



Telecommunications • Litigation • Finance • Environment • Energy

U.S. Climate Policy Effects on Business and the Environment

The Conference Board
September 26-28, 2007

Dean M. Murphy
The Brattle Group

Agenda

If we decide to cut U.S. CO₂, how would we do it?

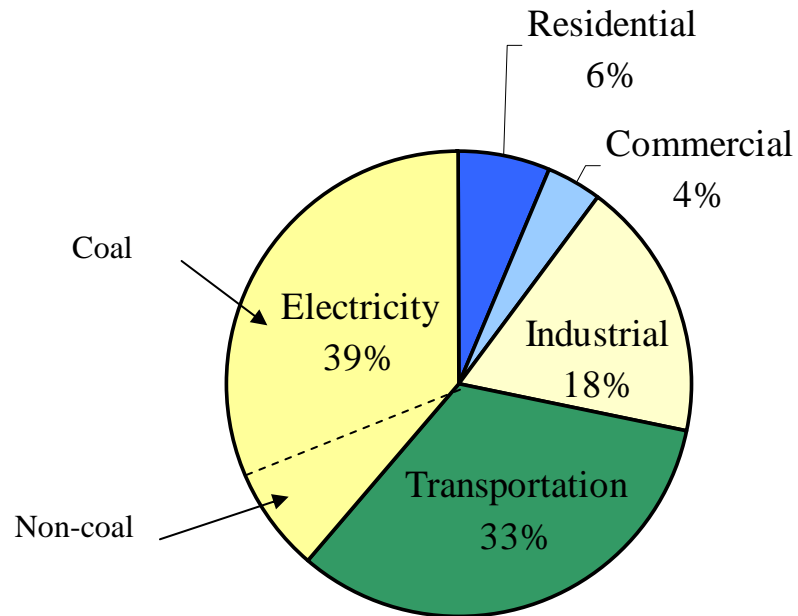
- What sectors?
- What policy mechanisms?
- What would be their effects?
- Costs to business and consumers?
- Regional effects?

Getting to a Low-Carbon Economy

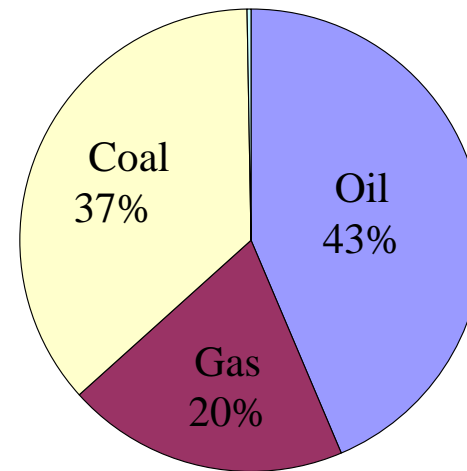
U.S. CO₂ Emissions

Primary CO₂ sectors: electric power and transport

Sector Shares



Fuel Shares



Note: Excludes non-CO₂ GHGs (~15% of total GHG emissions)

Mandatory, Market-based Climate Policy

“Pricing carbon” is a key element of climate policy

Control quantity: Cap-and-trade,
aka emissions trading

- Cap limits CO₂ emissions
- Trading creates market for CO₂ emission rights
- Allowances distributed (allocated free and/or auctioned)
- Quantity set by regulation; market determines price

Control price: CO₂ fee,
aka carbon tax

- Impose fee on emissions (e.g., on carbon content of fossil fuel)
- Tax credits for certified CO₂ offsets (e.g., sequestration)
- Substantial revenues available to reduce CO₂, mitigate impacts
- Price set by regulation; market determines quantity

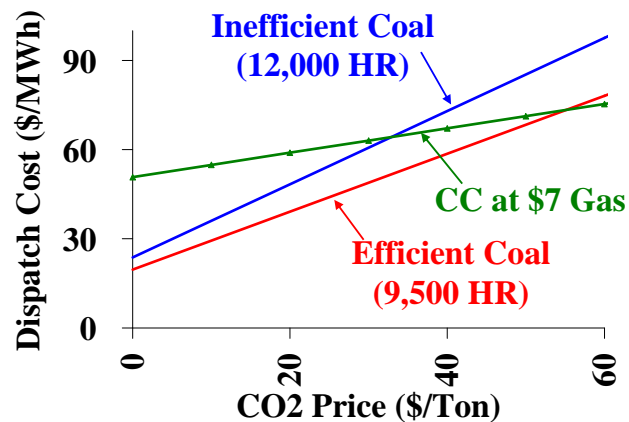
In Power Sector, Coal is King

Existing coal plants are very profitable

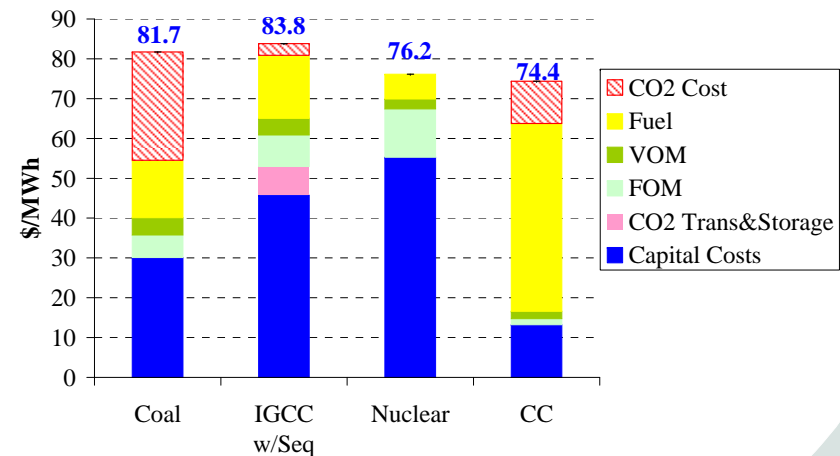
Coal is clear choice for new capacity

- \$30/t CO₂ (or more) is needed to make low-CO₂ investment and operation economic

Dispatch Switching
Existing Plants



New Generating Capacity
(\$30/t CO₂)



Must Retire* Existing Plants to Reduce CO₂

But few retirements are forecast

- Though average age is 35 years, only 2% of existing coal is forecast to retire by 2030 (EIA Reference Case)

Early retirement uneconomic unless CO₂ price high

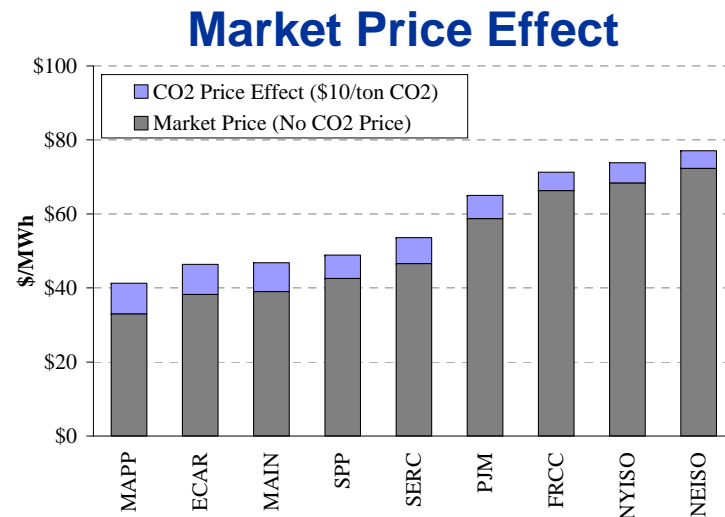
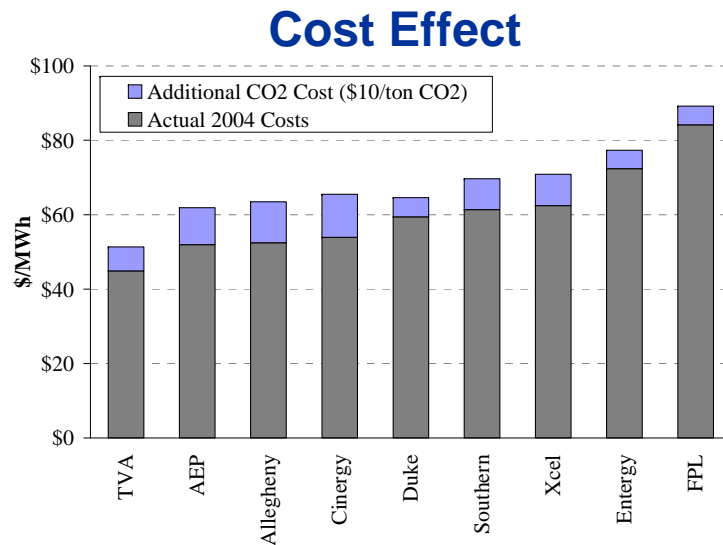
- Highly profitable at high (gas-driven) power prices
- \$40-60/ton CO₂ price needed to retire existing units
- Use targeted subsidies for early retirement?

* Or retrofit for carbon sequestration; economics are similar to retirement

Carbon Cost Effects: Power Sector

\$10/ton CO₂ = \$5-10/MWh (+5-10% delivered)

- Inexpensive coal generation hit hardest; effect is generally larger where power is initially cheaper



- Higher CO₂ price has less-than-proportional effect

Carbon Costs Flow Through to Consumers

Market dynamics and regulation have similar effects

- Regulated utilities: cost-of-service regulation
- Deregulated markets: price rises with carbon cost
 - ▶ Though costs pass through imperfectly
 - ▶ Many winners, a few losers (assuming no compensation)

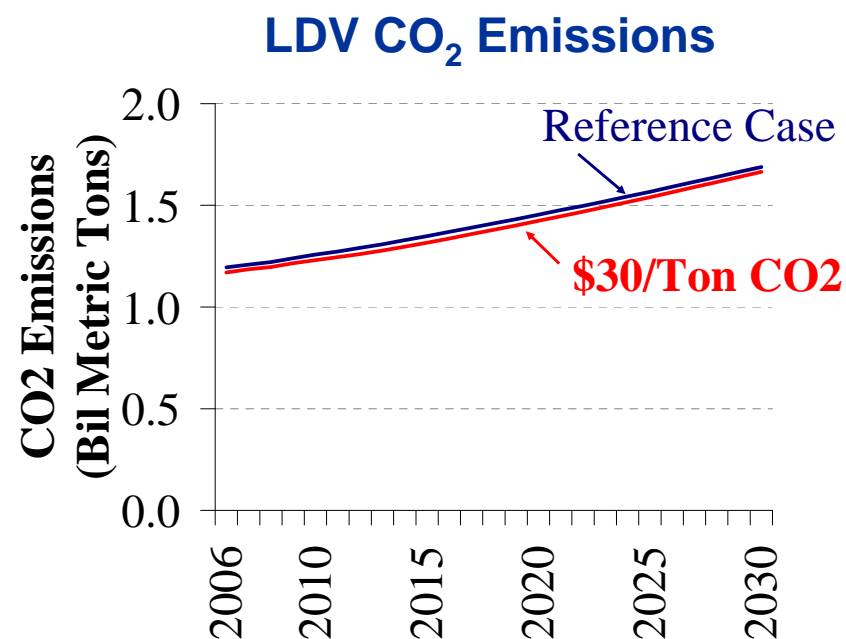
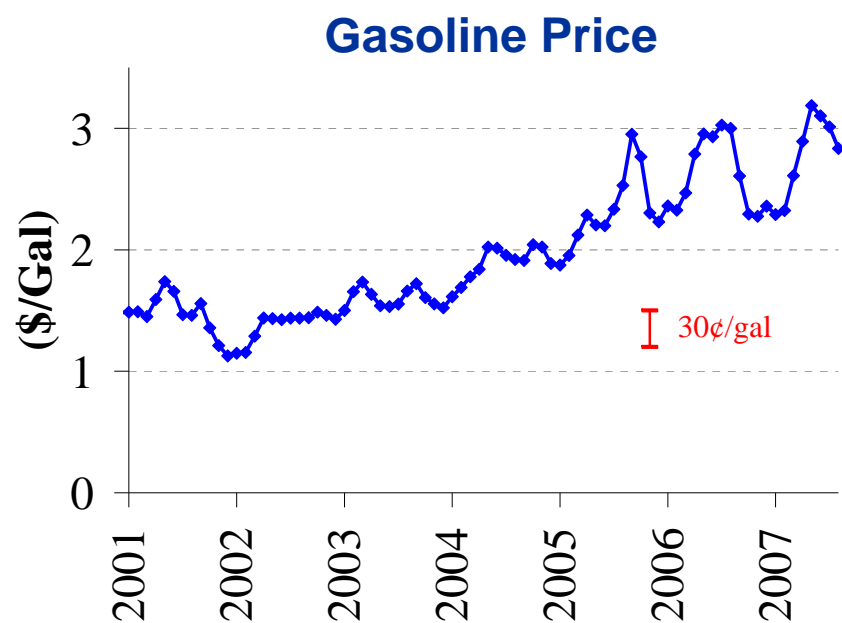
Large free allocations are unnecessary

- Windfall to deregulated producers (as in EU)
- Prevents demand response by holding price down
 - ▶ Better to allow price to rise, compensate consumers directly

Transport Sector is Insensitive to CO₂ Price

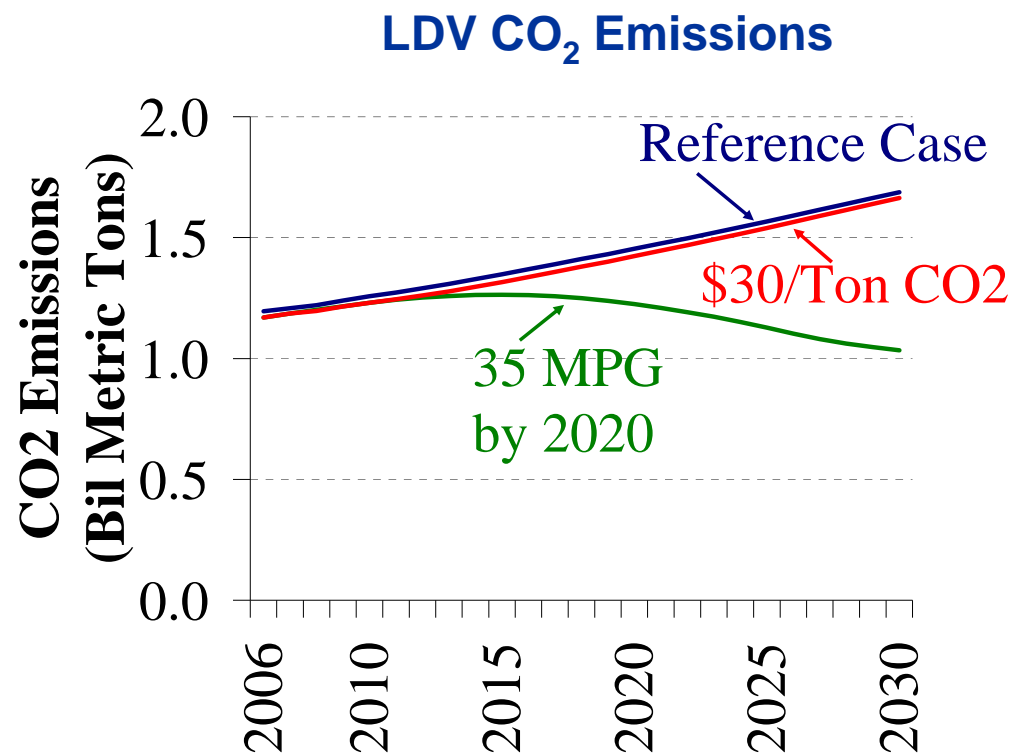
Even \$30/t CO₂ increases gasoline price only modestly

- Adds ~30¢/gallon (+10%)



But Mileage Standards Cut CO₂ Substantially

Senate energy bill: 35 mpg by 2020



- Biofuels may also play an important role

Getting to a Low-Carbon Economy

Energy infrastructure is long-lived

- Need predictable, well-understood long-term policy

Power sector – put a price on CO₂

- \$30/ton and more, with confidence and within planning horizon

Transport sector – efficiency standards

- CO₂ price will be too little, too late

R&D support is crucial (though by itself insufficient)

Cap & Trade, or a Carbon Tax?

CO₂ price drives investment and behavior

- Long-run certainty and stability in CO₂ price encourage rational investment
 - ▶ Minimizes overall costs and disruption
- Tax easily phased in to facilitate smooth transition

Tax has other advantages

- Less susceptible to political manipulation
 - ▶ Avoids windfalls, other problems of free allocations
- Revenue stream to cut CO₂, compensate consumers
- Carbon tax does not have most “tax” problems

Policy Proposal

Increasing carbon tax (or modified cap-and-trade)

- E.g., start at \$10/ton, increase \$2 each year
- Phases in gradually: long-term CO₂ price known
 - ▶ Time to react; clarity on what to react to
- Other features:
 - ▶ Economy-wide
 - ▶ Limited transitional protections
 - ▶ Revenue neutral – return balance to consumers

Transport sector efficiency (and biofuels?)

- Don't wait for reductions induced by CO₂ price
- Possibly electrification, if power de-carbonized