Cap & Trade

Lessons Learned from Modeling Process

State of Wisconsin
Governor's Global Warming Task Force

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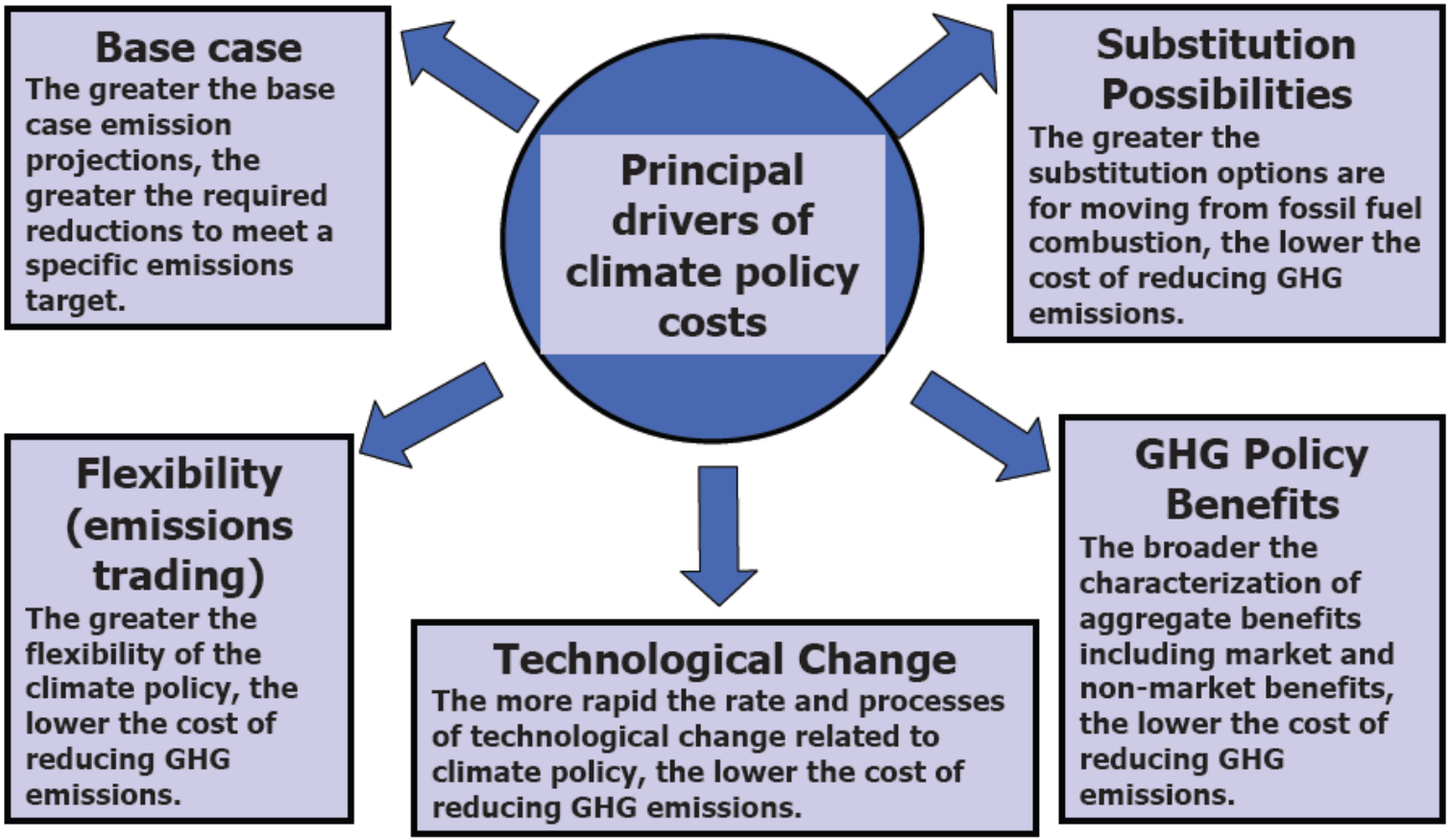

Source: Insights from Modeling Analyses of the Lieberman-Warner Climate Security Act, (S.2191), PEW Center on Global Climate Change, May 2008.

Modeling Context

- Modeling will not provide a definitive indication of the future.
- Modeling can provide a consistent framework for evaluating the implications of different policies.
- Results depend on assumptions and inputs used in the model as well as on policy definitions and design.
- Uncertainty increases with the period modeled
  - Economic forecasts become increasingly uncertain
  - Regulatory environment may change
  - Technological change including changes in non-energy technologies (ie. Internet, teleconferencing, etc.) can have significant energy impacts.
- Model design also influences outcomes.

Modeling Context – ENERGY2020

- E2020 assumes realistic, not idealized or optimal response to price signals.
- Model recognizes that price signals still subject to market imperfections and non-price factors.
- In modeling C&T, the model starts with the target level of emissions and iterates prices until target levels of emissions are met in the Market as a whole.
- In this project the Market was defined as the region encompassing Wisconsin, Iowa, Illinois, Minnesota and Michigan.
- Economic forecast from REMI accepted as basis for modeling – may be optimistic for some sectors.

Description of Proposed Policies

- Modeling Includes “All Policies”

Policy No.	Policy Title
C&EE 01	Enhanced Energy Efficiency Program
C&EE 02	Residential & Commercial Energy Efficiency & Green Building Codes
C&EE 03	State Appliance Efficiency Standard
C&EE04	Residential Rental Lighting Standard
F&A 01	Urban Forestry
F&A 08	Biomass Use in State Facilities.
Trans 01	CO2 Emission Standards, Commonly Called “California Car” Standards
Trans 02	Low Carbon Fuel Standard
Trans 03	Reform Planning and Funding Policies to Reduce VMT
EG 01	Enhanced Renewable Portfolio Standard

Description of Modeled Cap & Trade Policy

- Commences in 2011 (Consistent with MWGA Accord)
- Based on 2009 emission levels.
- Covered sectors include:
  - Electricity generation
  - Transportation
  - Industrial
  - Commercial
  - Residential
- Year by year compliance period (ratcheted down slowly)
- Point sources emitting <25kt/year excluded
- Target
  - To reduce emissions to 1990 levels by 2020.
  - Assumes WRI inventory for 1990.
  - Continue to decrease to 70% below 1990 by 2050.

Description of Modeled Cap & Trade Policy

- Modeled as a Regional trade system including the 5 states which signed the MWGA Accord – WI, IA, IL, MN, MI).
- Assumptions:
  - No link to RGGI
  - No access to EU or other international credits.
- Offsets to meet up to 10% of the allowances needed in any given year and two cases modeled – one with a 100% auction and a second case with 100% free allocation.
- Includes all emissions on all power imports (modeled as an economic penalty on all imports)

Summary of Cap & Trade Observations

- Balance between stringency of policy and resulting costs.
- Allowance costs are dependent on policy design.
- Limiting offsets to domestic only or limiting types of offsets permitted will increase costs.
- Offsets can help bridge period until longer term solutions can be put in place.
- Starting point matters – prior implementation of EEPS, California Cars, etc. affects relative position in market as well as cost of next level of reductions.
- Ideally all jurisdictions participating in market should implement similar complementary policies.

Observations on Proposed WI Policy

- Limited offset availability
  - No international offsets
  - Limit placed on domestic US offsets (12% of total – initially modeled with a further 25% reduction)
  - No link to other trading systems.
- 10% limit in “limited offset” case low compared to other proposals such as Lieberman-Warner.
- Less than 10% of required reduction is available from domestic offsets.
- Limited offsets resulted in rising prices in the market as a whole as the emission targets became more stringent.

Observations on Proposed WI Policy:

- Many low cost opportunities in Wisconsin had already been implemented through the “other policies” in PC01.
- Additional opportunities required a move up the cost curve and greater incentives to overcome market imperfections.
- In the rest of the market the only policy assumed to have been implemented were those associated with the Energy Independence and Security Act (bio-fuels, CAFÉ and building and equipment standards).
- Assumption that WI implemented complementary policies while Region had not resulted in some WI sectors selling permits within the region, particularly early in the period, in some scenarios.
- May also result in over-compliance in some states as the market as a whole moves towards its target

Observations on Proposed WI Policy :

- These factors limited electric industries ability to respond
  - New nuclear power development not allowed in Wisconsin (policy)
  - CCS was assumed not to be available until late in period (> 2018).
  - Renewable/wind contribution ultimately limited by system considerations (reached 18% of generation in some scenarios).

- As carbon costs raised effective fuel prices, fuel switching occurred in some scenarios.

Observations on Proposed WI Policy

- Low allowance prices in early years may result in limited market response.
- Market responses with longer lead times may not be initiated because of initial low prices.

(The model does not allow banking)

Factors Affecting Allowance Costs

- "Price" or cost of allowances will encourage action to reduce emissions, however, impact varies between sectors depending on ability to respond, prior policies and market imperfections. (power sector versus transportation sector)

- Implementation of efficiency regulations, efficiency programs and other policies reduced energy use in Wisconsin by 24% relative to the original business-as-usual projection.

Factors affecting Costs

- A number of sensitivity analyses were completed as part of the EPA's evaluation of the Lieberman-Warner Climate Security Act of 2008 (EPA, March 14, 2008, P.6).
- Each variation compared the cost of permits in the scenario to the costs estimated for the Act as written:
  - Where domestic and international credits were unlimited, allowance prices fell by 71%.
  - Where the use of domestic credits were unlimited but international credits were limited to 15% of compliance obligation prices fell by 26%.
  - Where international permits were not allowed and domestic permits were limited to 15% of compliance obligation allowance prices rose by 34%.
  - Where domestic and international permits were not allowed allowance prices increased by 93%.

Economic Impacts

- Economic analyses of Cap-and-Trade policies have generally found limited economic impacts.
  - For example, analysis of Lieberman Warner is similar to what we found for Wisconsin
- Policies modeled for Wisconsin using the REMI model indicated a similar minor impact.
- Energy price impacts partially offset by efficiency gains and reduced use.
- Auction revenues can be used to support energy efficiency gains, reducing impacts of energy price increases and further increasing emission reductions.

Design Issues:

- Minimizing leakage is a challenge. Competitive issues impact the power sector. These factors could be reduced as region covered increases.

- It is difficult to model treatment of power imports; requires detailed information on the source of imports, contracts, etc..
- Ideally the region included in the market should match to Regional Transmission Organizations (MISO) districts to extent possible.

Questions and Discussion