

GWSA Public Meeting: Economy-Wide Price of Carbon

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Environmental Protection

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Carbon Pricing and the States

- What if a national carbon price is implemented?
- What if a national carbon price is not implemented?
- What role for other policies at the state or regional level?

National Climate Policy Enacted

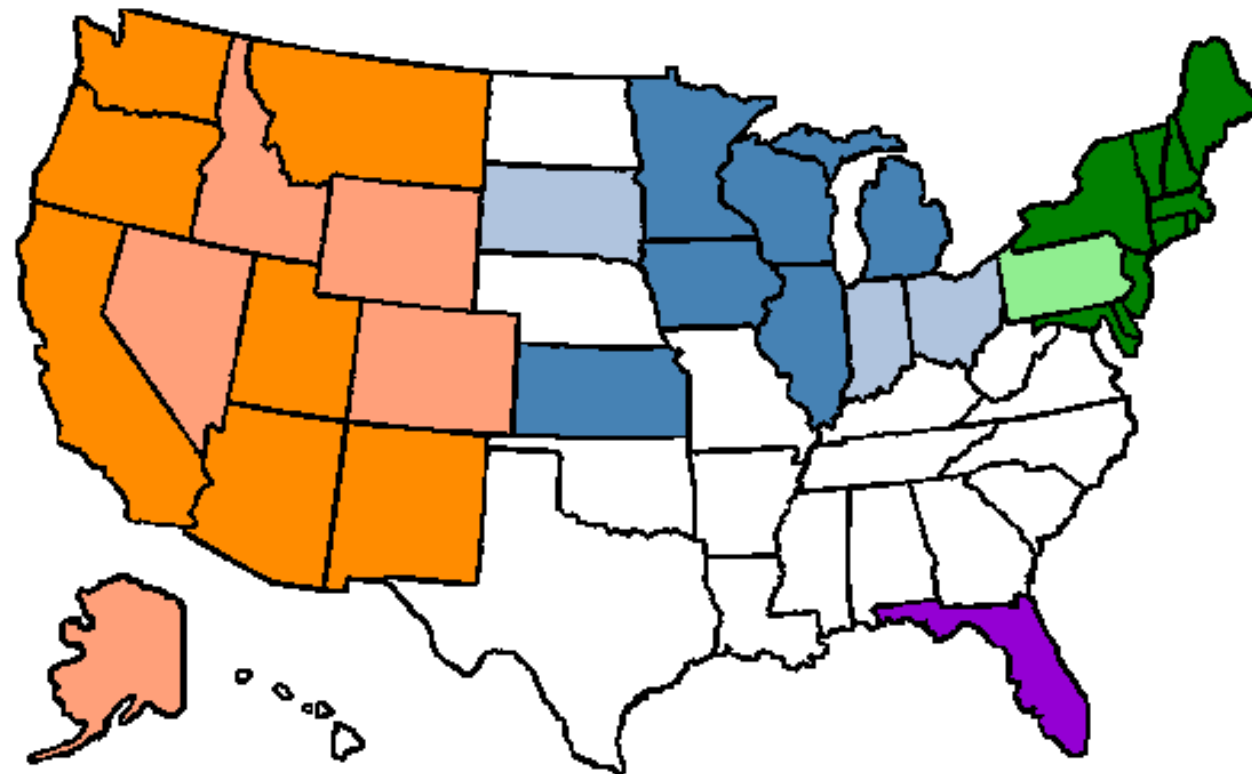
- Greenhouse gases are a global problem
- Policies at national level should trump regional, state or local policies
- Administrative costs lower for firms if they face a single national policy
- Preemption in Waxman-Markey addresses this issue

National Climate Policy Enacted

- Many other policies to reduce GHG emissions have questionable value
 - Renewable Portfolio Standards
 - Low Carbon Fuel Standards
 - Tax Credits for renewable technologies
- Other state or regional policies have real value
 - MassSave and other efficiency programs
 - State regulatory review to reduce barriers to distributed power
 - Inventory of state-level offset opportunities

No National Climate Policy

- Regional climate accords an efficient substitute
 - RGGI, WCI, MGGRA
 - Linkage across regional accords desirable



- Regional Greenhouse Gas Initiative RGGI
- RGGI Observer
- Midwest GHG Reduction Accord
- MGGRA Observer
- Western Climate Initiative
- Western Climate Initiative Observer
- Individual State Cap-and-Trade Program

No National Climate Policy

- Regional climate accords an efficient substitute
 - RGGI, WCI, MGGRA
 - Linkage across regional accords desirable
- Comprehensive coverage desirable
 - Expanding RGGI to include transportation and industrial emissions important
 - How best to handle land use changes?

What About Other Policies?

- Renewable Portfolio Standard
- Tax Credits for Clean Technologies
- Low Carbon Fuel Standards

Renewable Portfolio Standard

- Why have Renewable Portfolio Standard programs if a comprehensive carbon price is put in place?
- Goal of RPS is to encourage carbon-free energy sources
- But that's what the carbon price does
- RPS is at best redundant and may drive up the cost of achieving given GHG reductions

Tax Credits for Clean Technologies

- Wrong price signal with subsidies
- Violates Technology Neutrality
 - Tax credits for hybrids
 - Production tax credits

Hybrid Vehicle Tax Credit Model 2009 Values

Vehicle	MPG	Hybrid Vehicle Tax Credit	Annualized Value of Credit	Annual Gasoline Savings (Gallons)	Tax Credit per Gallon of Gasoline Saved
Chrysler Aspen Hybrid	21	\$2,200	\$347	30	\$11.68
Ford Escape Hybrid (2WD)	32	\$3,000	\$474	234	\$2.02
Mazda Tribute Hybrid (2WD)	32	\$3,000	\$474	234	\$2.02
Nissan Altima Hybrid	34	\$2,350	\$371	257	\$1.44
Toyota Corolla	31	\$0	\$0	222	\$0
Toyota Prius	46	\$0	\$0	353	\$0

Source: Metcalf (2009). Savings relative to a vehicle that gets 20 miles per gallon and is driven 12,485 miles per year. Vehicles are assumed to be driven for ten years and savings are annualized with a ten percent discount rate.

Production Tax Credit			
Renewable Source	PTC	Capacity Factor	Subsidy per ton CO₂
Geothermal	\$ 0.021	73%	\$ 7.74
Wind	\$ 0.021	27%	\$ 12.28
<p>Source: Metcalf (2009) Capacity factor based on electricity generation in 2006. CO₂ emissions avoided assume geothermal replaces coal fired base load capacity while wind replaces natural gas shoulder or peaking capacity. Coal and natural gas emissions based on EIA estimates.</p>			

Tax Credits for Clean Technologies

- Wrong price signal with subsidies
- Violates Technology Neutrality
 - Tax credits for hybrids
 - Production tax credits
- Subsidies are often inframarginal

Low Carbon Fuel Standards

- LCFS sets standards on carbon emissions per unit of output
- LCFS imply a high cost for carbon savings
- ... and they can actually *increase* carbon emissions
- How can that be...?

Low Carbon Fuel Standards

- LCFS acts as an implicit tax on high carbon fuels and an implicit subsidy on low carbon fuels
- The optimal policy on any carbon fuel (high or low) is to raise its price, not lower it
- In response to LCFS, firms decrease high carbon fuel use and increase low carbon fuel use
- The increase in emissions from low carbon fuel use can more than offset reduction in emissions from high carbon fuel use

Impact of LCFS		
Reduction in Carbon Intensity	5%	10%
Less Elastic Response		
Emissions Reduction	13%	25%
Marginal Cost of Emission Reductions	\$6,752	\$12,124
Average Cost of Emission Reductions	\$1,293	\$2,272
Carbon Price to Achieve Same Outcome	\$622	\$2,865
More Elastic Response		
Emissions Reduction	8%	20%
Marginal Cost of Emission Reductions	\$695	\$1,020
Average Cost of Emission Reductions	\$257	\$307
Carbon Price to Achieve Same Outcome	\$46	\$133
Source: Holland, Hughes and Knittel (2009)		

Summing Up

- Carbon pricing essential
 - Preferable at national level but regional pricing an important fallback option
- Other programs important to the extent they address other market problems
 - Information
 - Regulatory hurdles
- RPS, LCFS, and tax credits at best redundant
- Energy efficiency programs, building codes, regulatory reforms, offset information valuable

Related Readings

- Holland, Stephen P.; Hughes, Jonathan E. and Knittel, Christopher R. "Greenhouse Gas Reductions under Low Carbon Fuel Standards?" *The American Economic Journal: Economic Policy*, 2009, 1(1), pp. 106-46.
- Metcalf, Gilbert E. "Tax Policies for Low-Carbon Technologies," NBER Working Paper No. 15054, June 2009