

Combinatorial Auctions for Emission Allowance Markets

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CEM IR&D



Problem



- **Greenhouse gas emissions will be regulated with an emission allowance market (cap and trade).**
- **Auctions are the most transparent and economically efficient means of allocating allowances to the private sector.**
- **What auction rules minimize the total cost of satisfying the environmental objectives?**

Background



- **Cap and trade is a market-based pollution regulation:**
 - **Government sets a total limit and establishes tradable property rights**
 - **Private industry finds the least expensive means of satisfying the total cap.**

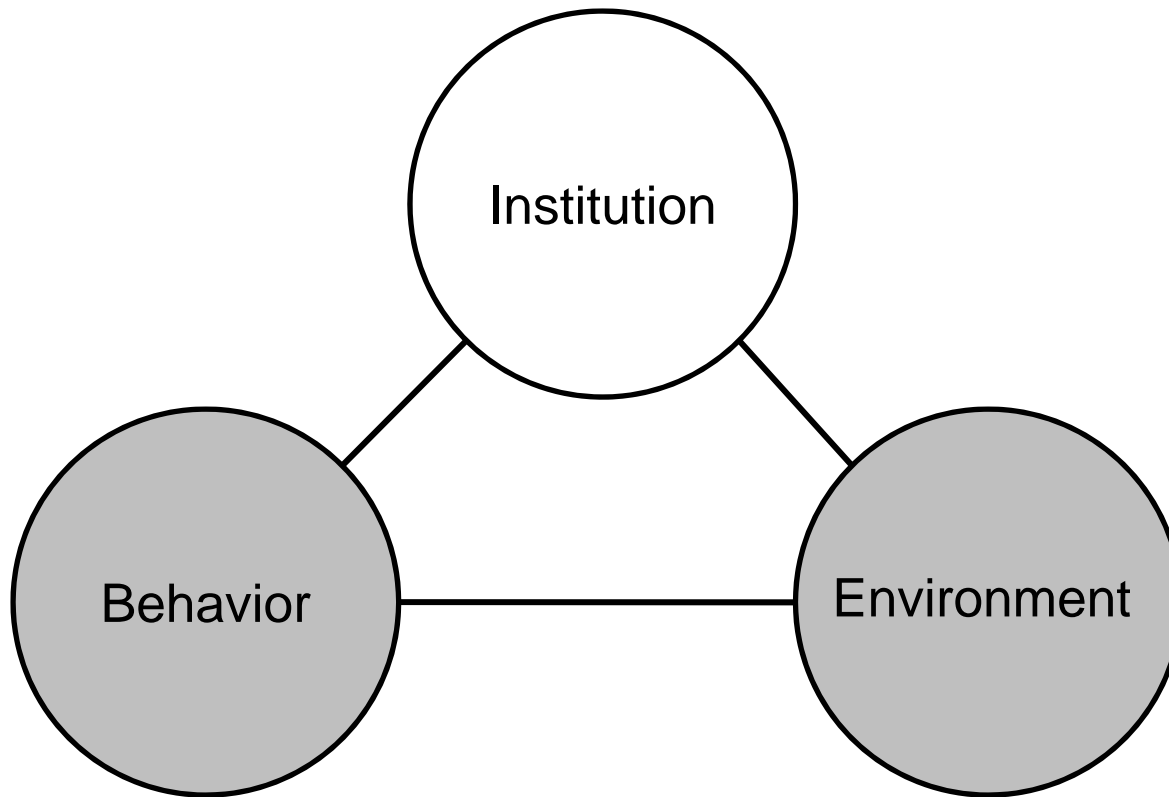
- **Cap and trade is the most politically viable means of regulation:**
 - **Multiple allowance markets already exist**
 - **President's FY10 budget specifically identifies CO2 market auctions as sources of federal revenue**
 - **Eases international coordination**
 - **Establishes a known ceiling on emissions.**

Objective



- **Develop an auction that helps EPA minimize the total cost of satisfying environmental standards.**

Activities



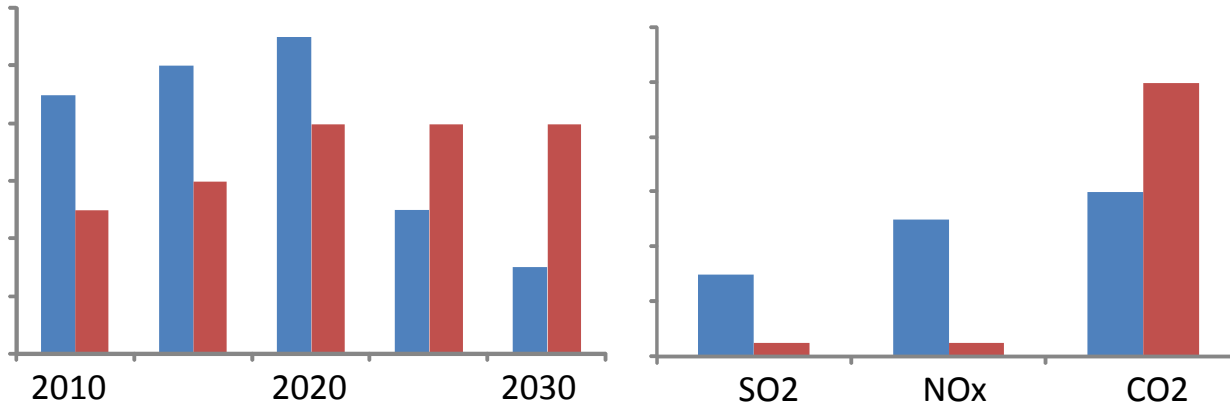
- **This is economic systems engineering, but we control only 1/3 of the system.**
- **The research highlights MITRE's ability to engineer large, highly complex systems of national importance.**

Highlights



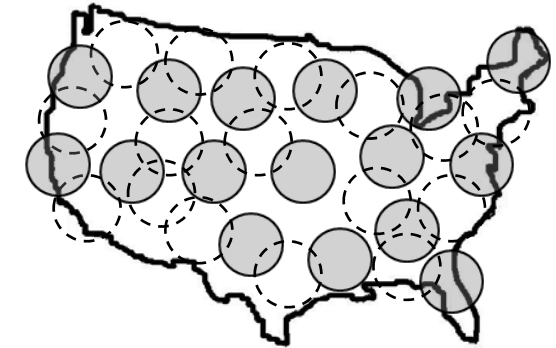
- **Developed software for experimenting (live people, agents, or some combination) with general market designs.**
- **Currently experimentally evaluating EPA's current practice and its near-term intentions**
 - **Experiment addresses holes in the literature and specific government constraints.**
- **Refined combinatorial design to address market asymmetries follows this summer.**

Demonstration



Differing investment time horizons

Heterogeneous stoichiometry



Geographic constraints

- **Heterogeneous market participants have asymmetric needs.**
- **Market rules should not arbitrarily favor one.**
- **A combinatorial auction minimizes market risk by allowing participants to express exactly what they want across commodities.**

Impacts



- **A well-designed market:**
 - **Minimizes the total cost of satisfying the environmental constraints:**
 - **The market will affect every consumer in the country**
 - **Minimizing this cost will benefit all**
 - **Assures continued political viability of regulation.**

- **The research furthers MITRE's market design capabilities. Our methods and tools can be applied across the Corporation.**

Future Plans



- **Experimentally evaluate combinatorial design to identify any deviations from theory.**
- **Transition appropriate design to EPA for implementation.**