



VERMONT TOTAL ENERGY STUDY

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THE PROJECT

- ⊙ Client: VT Public Service Department
 - ⊙ Act 170 of 2012 (modified by Act 89 of 2013)
- ⊙ Dunsky Energy Consult (Montreal)
 - ⊙ Sustainable Energy Economics (NY)
 - ⊙ KanORS (India)
 - ⊙ Grasteu Associates (VT)
 - ⊙ Forward Thinking Consultants (VT)



THE GOAL

- ③ Answer three main questions
 - ③ Is it possible to reduce GHG emissions from energy consumption in VT by 75% and get 90% of energy from renewable energy by 2050?
 - ③ Can Vermont's goals be achieved with real-world public policies?
 - ③ How much will it cost the citizens of Vermont?



THE WORK

- ◎ Build a model of Vermont's energy economy
 - ◎ Identify and gather data on all energy sources
 - ◎ Quantify and project all energy consumption
- ◎ Define and apply policy options
 - ◎ Graduated Carbon Tax
 - ◎ Total Renewables & Energy Efficiency Standard
- ◎ Run the model many times



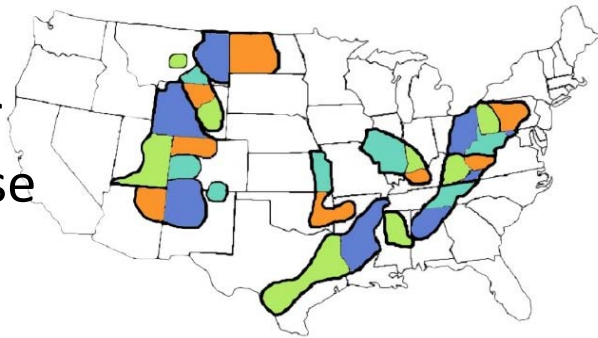
THE MODEL

- ① Framework For Analysis Of Climate-Energy-Technology Systems (FACETS) model of US energy production, distribution and consumption
 - ① Electricity, natural gas, petroleum, Biofuels
 - ① Conservative assumptions

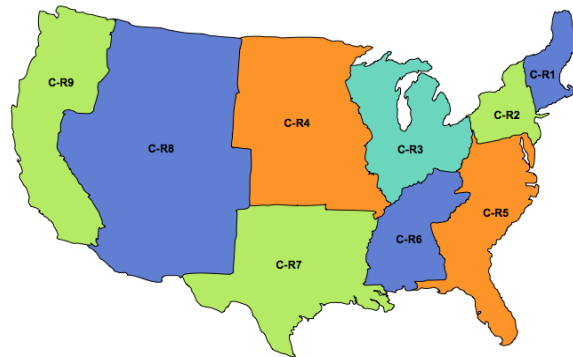
FACETS US ENERGY SYSTEM

- Combines a highly detailed energy sector with integrated end use modeling
- Multi-region in every sector
- Provides state-level analysis in the context of regional/national markets and policies

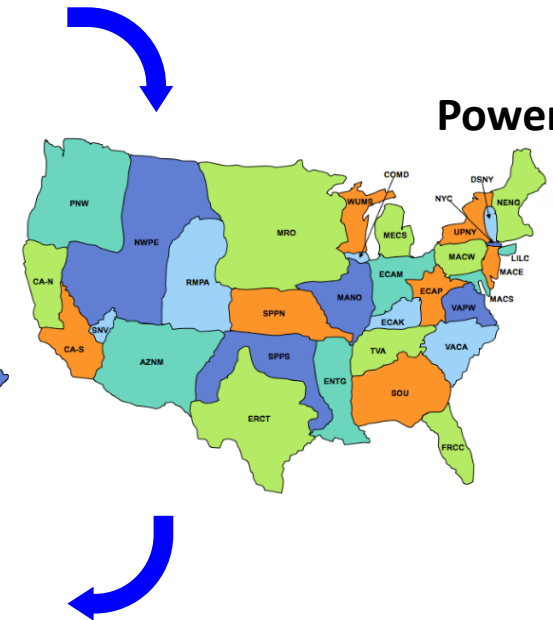
Coal



Demand



Power



<http://www.facets-model.com/>



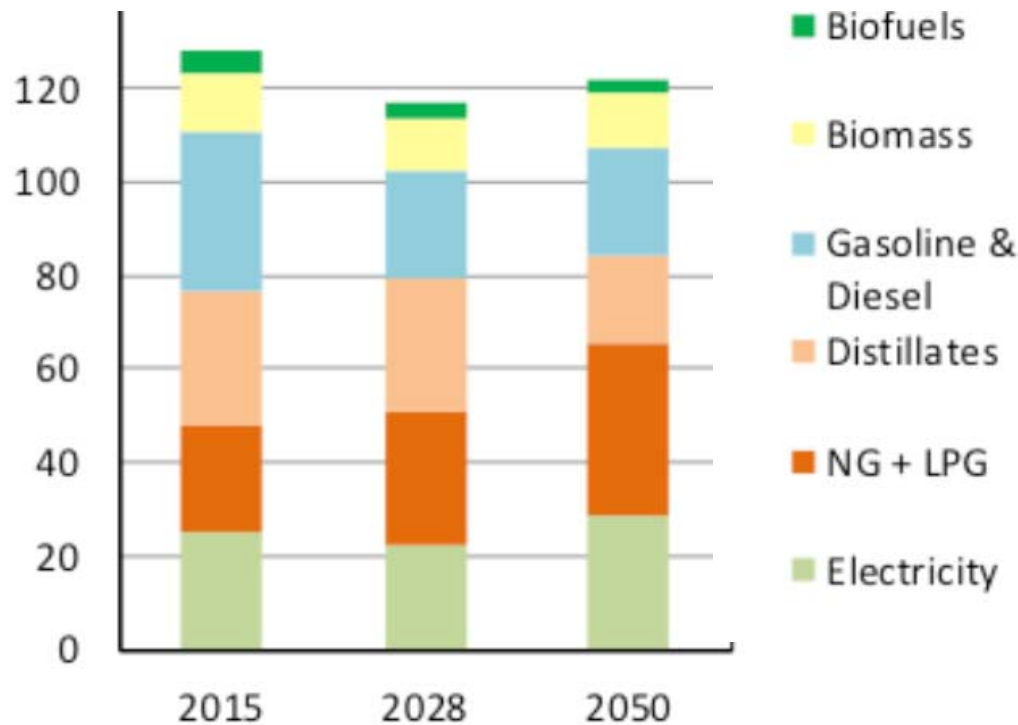
POSITIVE TRENDS

Statewide (from EIA)	CO ₂ Emissions	Energy Consumption	Renewables Share
2003	6.6 mil tonnes	161 TBTUs	14%
2012	5.6 mil tonnes	130 TBTUs	27%

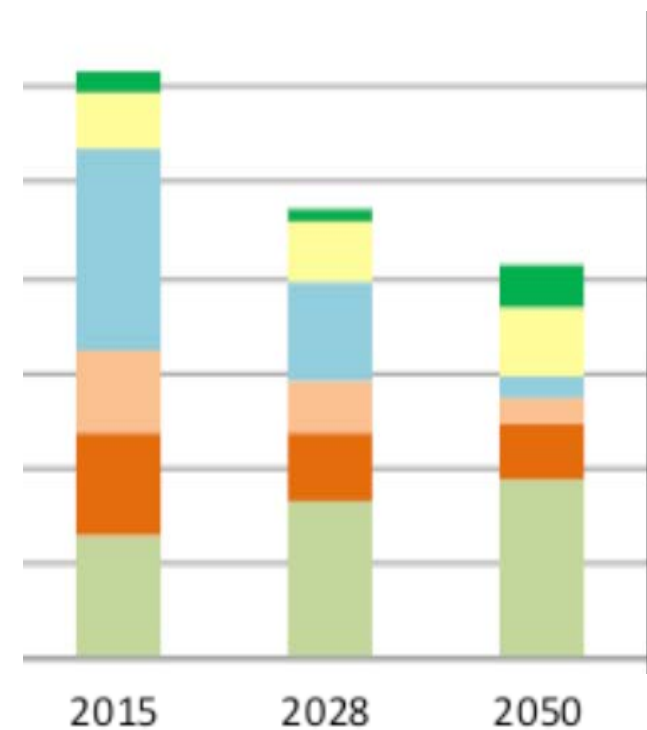
CHANGES IN CONSUMPTION

BUSINESS AS USUAL VS CARBON TAX

Business as Usual



Carbon Tax Shift
High Biofuel Prices

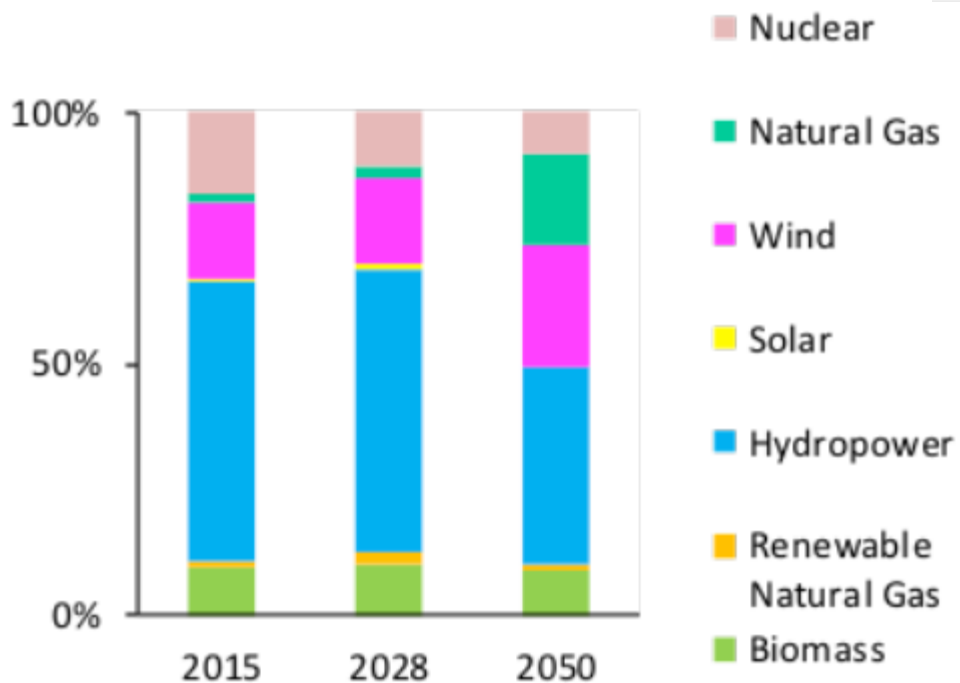


Trillions of BTUs

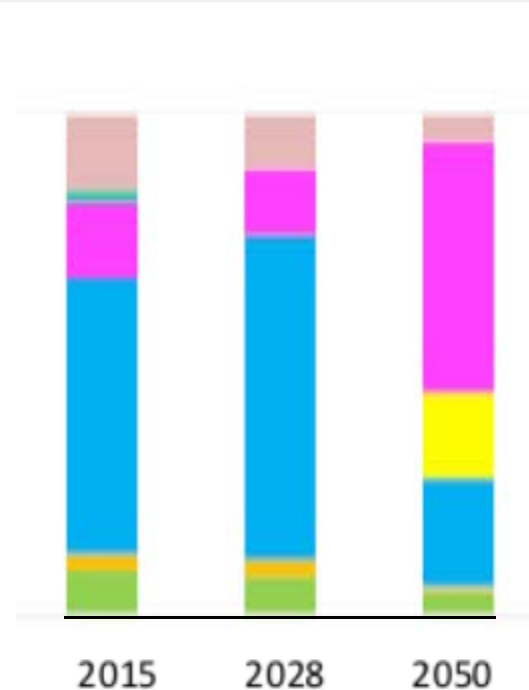
ELECTRICITY GENERATION MIX

BUSINESS AS USUAL VS. CARBON TAX

BAU Electricity Mix

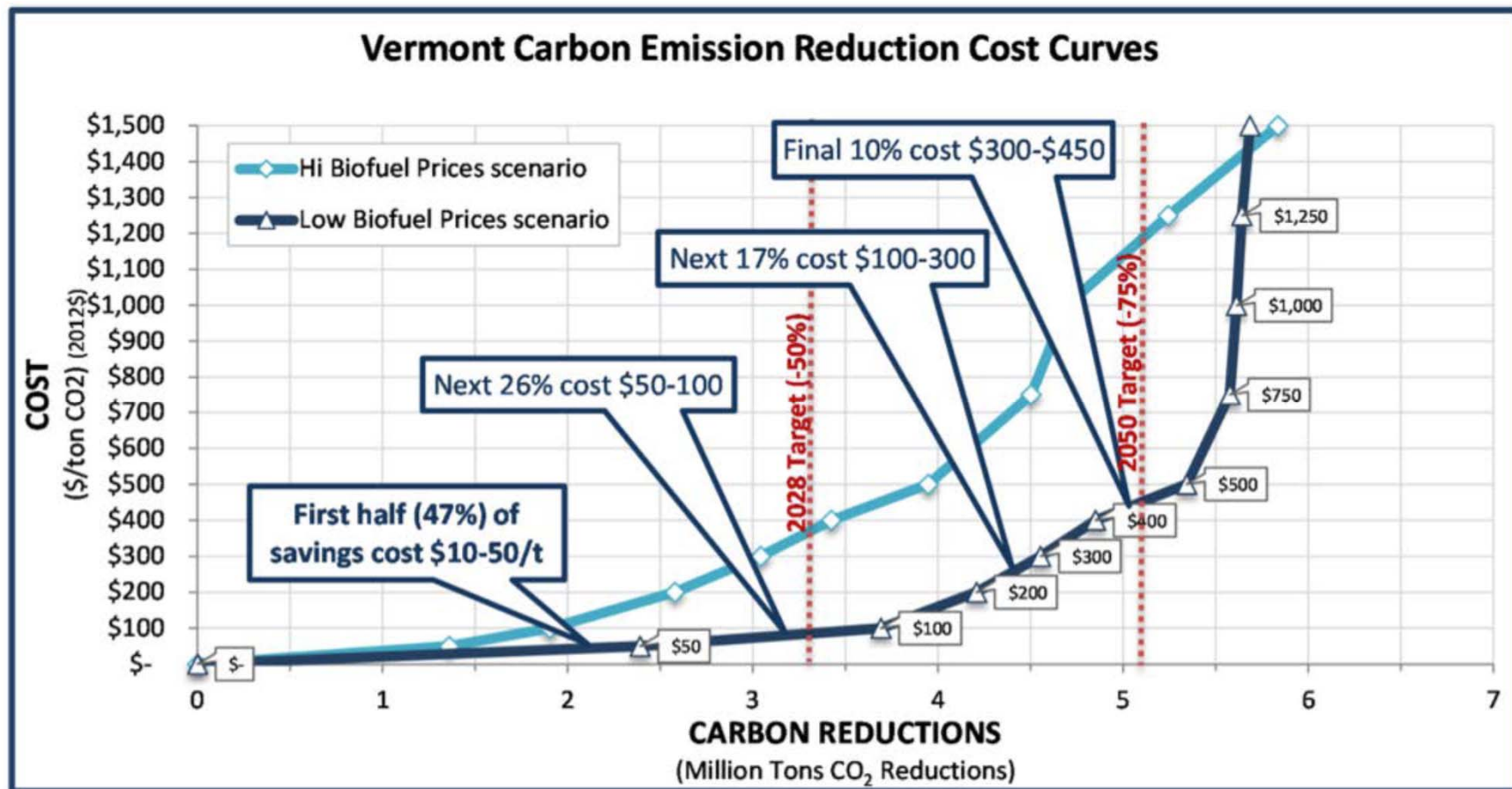


Carbon Tax Shift
High Biofuel Prices



Percent of Electricity Generation

GETTING THE PRICE RIGHT



CARBON TAX ENERGY COSTS

Incremental Cost of Achieving VT Greenhouse Gas Reduction and Renewable Energy Goals

POLICY OPTION		COSTS			
		% change re: BAU		\$/ton	
	BIOFUEL PRICES:	LOW	HIGH	LOW	HIGH
Tax Shift		2.6%	4.5%	\$42	\$67

VT TOTAL ENERGY STUDY

CONCLUSIONS

- ⊙ Vermont's goal of reducing greenhouse gas emissions from energy consumption by 75% and 90% of energy from renewable sources by 2050 is technically achievable.
- ⊙ Vermont's goal can be achieved using a graduated carbon tax that accelerates the shift from fossil fuels to energy efficiency and renewables.
- ⊙ The cost of implementing a carbon tax in VT would be small compared to the total cost of energy.



CHANGES SINCE 2013

- © 2014 Clean Power Plan
- © 2015 Paris Climate Agreement
- © 2015 Vermont RESET

