Architecture and Policy of Cap and Trade: The Basic Elements

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What is cap-and-trade?

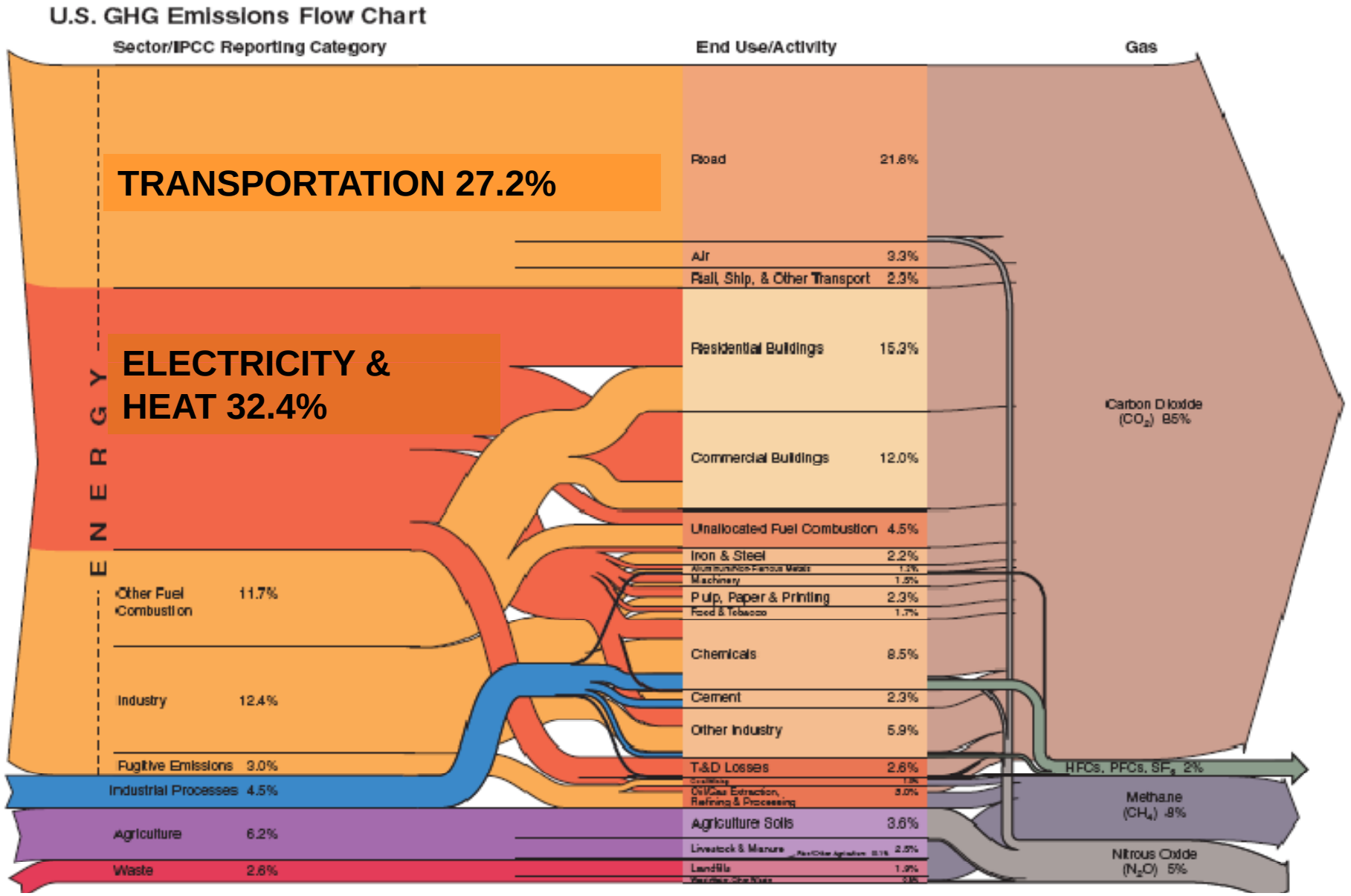
- Set a fixed limit on OVERALL emissions, not each single source, declining over time.
- Create a new kind of currency (tradable allowances) for quantities of emissions.
  - "Carbon credits are just another form of money"
- Require emitters (or consumers) to retire allowances to match "their" emissions in each time period.
- Sell or give out allowances
- Permit trades in an allowance market
- Examples: US Acid Rain and NOx programs
- Warning: We are learning that GHG reduction is DIFFERENT than earlier cap/trade efforts.

GHG Cap and Trade Architecture:

"This is not your father's cap and trade"

1. **Cap coverage** - what's included?
2. **Cap basics:** base year, level & rate of decline
3. **Point of regulation**: Upstream to downstream
4. **Allowance distribution**: Auction or allocation?
5. **Allocation choices**: emitters, consumers, impacted communities, set-asides, etc.
6. **Leakage control:** How to ensure cap integrity?
7. **Flexibility mechanisms**: Offsets, Banking and Borrowing
8. **Cost management strategies**: circuit breakers, efficiency programs, technology development
9. **Trading rules:** who can trade with whom for what?
10. **Complementary policies**: what else is needed?

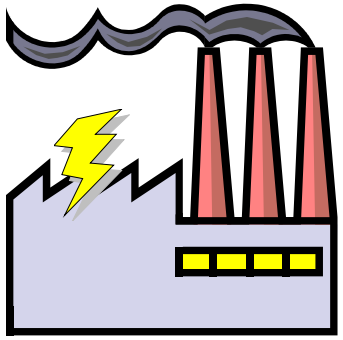
1. C&T Scope: Which Sectors are in? Which gasses?



WRI: **Sources & Notes:** Emissions data comes from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003,* U.S. EPA (using the CRF document). Allocations from "Electricity & Heat" and "Industry" to end uses are WRI estimates based on energy use data from the International Energy Agency (IEA, 2005). All data is for 2003. All calculations are based on CO2 equivalents, using 100-year global warming potentials from the IPCC (1996), based on total U.S. emissions of 6,978 MtCO2 equivalent. Emissions from fuels in international bunkers are included under Transportation. Emissions from solvents are included under Industrial Processes. Emissions and sinks from land use change and forestry (LUCF), which account for a sink of 821.6 MtCO2 equivalent, and flows less than 0.1 percent of total emissions are not shown For detailed descriptions of sector and end use/activity definitions, see *Navigating the Numbers: Greenhouse Gas Data and International Climate Policy* (WRI, 2005).

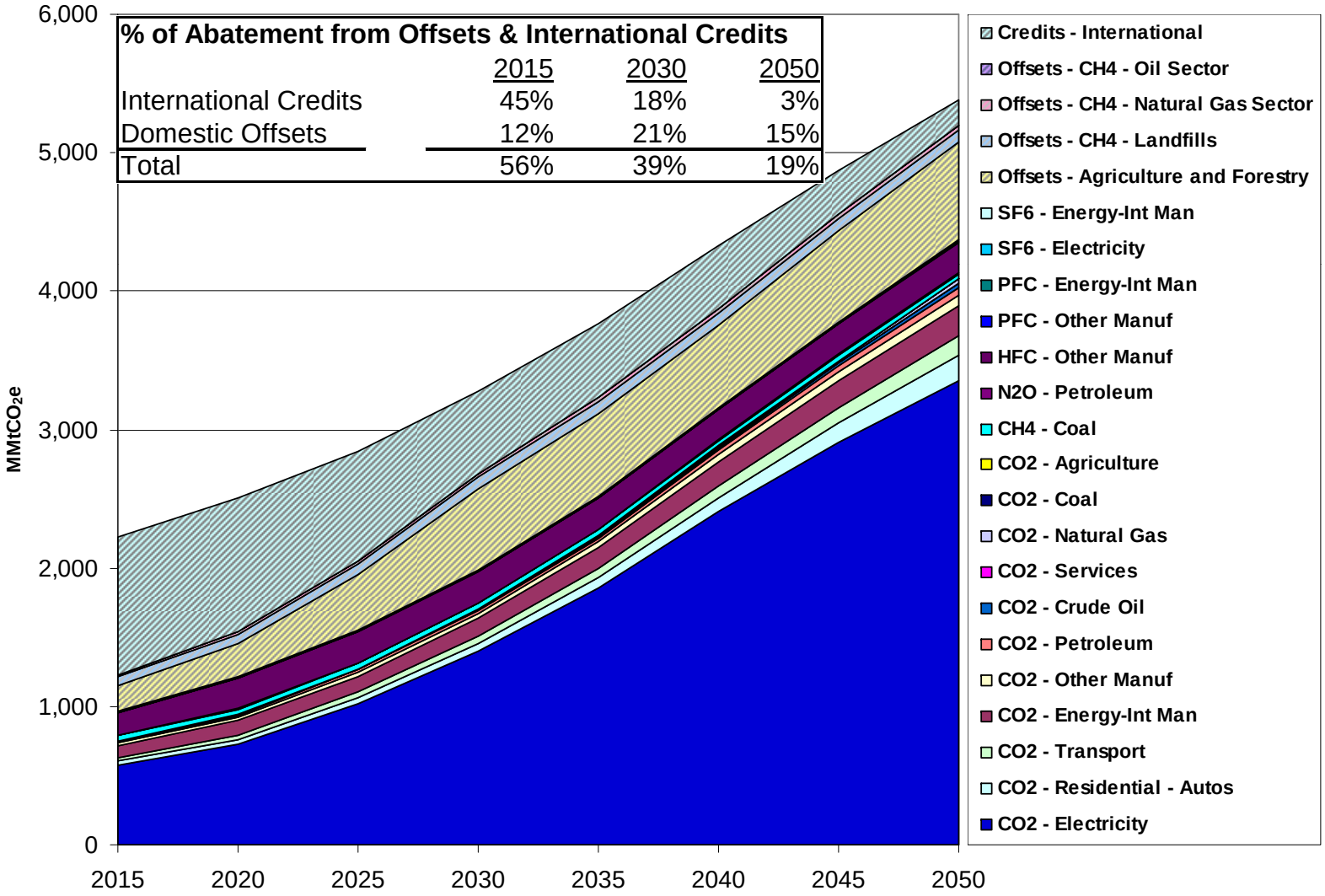
300 power plants emit the CO2 of ~200 million vehicles

More Than 1/3	About 1/3	Less Than 1/3
3,000 Power Plants	**200 million** Cars & Trucks	**2 Billion** Other Sources
15% from 20 plants **50% from 100 plants** **90% from 300 plants**	**Most vehicles made by 7 manufacturers**	



Power sector bears a lot of the burden

Sources of GHG Abatement
(ADAGE model--S. 280 Senate Scenario US EPA11-07)

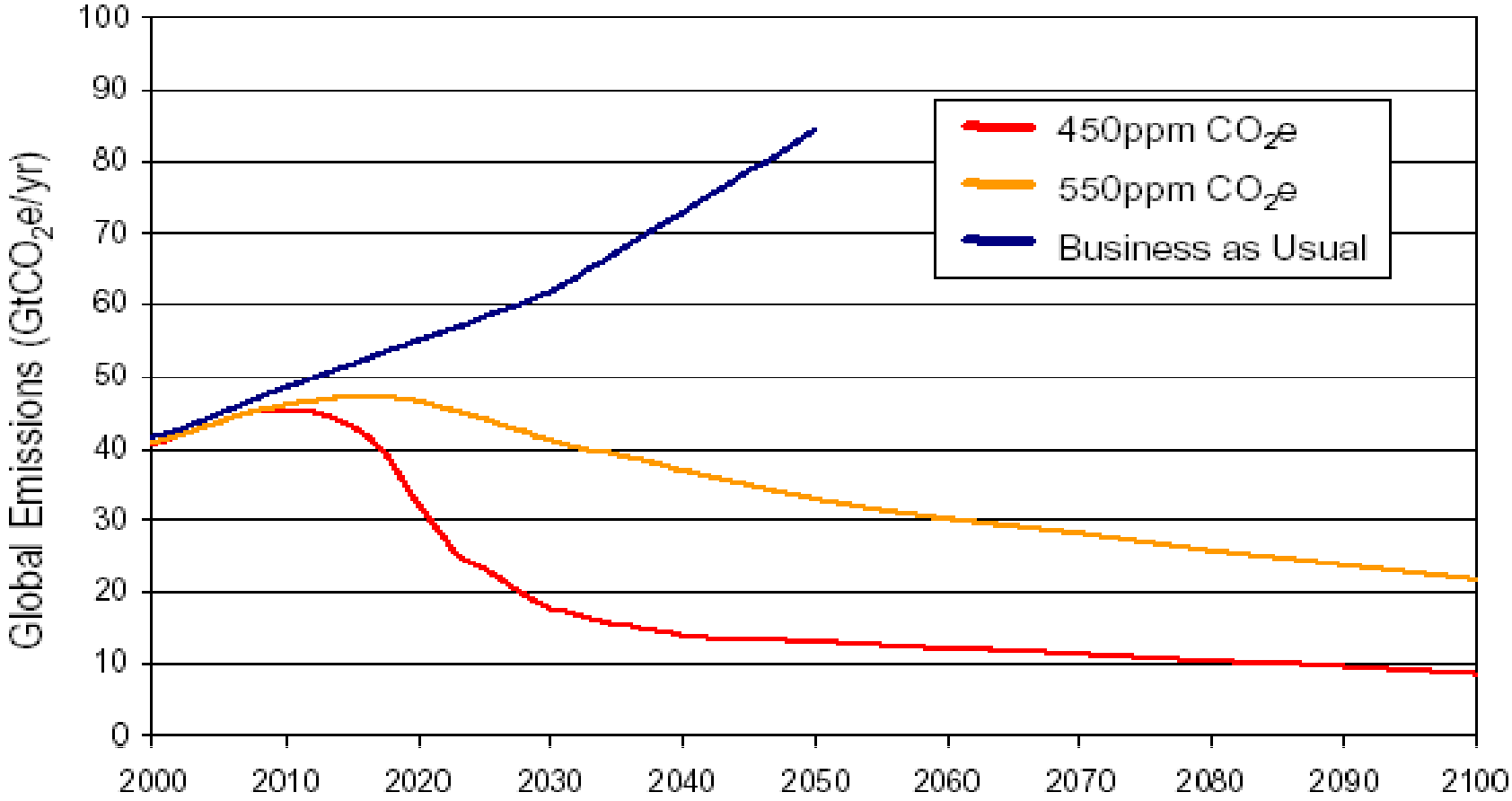


- S. 280 allows offsets and international credits to make up 30% of the total allowance submissions requirement.
- The quantity of offsets allowed decreases as allowance submissions decrease.
- Since the quantity of offsets allowed is decreasing over time and the quantity of abatement is increasing over time, offsets make up a large fraction of abatement in the early years of the policy, and there contribution to total abatement decreases over time.

2. Cap Numbers

- **Baseline period**: 1990? Today? Yesterday? Projected Business-as-usual (BAU) path?
- **Reductions:** How deep and for how long?
  - Technology-forcing requires a long-term program
- **Does the slope change over time?**
  - Slow now means big reductions later
- **Gradual curve or step-wise cliffs?**
  - *A ramp is better than a cliff, esp for carbon*

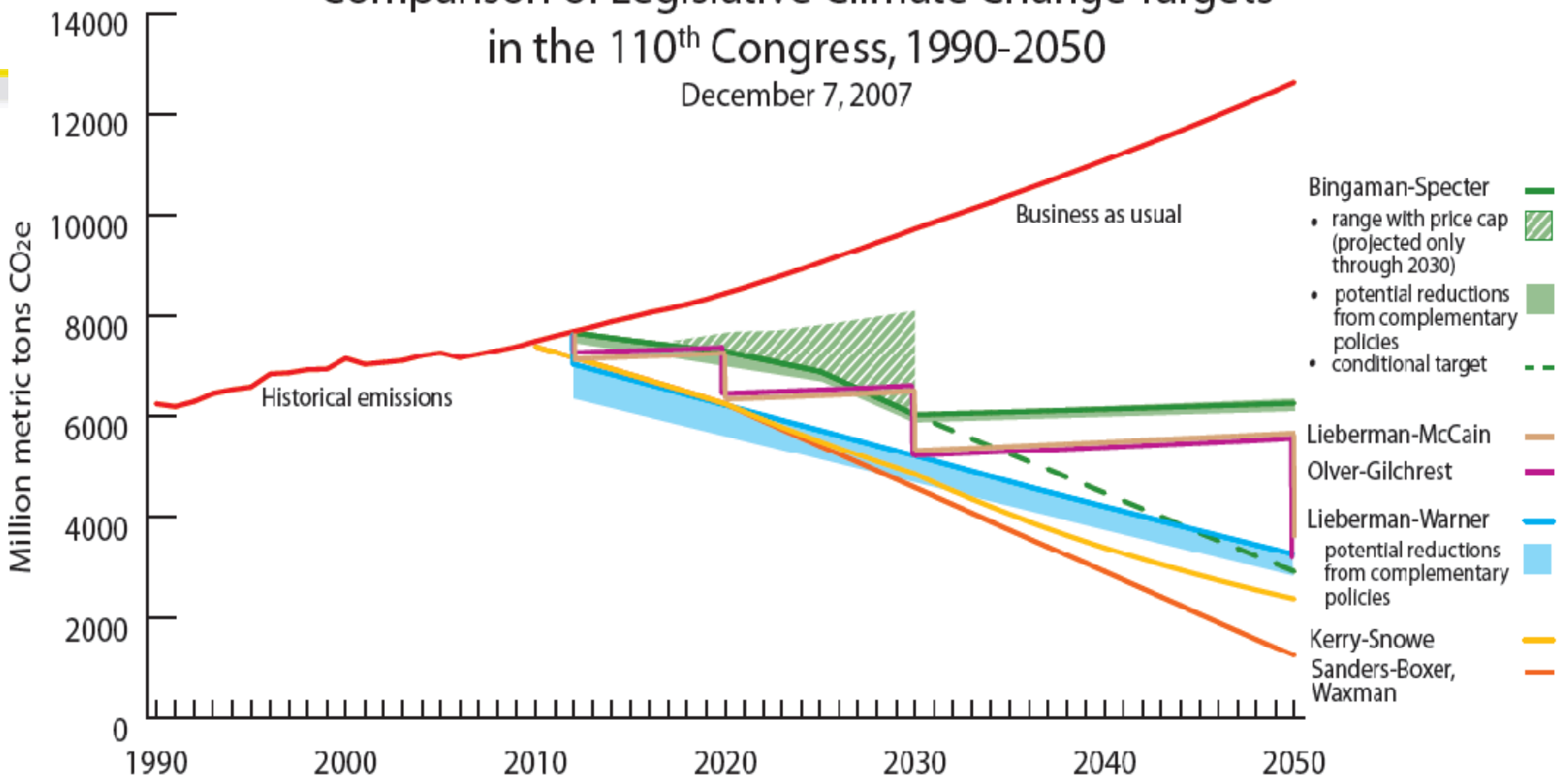
We have a long way to go – Stern Review of climate science



Source: Stern Review (UK) October 2006

Comparison of Legislative Climate Change Targets in the 110th Congress, 1990-2050

December 7, 2007



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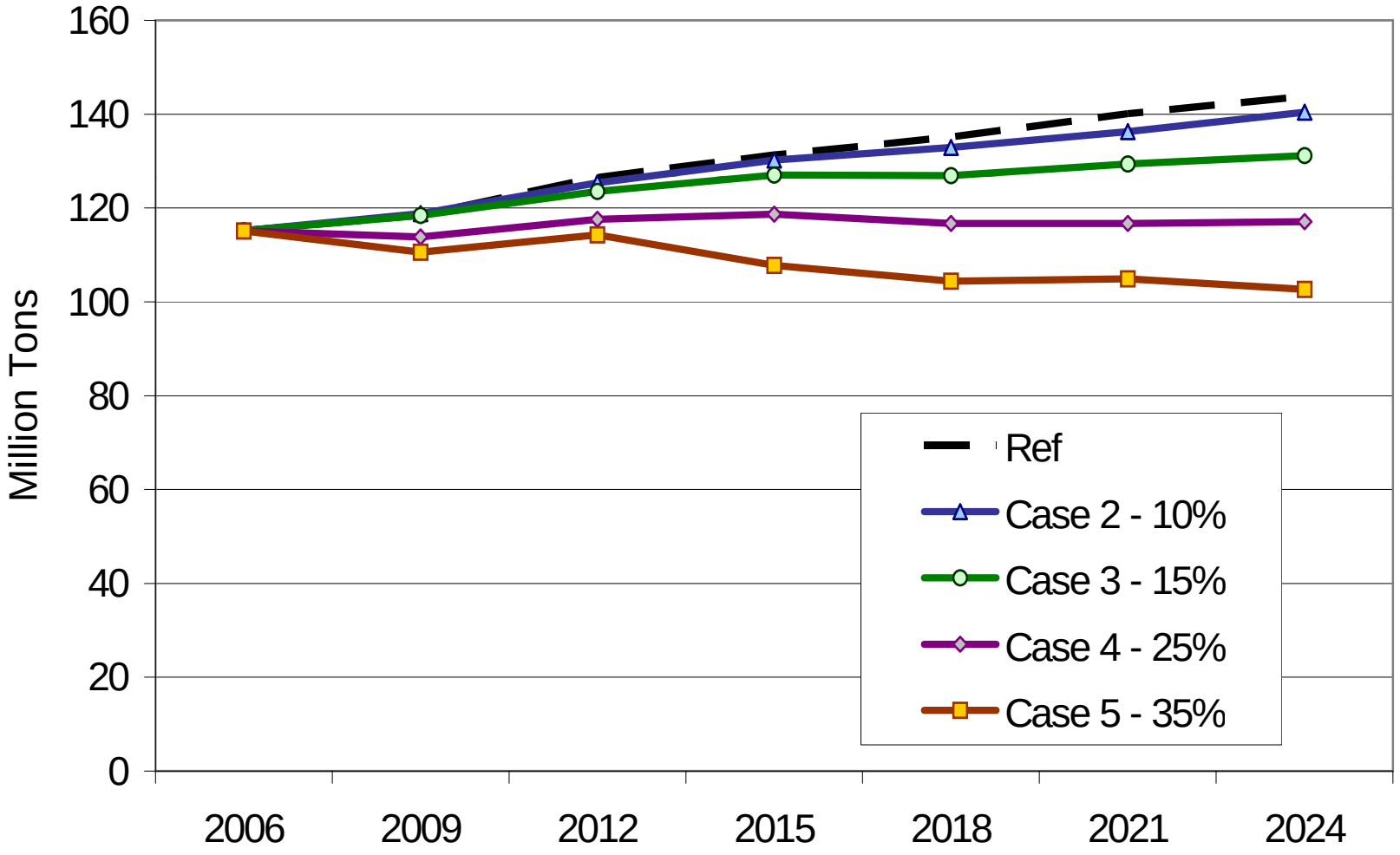
For a full discussion of underlying methodology, assumptions and references, please see http://www.wri.org/usclimatetargets. WRI does not endorse any of these bills. This analysis is intended to fairly and accurately compare explicit carbon caps in Congressional climate proposals and uses underlying data that may differ from other analyses. Data post-2030 may be derived from extrapolation of EIA projections.

Scenarios RGGI modeled



3. The Point of Regulation

- **"Point of Regulation"** -- the point in the chain of commerce where emissions are counted and credits must be retired
- E.g. "Upstream" at wellheads vs. "downstream" at gas stations or vehicles
- The points of regulation may be different across different sectors
- Point of regulation NEED NOT be the same as the point of combustion or emission
- Point of regulation NEED NOT be the same as the point of allocation of allowances

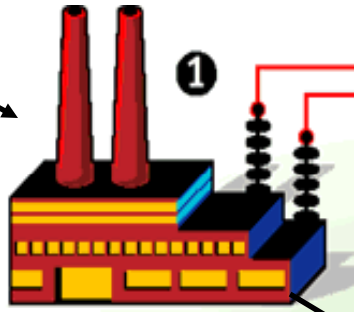
What is the best point of regulation? Choices for the power sector

"Upstream" at mines, wellheads

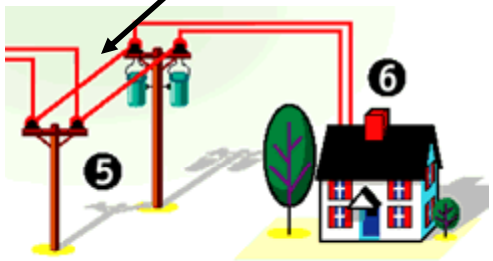
Mid-stream at generation

Midstream at load-serving entities

Downstream at customer locations



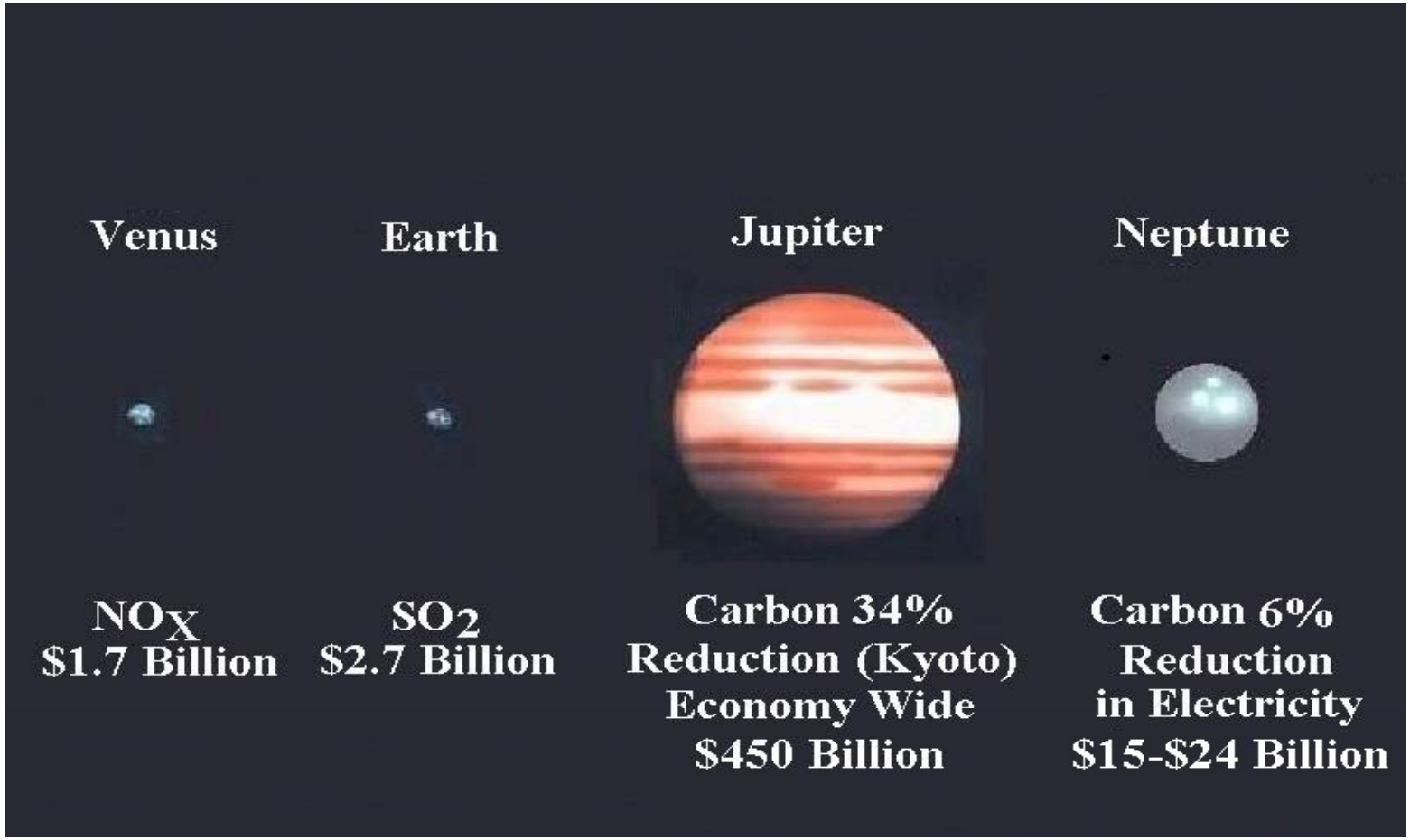
Load-serving entity/ Portfolio manager



4-5 Allocation Choices

- ***Free Allocation***, ***Auction***, or both?
- If allocation, to whom? To covered sources, or to others (such as states, consumer trustees, etc) ?
- Many thorny allocation questions arise
- Auction proponents: polluter should pay
- Grandfathering proponents: free allocation lowers costs to affected firms.
- However: it’s even more complicated than that!

Carbon reduction (and trading) will be big business



6. Dealing with leakage

- Leakage: additional emissions outside the capped system (therefore not counted)
- Effects:
  - Erosion of program goal
  - Competitive advantage to “foreign” sources
  - Unofficial safety valve on price impacts
- Can be direct (imported electricity) or more subtle (imported furniture)

7. Flexibility mechanisms

- Banking – saving allowances you don't need now, for future use
- Borrowing – emitting too much now, promising to pay back later
- Offsets – causing reductions outside the capped system
  - E.g.,Controlling landfill methane
  - Trees in China?
  - Problem: "anyway tons" and "hot air" reductions

Program Flexibility
(AEP's recommendations)

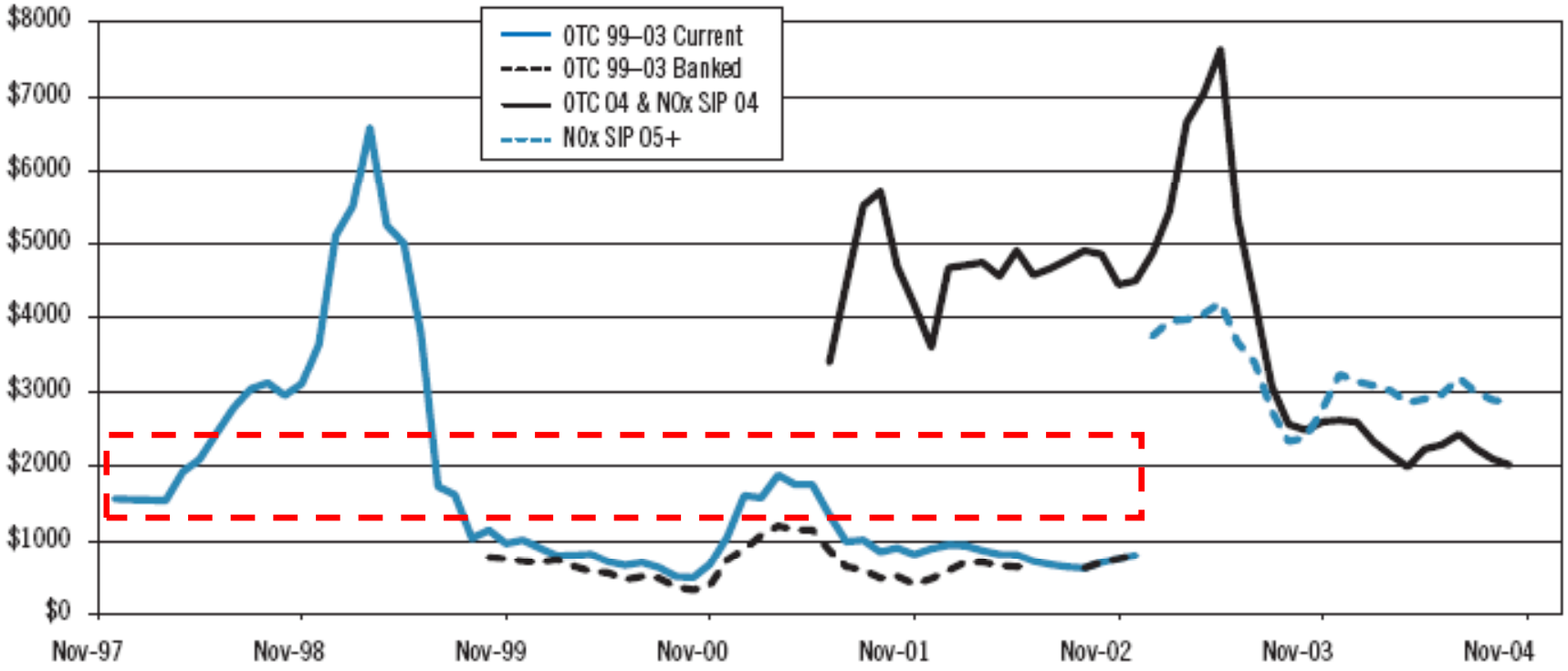
- **Unrestricted Emissions Trading**
- **Unrestricted Emissions Banking**
- **All Greenhouse Gases Count**
  - Not just CO_2—Methane and N_2O and other non-CO_2 GHGs are 20% of total US GHGs and often cheaper to control
- **All Real and Verifiable Offsets Should Count (e.g. Forestry, Methane from landfills, agriculture)**
  - Many options cost less than \$10/ton CO_2 equivalent reduced vs. Utility Reductions generally \$10-50/ton
- **Credit for Early Action**

8. Cost containment strategies

- Two ways to contain program costs:
  - Relax the program
  - Structure program to reduce compliance costs
- ***Trading***, ***banking***, ***multi-year compliance periods***, ***offsets*** are all cost-control mechanisms
- **"Circuit breaker"** tools also proposed to control costs
- **End-use efficiency** is a cost-containment strategy – how to promote this in cap/trade?

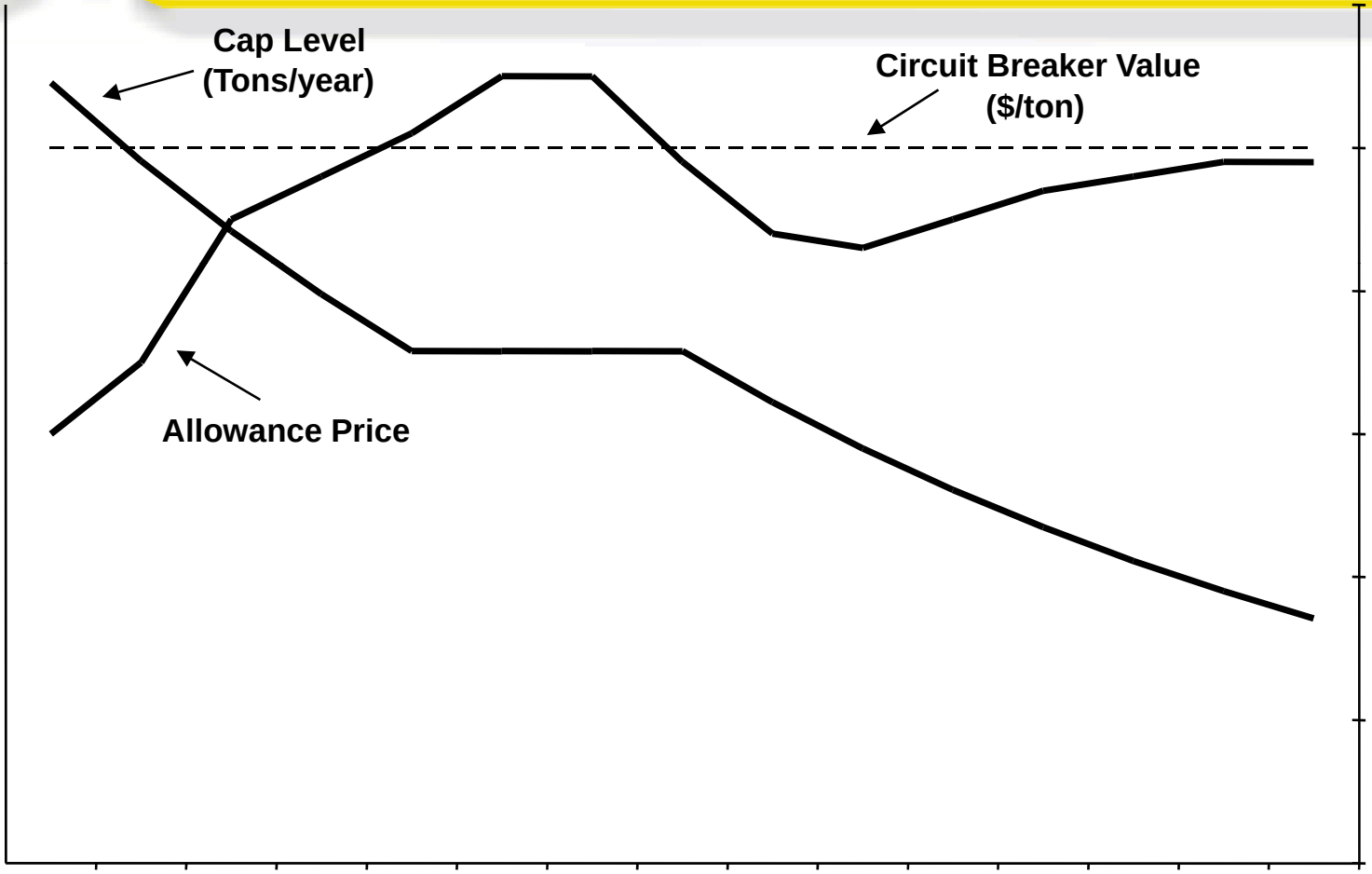
Letting the market work: NOx allowance price history

Figure 6. Market Prices, OTC NO_x Budget Program (nominal dollars)



Source: Argus Air Daily. For more information contact: airdaily@argusmediagroup.com. Further use of this data is prohibited without prior written consent.

Circuit Breaker can suspend pace of cap declines



9. Trading Rules and Trading Limits

- Who can trade for your carbon currency?
- As in any currency, “bad money drives out good”
- Needed: Common rules on offsets, M&V, similar reduction curves
- What about hoarding?
  - Use it or lose it rules? Or “retire them if you want..”?
- Rules to control market manipulation?

10. Complementary policies

- Increasingly understood to be critical to emission reductions
  - E.g., Smart growth, VMT reductions, end-use energy efficiency programs
- Where "complementary" policies are crucial to cap-and-trade success, they can be hard-wired into the C&T system
  - E.g., "efficiency allocation" of carbon credits; credits for RPS, advanced energy technology

The Regulatory Assistance Project

RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP is funded by US DOE & EPA, several foundations, and international agencies. We have worked in 40+ states and 16 nations.

Richard Cowart was Chair of the Vermont PSB, Chair of NARUC's Energy & Environment Committee, and of the National Council on Electricity Policy. Recent assignments include technical assistance to RGGI, the New York ISO, the California PUC, the Oregon Carbon Allocation Task Force, the Western Climate Initiative and to China's national energy and environmental agencies.