariffs

- Fixed price long term contract for gross generation
- Often confused with subsidies
- Implemented in Europe, China (wind), India (solar), and Gainesville, FL (solar)
- Greater implementation planned
  - Swiss program launched in January applies a system of feed-in tariffs to solar, wind, small hydro (up to 10MW), small geothermal (up to 20MW) and biogas for 20-25 years
  - Ontario and Vermont tariffs for multiple technologies recently passed into law, implementation currently under discussion

Market Solutions for Limiting CO_2

- Carbon Tax
  - Known and direct cost associated with emission
  - Entities balance cost of emission with cost of abatement
- Cap and Trade
  - Regulator sets emissions levels across scope of program
  - Tradable emissions allowances
  - Entities balance expected cost of emission with cost of abatement

Carbon Tax

- Regulator assigns a price for carbon emissions and collects from each entity
- Largely dismissed in the U.S.
  - Proposed by Clinton in 1993
  - Preference for the market to determine the price for carbon
- Limited global implementation
  - British Columbia fuels tax through 2012
  - Finland and Sweden have had carbon taxes since early '90s
  - City of Boulder, Colorado

Cap and Trade Programs

- Regulator sets cap on emissions volume
- Tradable emissions allowances
- Implemented in EU ETS Phase II, New Zealand (forestry sector only)
  - EU plans Phase III for 2013
- Planned for Australia & Japan (voluntary trial program)
- New Zealand forestry sector participation began January 2008
  - Other sectors enter 2010-2013

Cap and Trade in the U.S.

- Regional Greenhouse gas Initiative (RGGI) began auctioning permits in September of 2008. Compliance began in January
- Chicago Climate Exchange is a voluntary GHG market with reduction standards and marketable credits
- Governor Crist proposed reduction targets in 2007 Executive Order
- Waxman-Markey Bill proposed the framework for a nationwide cap and trade program for CO_2
- Boxer-Kerry Bill due out today

Cap and Trade Emissions Targets

Florida Executive Order		Waxman-Markey	
Year	Emissions Level	Year	Emissions Level
2012	2005 (100% of 2005)	2012	90% of 2005
2017	2000 (~95% of 2005)	2020	83% of 2005
2025	1990 (~70% of 2005)	2030	58% of 2005
2050	20% of 1990 (~14% of 2005)	2050	17% of 2005

Cap and Trade vs. Carbon Tax

- Carbon tax is seen as easier to administer
  - No allocation issues
  - No secondary market for allowances
- Cap and Trade approach seen as more 'market-based'
  - Market determines allowance price
  - Allocation of allowances can be political
- Economic impact of either program depends greatly on what the government does with the money

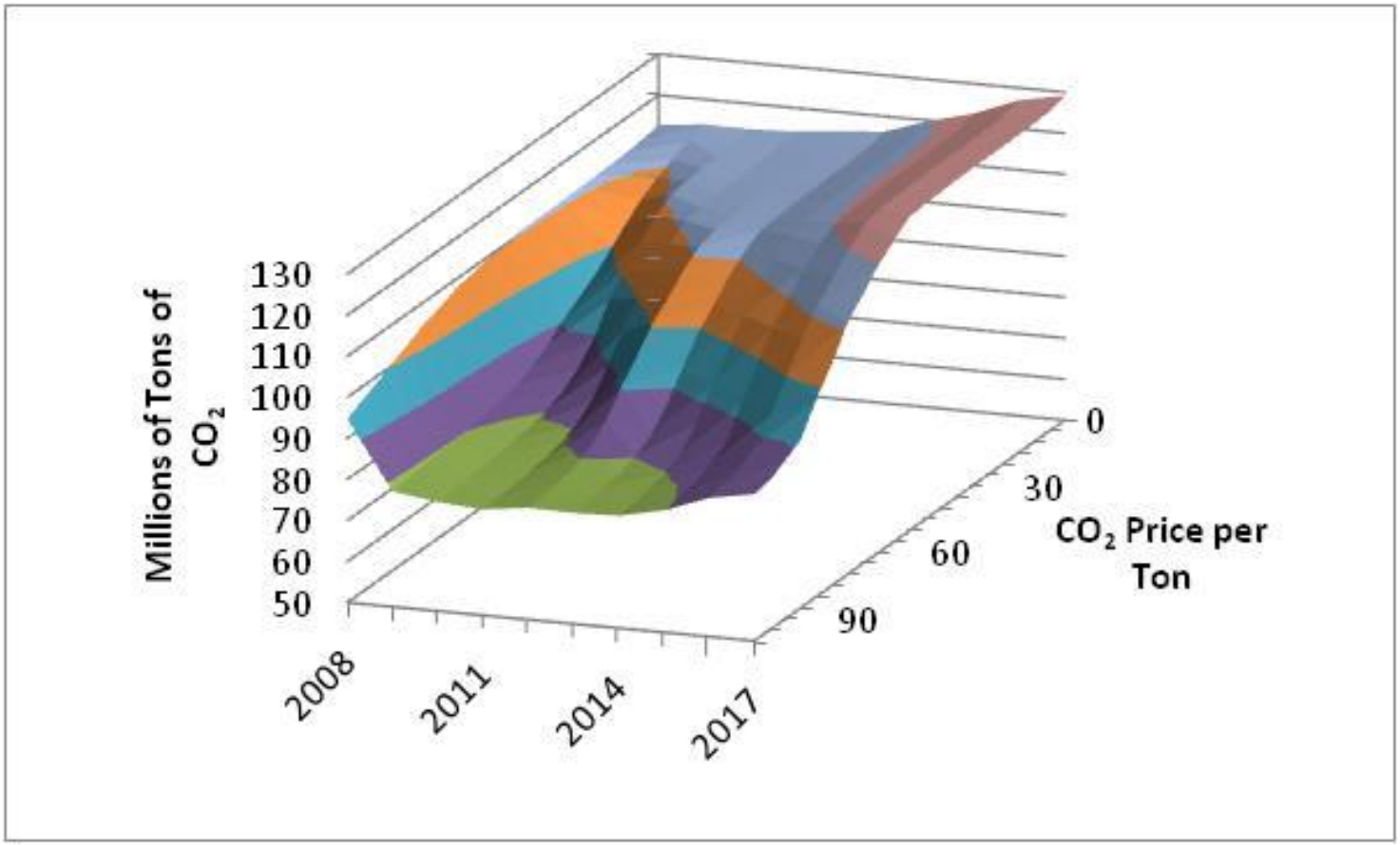
Cap and Trade in Florida

- FESC project for the Department of Environmental Protection
  - Julie Harrington, FSU
  - Ted Kury, UF
- Quantification of the impact of meeting emissions goals in Executive Order
- Provisions of state cap and trade program
- Initial impact on electric generation, with expansion of scope to other sectors

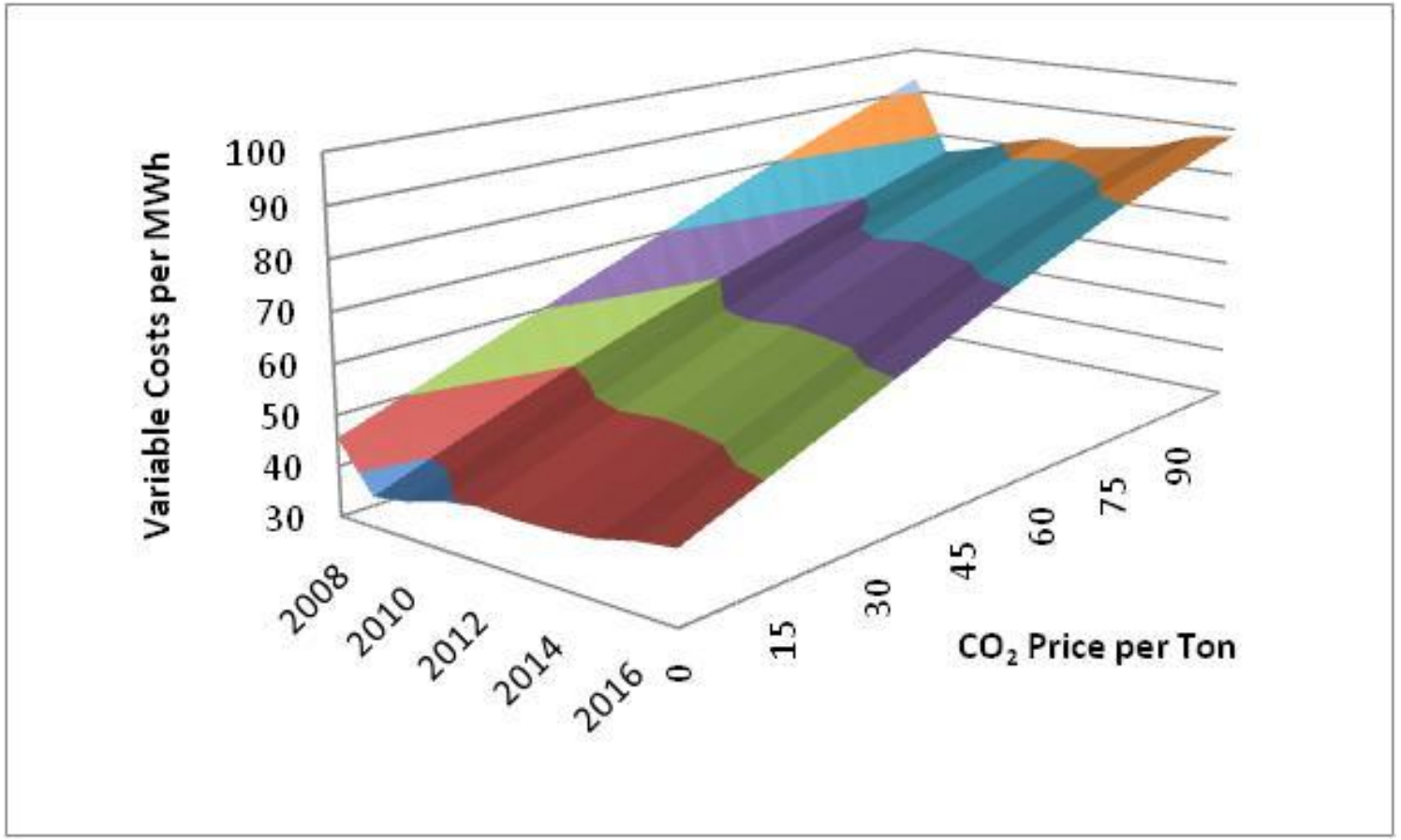
Economic Dispatch Model

- Transparent framework and logic
- Quantify the balance between level of the carbon cap and the shadow (or market) price of carbon
- Quantify the impact of RPS and generation additions
- Supply stack dispatch methodology
  - State-wide scope
  - Monthly resolution of hourly load
  - Individual generating units (over 500 in FL, AL, GA)
  - Key operating characteristics for each unit
  - Ability to shape load for growth or DSM

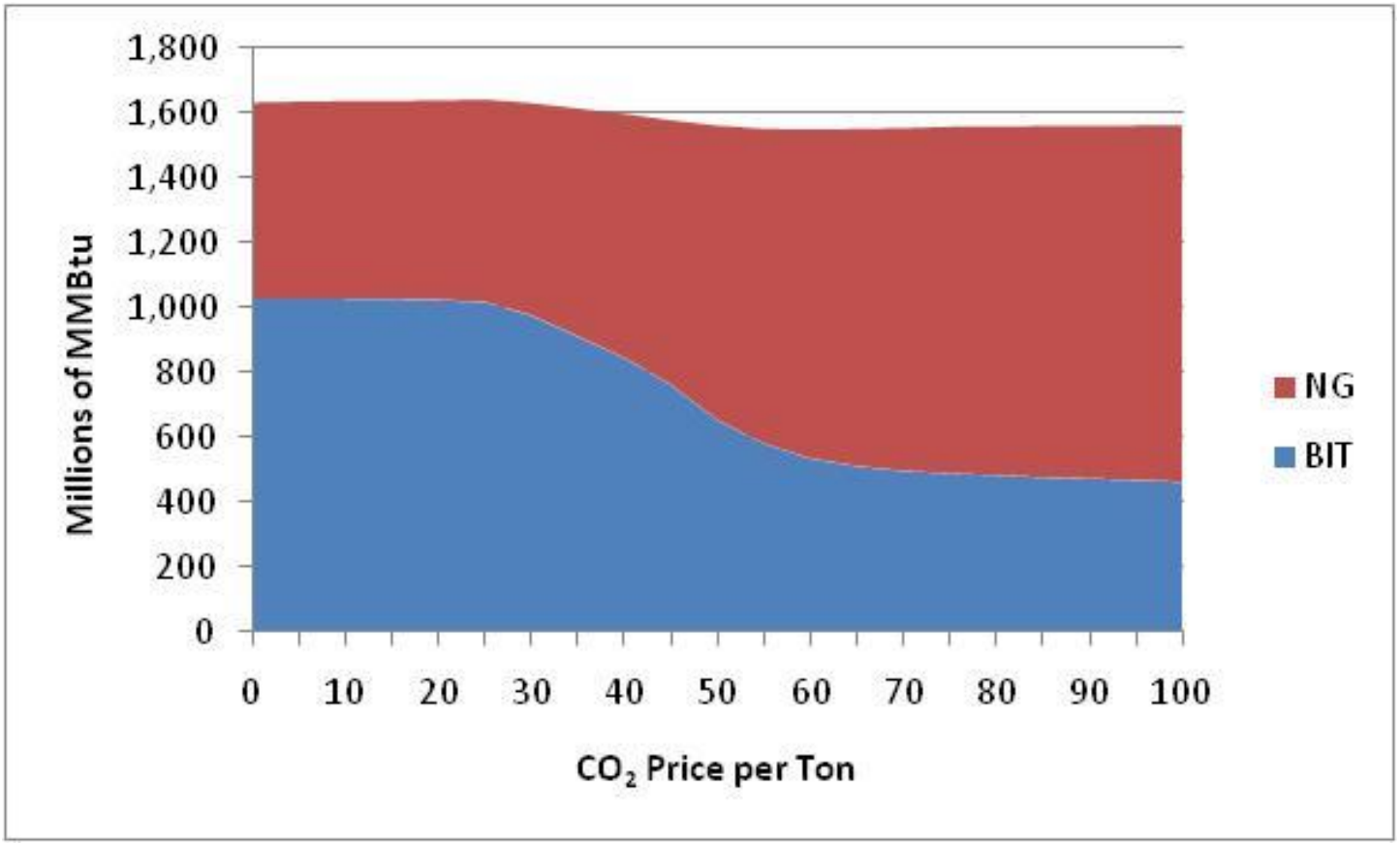
Marginal Effects of CO2 Price



CO2 Price and Energy Costs



2010 Fuel Mix



Next Steps

- Scenarios for future policy and market uncertainties
  - Fuel prices
  - Load growth
  - Generation restrictions
- Statewide macro-economic modeling of scenario results and policy variables
- Report of results to state

Conclusions

- Still much uncertainty surrounding climate and energy legislation
- Marginal effects of CO_2 pricing are dynamic
  - Vary across years
  - Vary depending on price
- Modeling needs to address these marginal effects

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