



## Cap and Trade among WCI and Midwestern States

1. The assumptions we adopted in our simulation model are summarized as follows:

Case IW: (A) five western states only; (B) five western states plus Minnesota—all emitters

- the simulation target year is 2020
- all sectors are included in the emission accounting and mitigation effort
- all GHG emissions are considered
- all gross emissions (excluding sinks) are considered
- all emissions are consumption-based
- offsets are not included
- no safety valve (permit price limit) is included
- in permit auction cases, we assumed that each state would receive permits equal to their cap. The price per permit was set at the equilibrium permit price.
- marginal cost curves embody direct mitigation costs only
- marginal cost curves do not include various transactions costs
- marginal cost curves do not distinguish between producer vs. consumer allocation of permits
- marginal cost curves of Arizona and New Mexico are developed based on mitigation costs of individual policy options presented in CCS reports of the respective State Climate Change Action Plans
- marginal cost curves of California, Oregon, Washington, and Minnesota are developed by a parametric shift method using New Mexico's marginal cost curve as a reference; the parametric shift rule assumes a direct relationship between the slope of the marginal cost and the carbon intensity of a state.
- emission caps for the five western states are 15% below 2005 levels by year 2020
- though Minnesota has state GHG mitigation goals to reach 15% below the 2005 emission level by 2015, 30% by 2025, and 80% by 2050, we assume a same emission cap for Minnesota in 2020 as the five western states in the simulations

Case IIW: (A) five western states only; (B) five western states plus Minnesota—upper-bound costs for all emitters

- same assumptions as for Case I, except:
- assumes half the cost-saving mitigation level for each state, i.e., the marginal cost curves are shifted upward so that the zero marginal cost level occurs at half the emission reduction level of Case I; this represents the worst-case condition, or upper-bound cost estimate, for each state to join the cap and trade mechanism

Case IWP: (A) Five Western States—electric power sector only; (B) five western states plus Minnesota

- same assumptions as for Case IW, except:
- emission caps are for power sector only, i.e., only power sector is committed to reduce 2020 baseline emission to 15% below the 2005 level.
- power sector marginal cost curves of Arizona and New Mexico are developed based on policy options directly designed for electricity sector; marginal cost curves for other states are developed using New Mexico's curve as a reference.

Case III: Midwestern States—all emitters

- same assumptions as for Case IW, except:
- emission projections in 2020 for Iowa, Illinois, Michigan, and Wisconsin are calculated based on EIA regional projected emission growth rates. Iowa belongs to West North Central Region. Illinois, Michigan, and Wisconsin belong to East North Central Region.
- marginal cost curves of Iowa, Illinois, Michigan, and Wisconsin are developed by a parametric shift method based on Minnesota's marginal cost curve.

2. The model yields the following general results:

- GHG emission reductions for each state before and after permit trading
- Cost of GHG emission reductions for each state before and after trading
- Auction value of permits (some cases)
- Number of permits traded (bought and sold) by each state
- Equilibrium permit price
- Cost savings for each state of joining the Cap and Trade mechanism