BROOKINGS | QUALITY. INDEPENDENCE. IMPACT.

Offsets: Trading and Tradeoffs

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February 1, 2011

What is an Offset?

- Set up a project or adopt a policy in a sector.
  - » Abroad
  - » Domestic
- Establish a baseline of projected emissions without project – it's counterfactual.
- Determine emissions reductions relative to baseline.
- Convert reductions to credits.
- Sell the credits.

Environmentally reliable offsets are:

- Real ---- reflect actual emission reductions/removals
- Additional ---- beyond what otherwise have happened
- Quantifiable ---- reliably measured or estimated
- Verifiable ---- easily monitored and verifiable
- Permanent ---- irreversible or backed up by a guarantee
- Enforceable ---- adopted in full or by reference into regulation

Offsets 1: Voluntary Offsets

- Baseline: Coal-based generation of electricity
- Abate emissions: Set up a wind farm, generate electricity
- Credits equal to emissions abated from forgone coal as a function of kwh generated.
- ***In theory, voluntary offsets benefit the environment and make money for investors.***

Voluntary Offsets

- Rigor depends on certifying organization
- Some entities voluntarily offset emissions.
- More engage in regulatory speculation.
  - » Will a future regulatory system recognize offsets by converting them to allowances?
  - » Regulatory recognition may obviate environmental benefits unless the cap is tighter by the same amount.

The Washington Post

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House Is Abandoning Carbon Neutral Plan

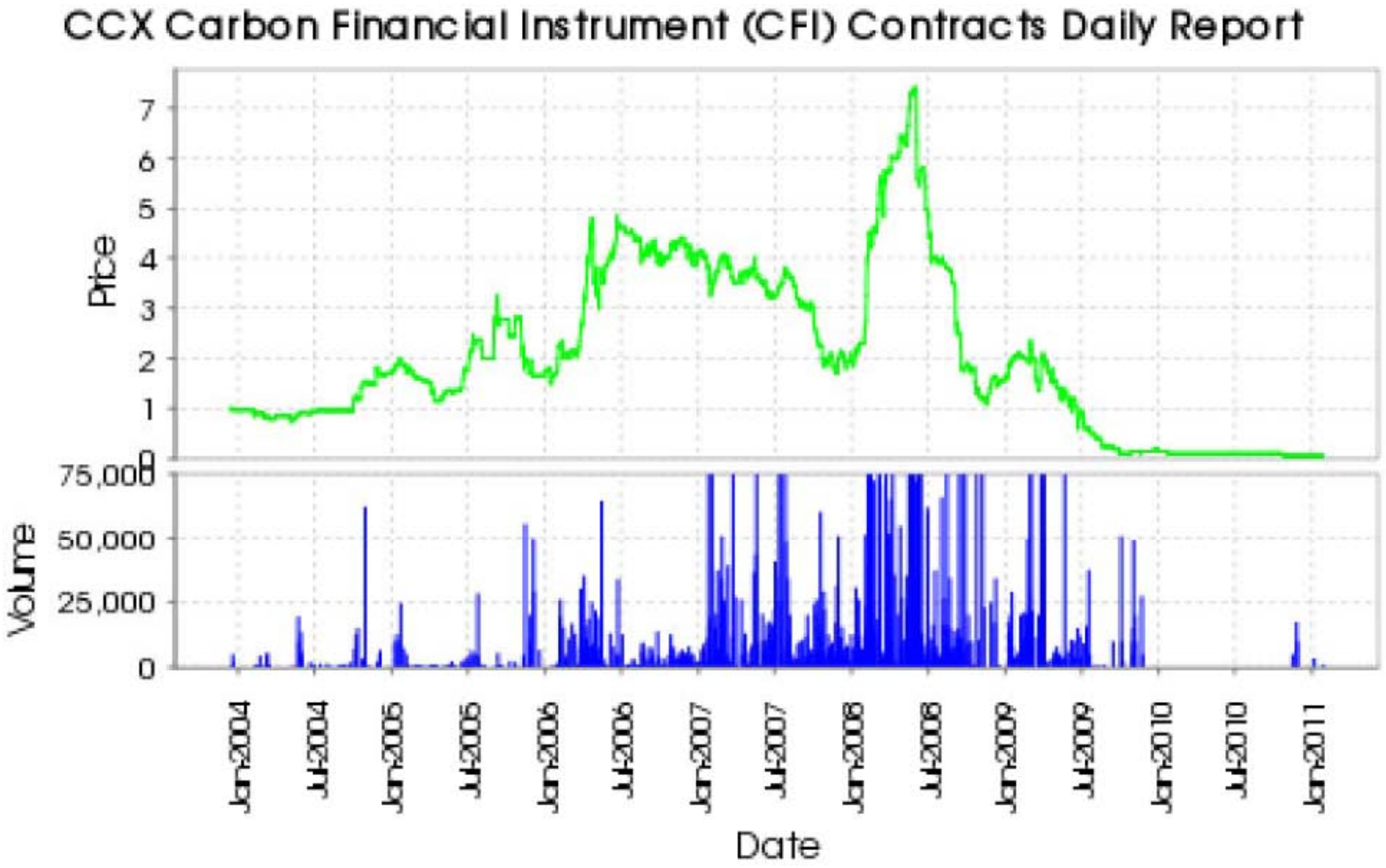
Move Highlights Congress's Green Struggle

By David A. Fahrenthold
Washington Post Staff Writer
Sunday, March 1, 2009

In 2007, the House of Representatives purchased 30,000 MMTCO2 offsets. from the Chicago Climate Exchange.

The Washington Post reported that although the money was funneled to projects that captured greenhouse gases or avoided their emission, many had been completed before the House paid a cent.

Voluntary Carbon Market Price Path



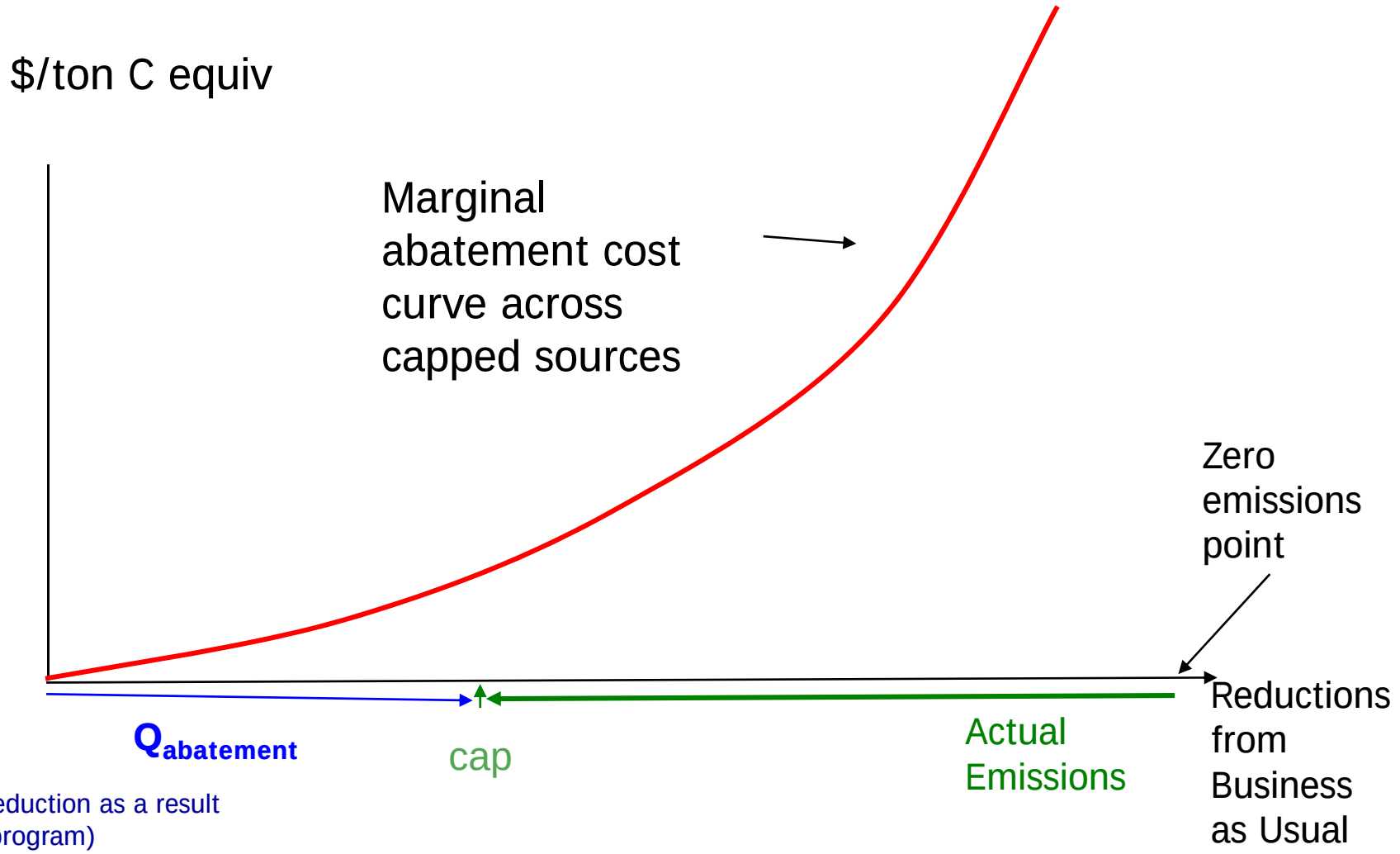
Price and volume reported in metric tons CO_2

Source: Chicago Climate Exchange

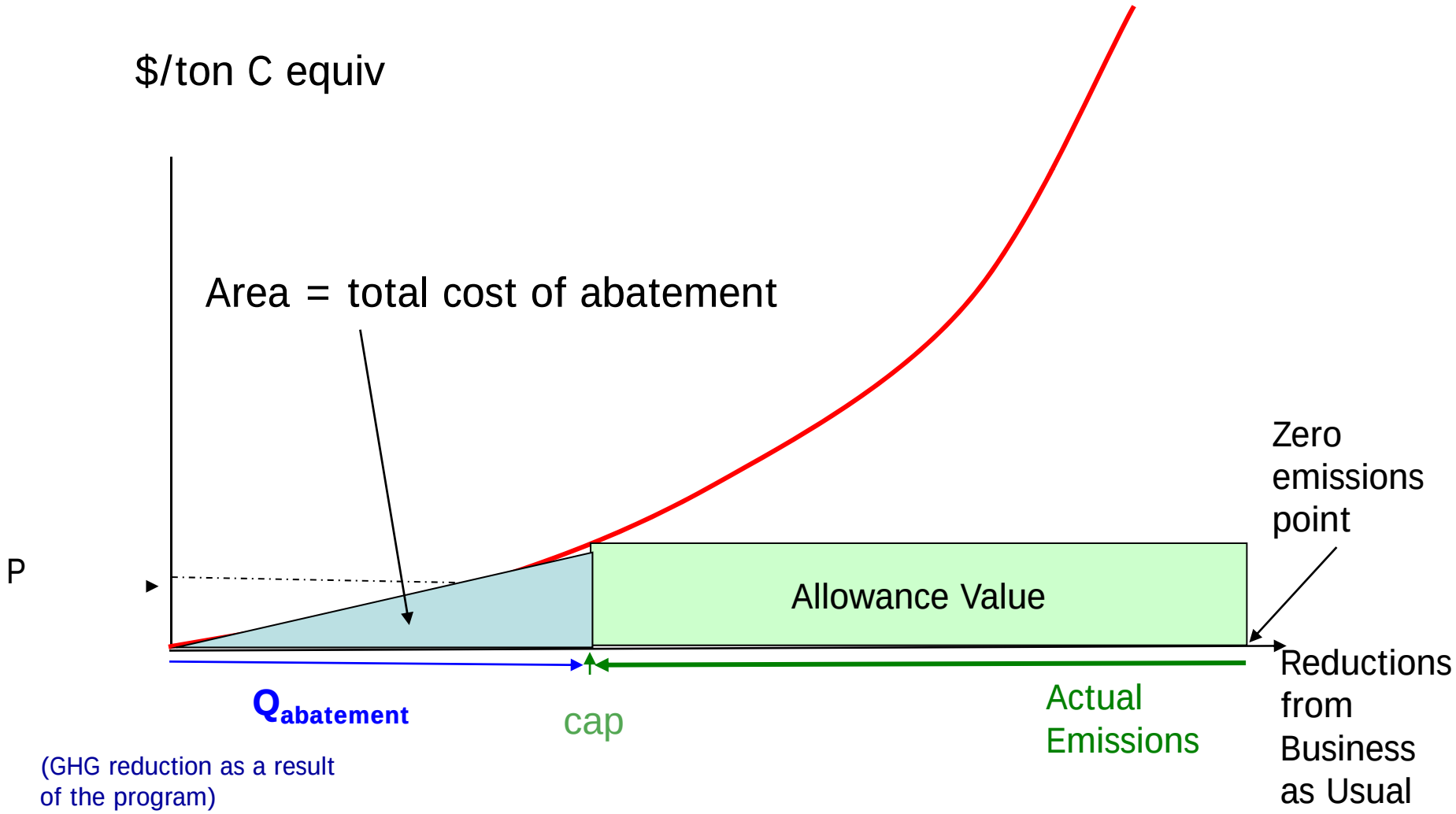
Offsets 2: Cap-and-Trade

- Abate emissions not covered under cap-and-trade program. For example, issue allowances for:
  - » Reduced net emissions from converting cropland to forest (i.e. carbon sink).
  - » Reduced emissions from coal-fired power plants in China
  - » Capture fugitive methane from coal mines and landfills.
- Offset allowances allow greater abatement by capped sectors.
- ***In theory, regulatory offsets lower cost of meeting cap to regulated firms and make money for investors. But there's likely no net climate benefit.***

Abatement Cost of Capped Emissions

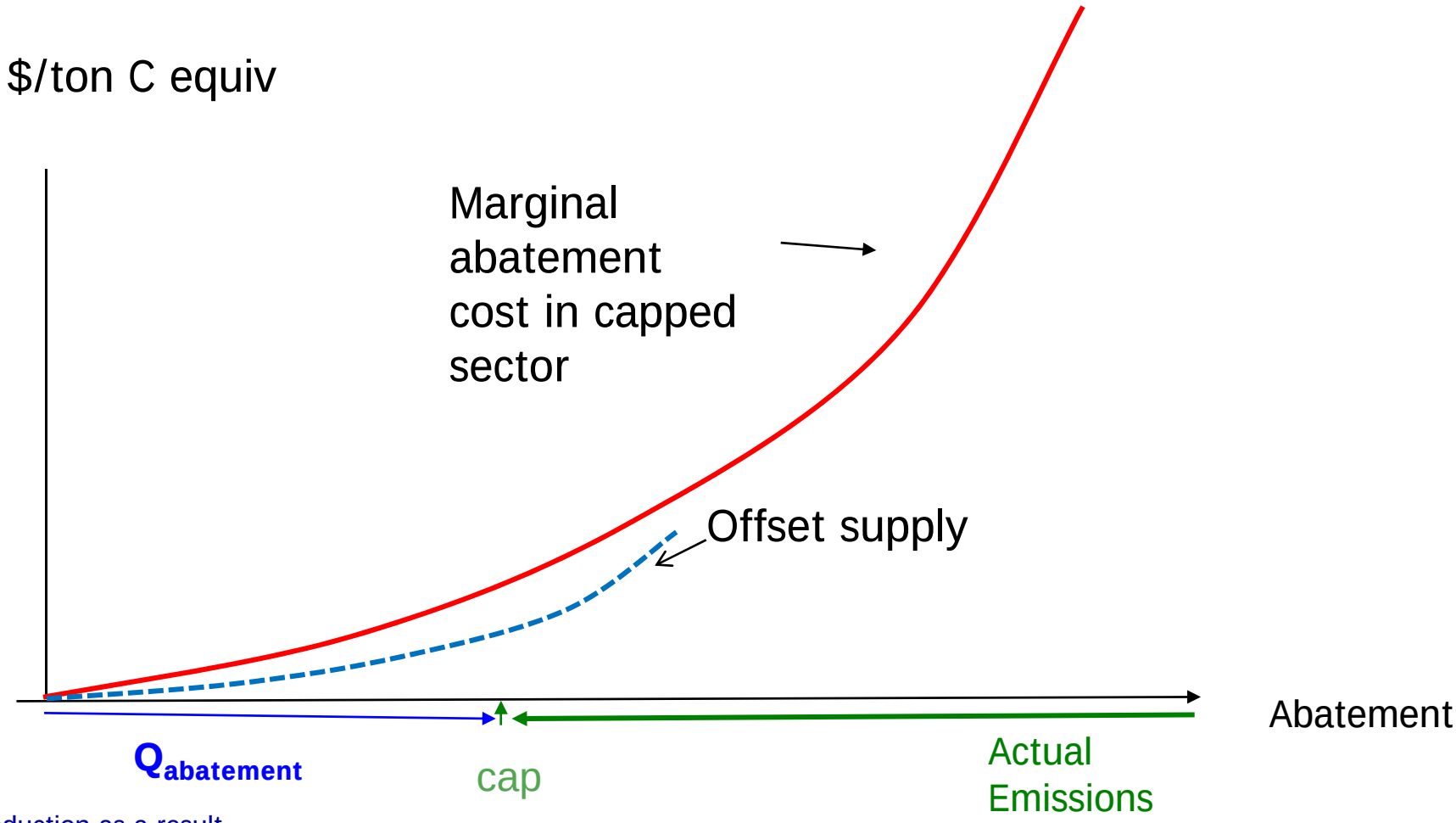


Cap-and-trade Without Offsets



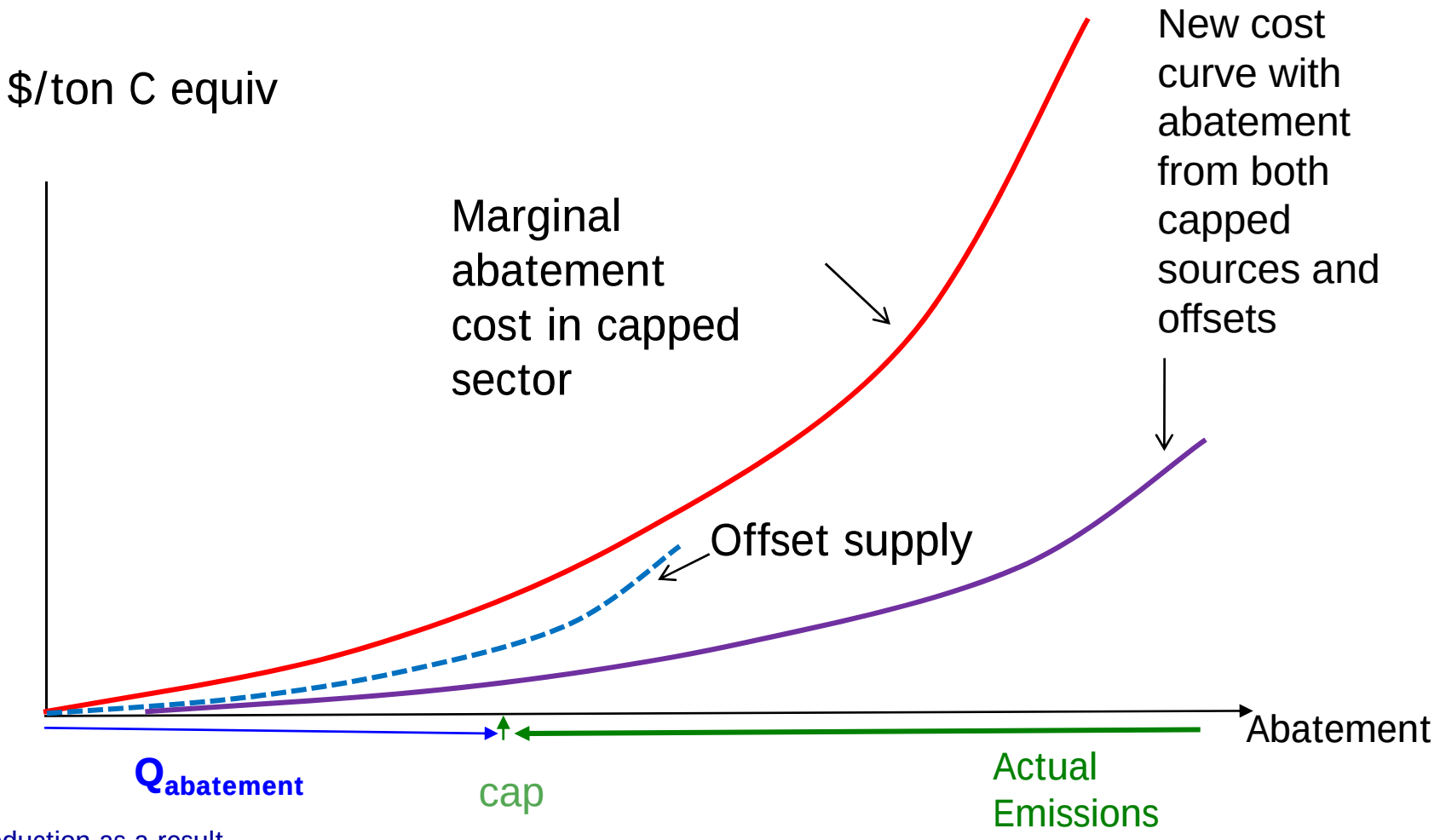
Cap-and-trade With Offsets:

Offsets offer a new supply of abatement.



(GHG reduction as a result of the program)

Cap-and-trade With Offsets



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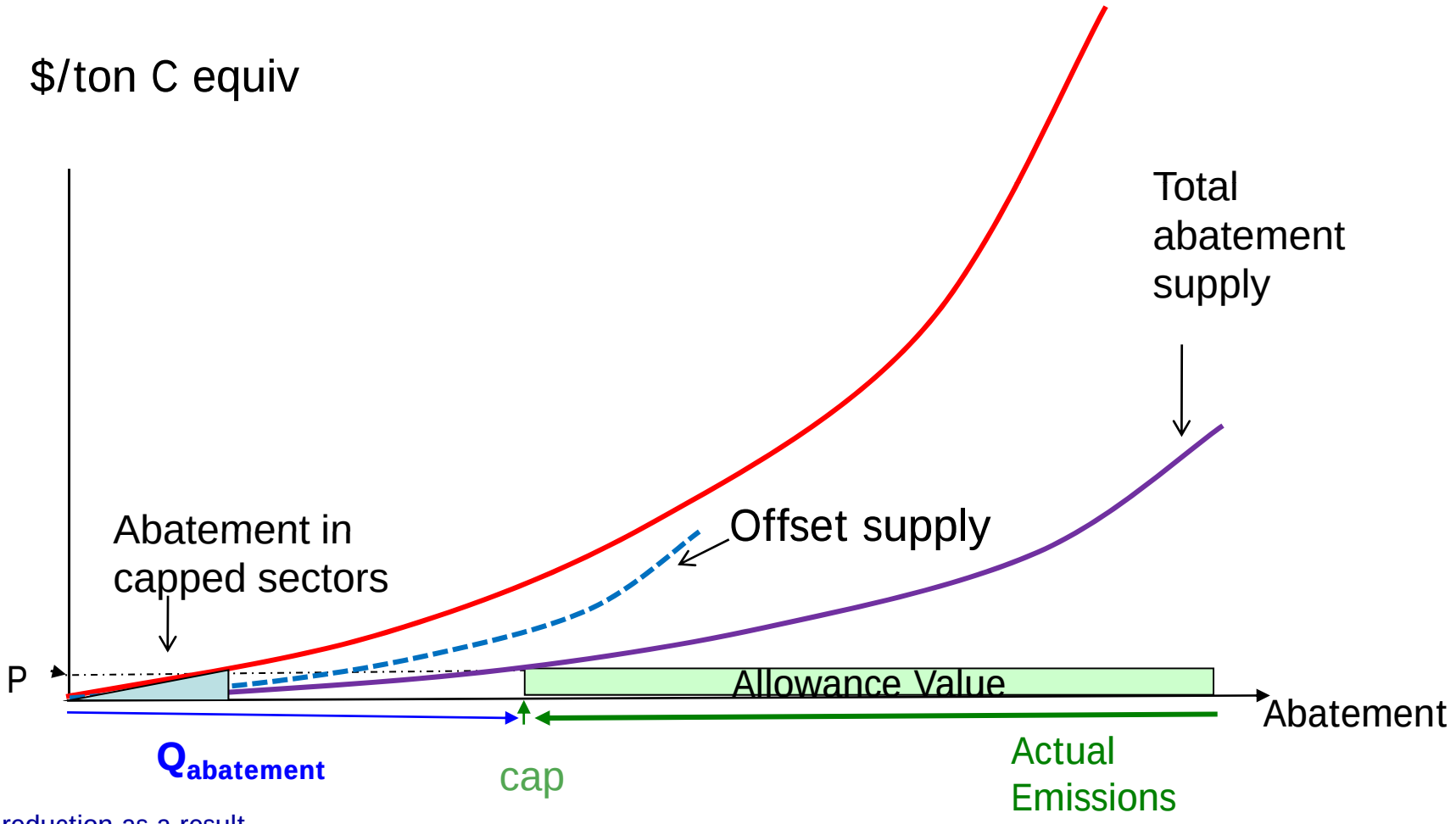

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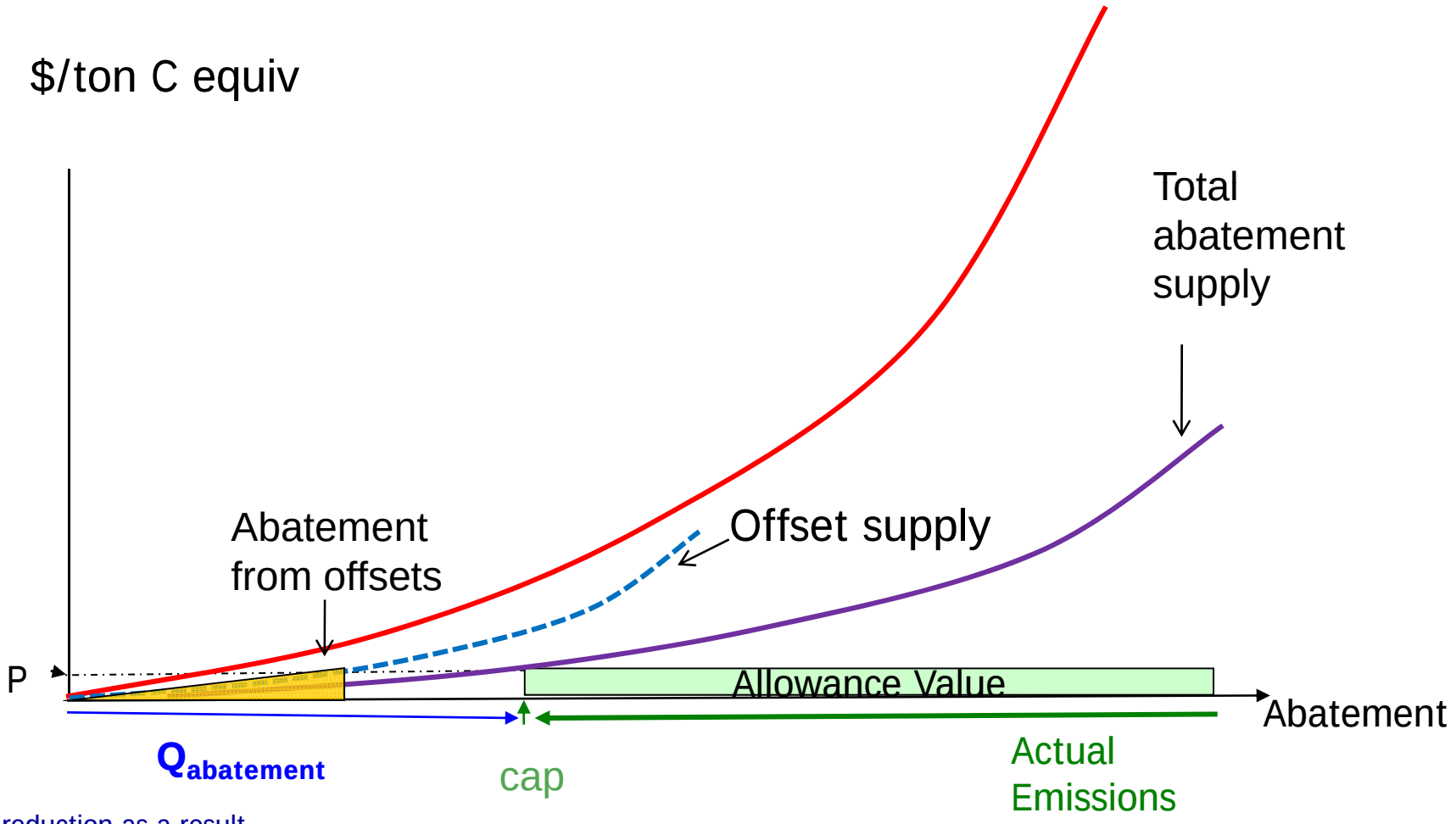

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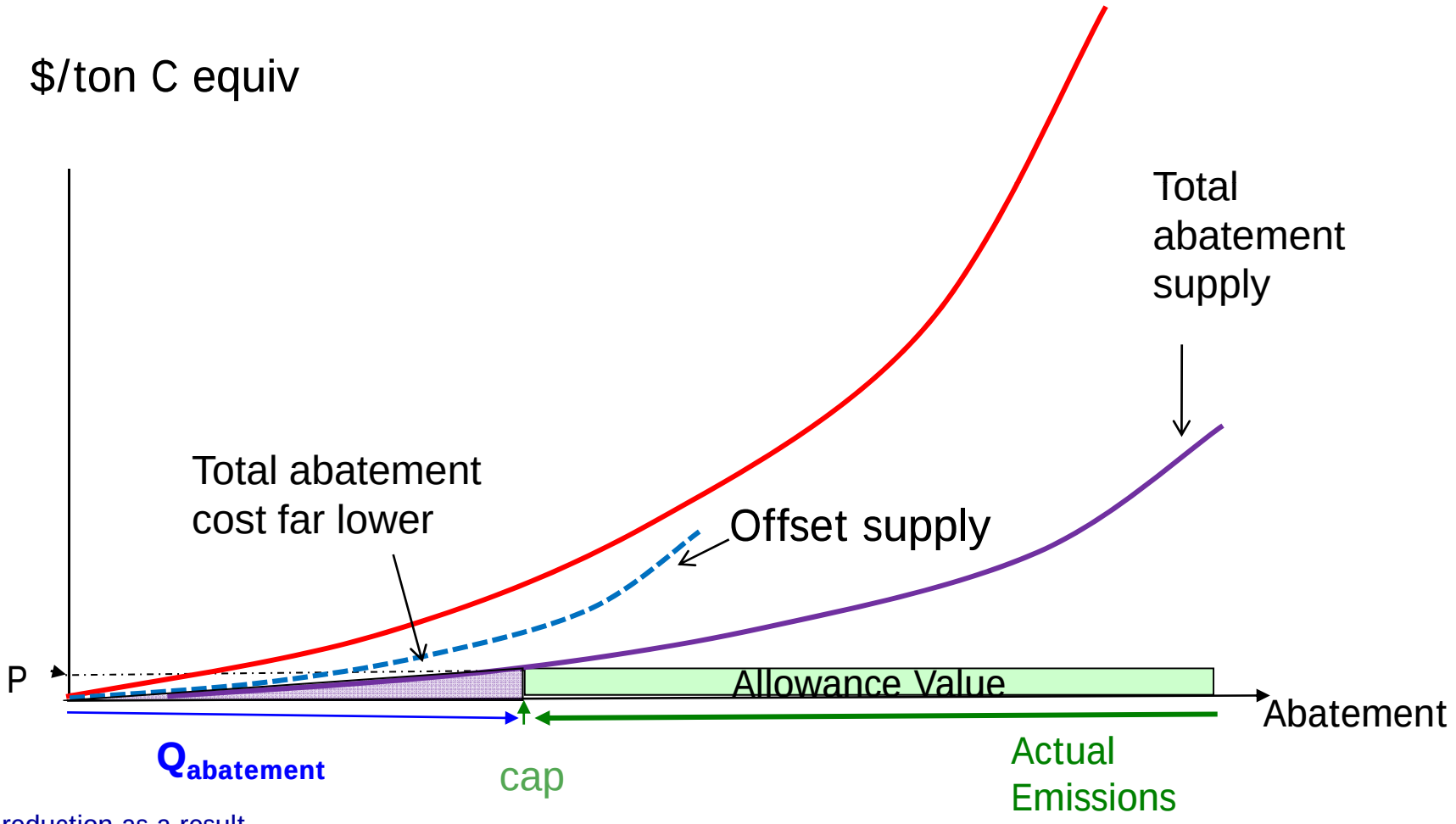

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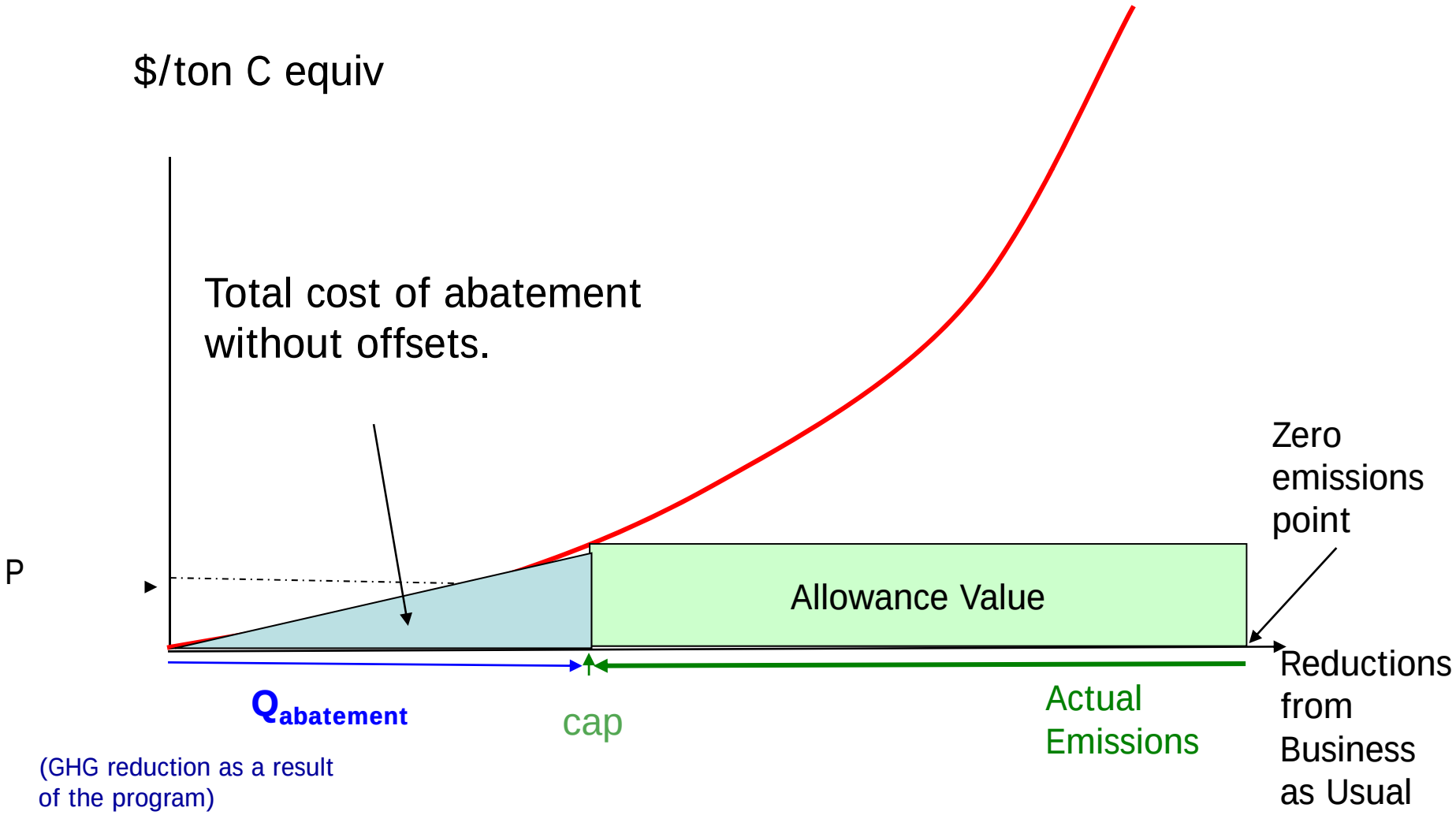
Cap-and-trade Without Offsets



Regulator can:

- Require > 1 ton offsets to cover 1 ton of regulated emissions
- Make additionality rules lax or strong
- Limit how many offsets covered entities can use for compliance
  - » Only specific abatement activities valid
  - » Up to X% of compliance through offsets
  - » Offsets not released unless allowance price > $Y

Source: http://www.rggi.org/docs/RGGI_Offsets_in_Brief.pdf

Example: RGGI

- Regulated power plants may use offsets to satisfy 3.3 % of their compliance obligation.
- Expandable to 5 % and 10 %, if allowance prices reach $7 and $10 per ton, respectively.
- Five eligible offset project categories:

  1) Capture or destroy CH4 from landfills

  2) Reduce SF6 from electricity transmission and distribution equipment

  3) Sequester CO_2 through afforestation

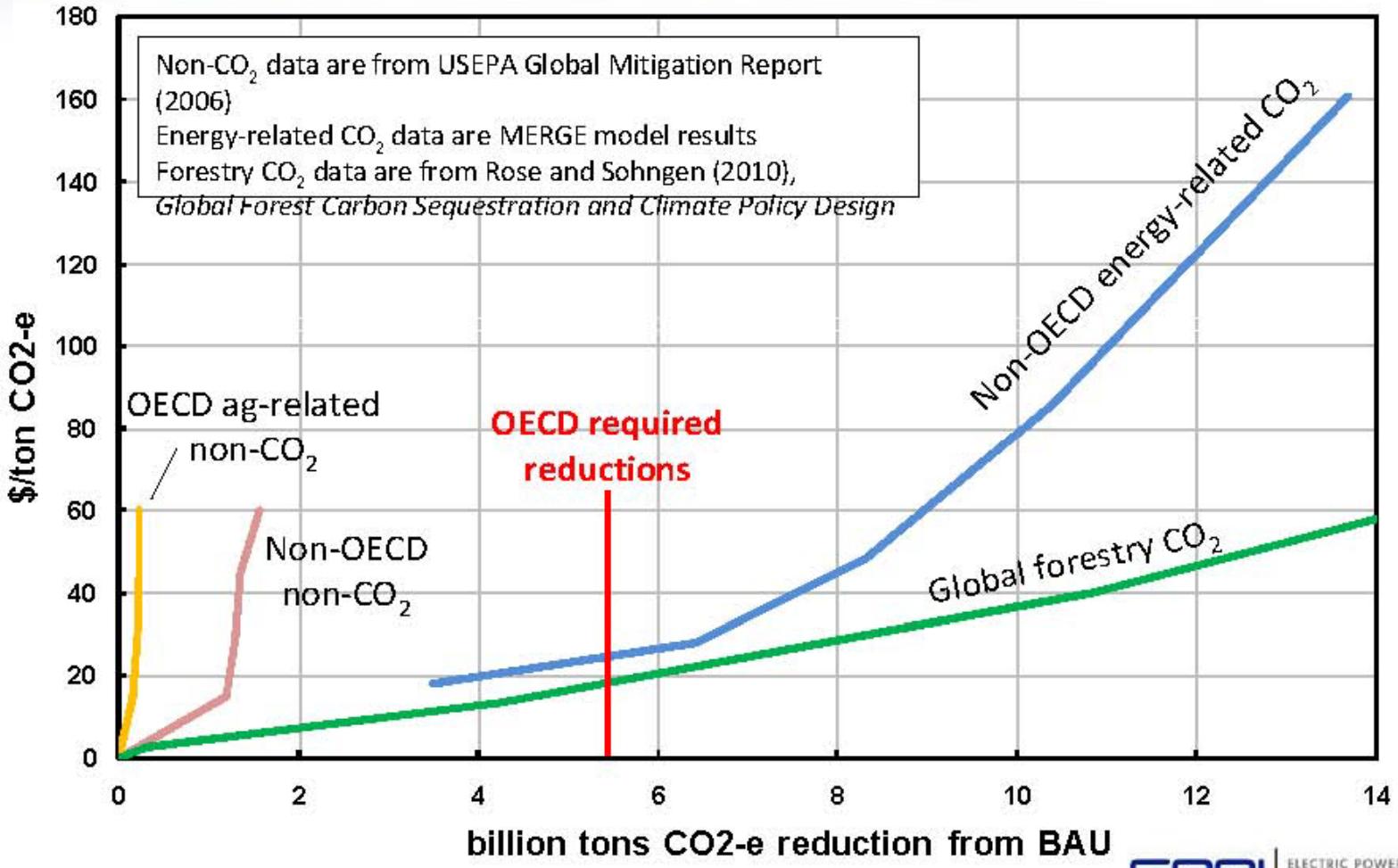
  4) Reduce CO_2 through non-electric end-use energy efficiency in buildings

  5) Avoid CH4 through agricultural manure management

Regulatory Offsets

- Total demand for offsets depends on:
  - Limits on compliance share
  - Price
  - Stringency of the cap and costs of abatement
  - Other flexible mechanisms, such as safety valve
  - Other countries' policies
- Supply depends on rules (like what qualifies) and costs of producing credits.

OECD *Potential* Supply Curves for 2030

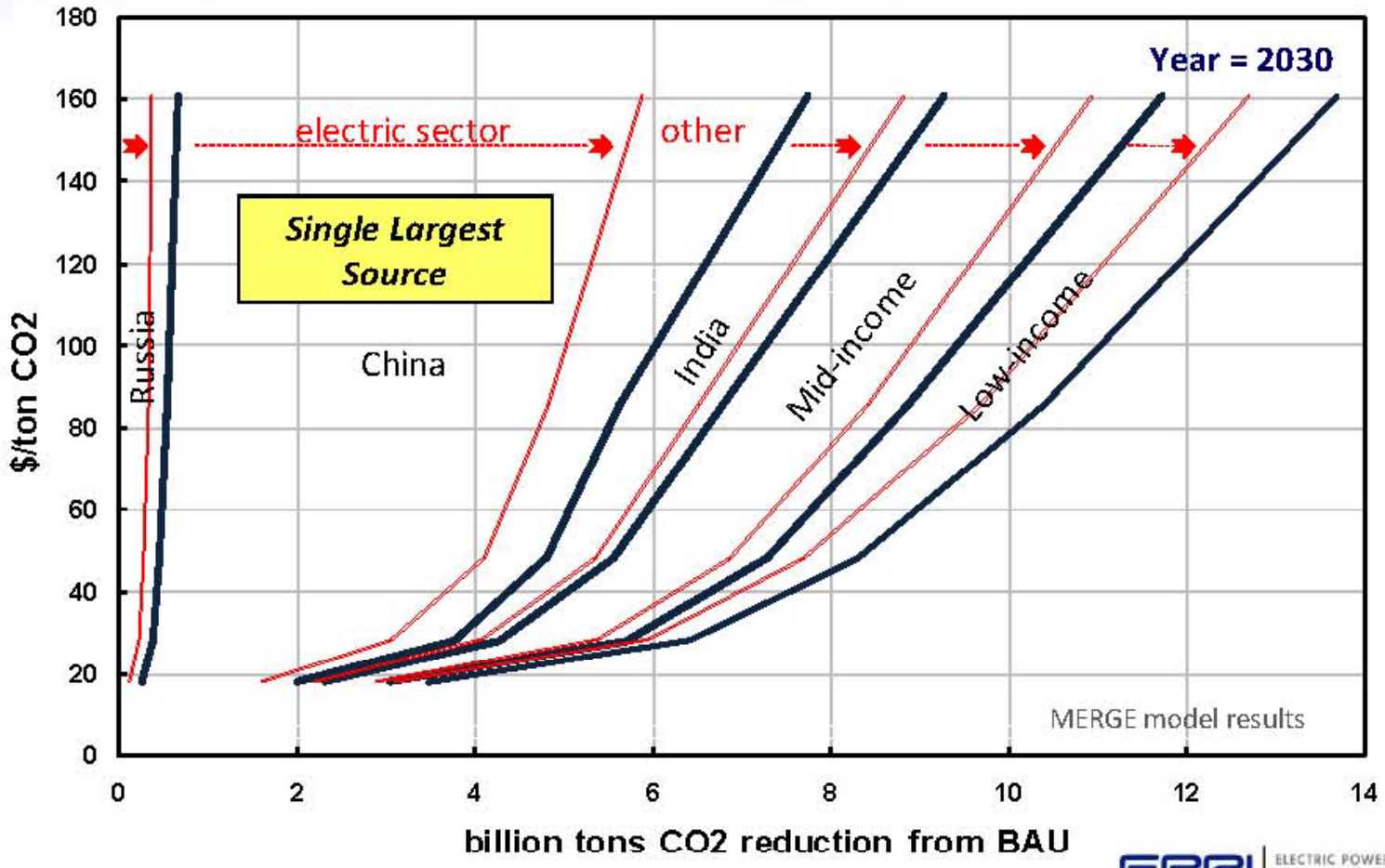


EPRI ELECTRIC POWER RESEARCH INSTITUTE

http://globalclimate.epri.com/doc/Blanford_Energy%20Sector_EPRI%20Offsets%20W7_Final.pdf

Of Energy Sector Emissions Reductions…

70% of abatement occurs in electric sector



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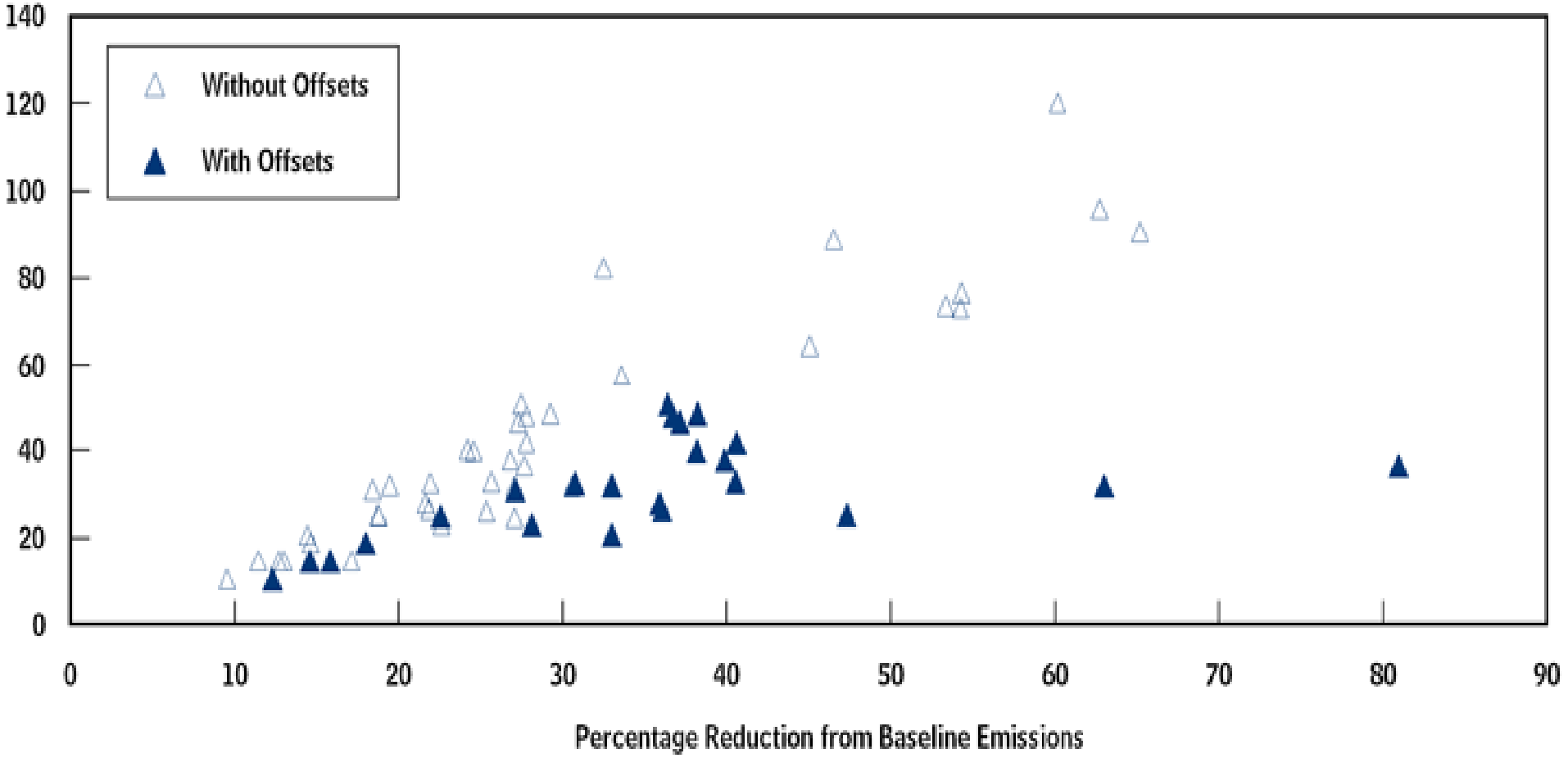
Benefits from Offsets

- Reduces overall cost of achieving cap
- Some activities can provide co-benefits such as habitat or air quality.
- Provides role and income for developing countries
- Cost savings may allow tighter targets

Various Estimates of the Costs of Reducing Greenhouse-Gas Emissions Under Cap-and-Trade Programs: With and Without Offsets

(Allowance price in 2007 dollars per metric ton of CO2e)



Source: Congressional Budget Office based on estimates from the National Commission on Energy Policy, the Environmental Protection Agency, the Energy Information Administration, the Nicholas Institute for Environmental Policy Solutions, and the Massachusetts Institute of Technology. https://www.cbo.gov/ftpdocs/104xx/doc10497/Offsets.1.1.shtml

Challenges for Offsets

- Reliable baselines and additionality
  - » How do you determine what would not otherwise happen?
  - » Extreme pressure to credit abatement activities that were happening anyway.
  - » It's just not fair: Laggards can win. Early actors lose out.
- Leakage
  - » How to account for emissions changes outside project boundary?
  - » E.g. Will forest preservation in Area A shift timber production elsewhere?

Challenges for Offsets

- Perverse Incentives
  - » Will crediting induce emitting behavior to receive payments to stop? Or delay sequestering behavior to be paid to begin?
  - » Raises incentive for sources to stay outside cap
- Tradeoff between close monitoring/conservative baselines and cost
  - » Intrinsic tension between cost-containment and environmental integrity
  - » Possible regulatory capture?

Challenges for Offsets

- Credit for emissions abatement that was subsidized by taxpayers? Is it additional?
- US regulated entities could compete with regulated entities from other countries with tighter targets, e.g. EU.
- Unintended consequences
  - » Fastest carbon stock accumulation could be with monoculture plantations.
  - » Land conservation could raise food prices.

Challenges for Soil and Forest Offsets

- Permanence
  - » Carbon sequestered must STAY sequestered forever or environment is worse off.
  - » Governance challenge
  - » Who bears liability for impermanence?
- Domestic offset activities may not help towards international obligations, in which case offsets make treaty compliance harder.

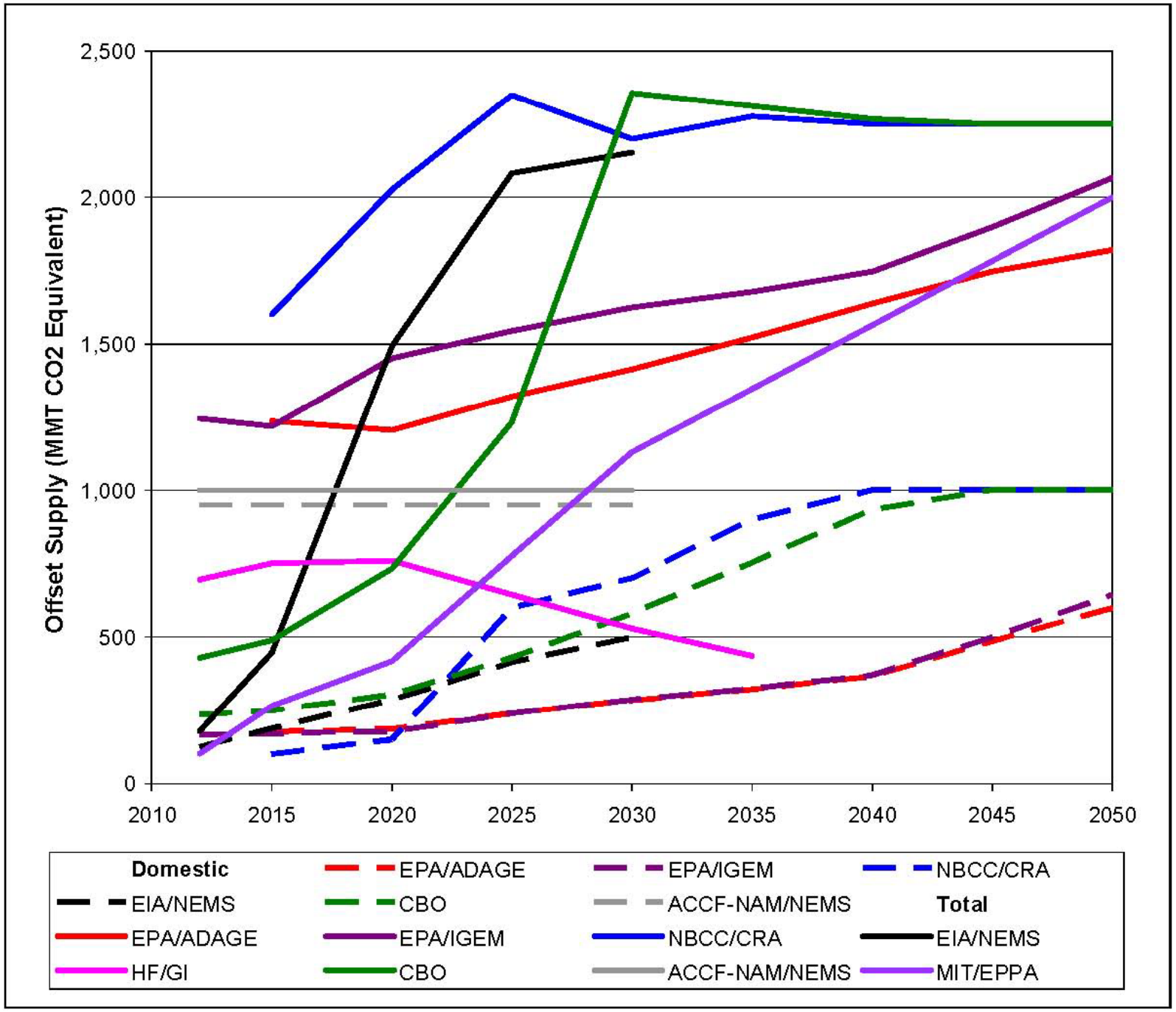
Challenges for International Offsets

- Large income from selling international offsets could discourage developing countries to take a target
- China and India now have commitments under Copenhagen.
- What are appropriate baselines?
- Doesn't induce a "clean energy economy" in US
- Large transfers of $ and tech may prove infeasible

Economic Analysis

- Economic effects of policy are highly dependent on offset availability/cost.
- Estimates of offset cost curves vary widely.
- Offset price depends on global demand.
- Take H.R. 2454, House-passed Waxman Markey bill for example…

Figure 15. Estimated Offset Usage Under H.R. 2454



CRS Compilation of Analyses of HR 2454*

Table 8. Effect of Offset Limitations on Allowance Prices

	2030 Allowance Price (2005$)			
	Core Projection	Limited Offsets Case	% Increase in Allowance Price	Limitation
EPA/IGEM	$26	$50	90%	No International Offsets
NBCC/CRA	$42	$120	180%	No International Offsets
EIA/NEMS	$61	$100	65%	No International Offsets
CBO	$37	$130	250%	No Offsets

Source: EPA/IGEM: "Data Annex" available on the EPA website at http://www.epa.gov/climatechange/economics/economicanalyses.html. EIA/NEMS: EIA, *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009*, (August 2009). NBCC/CRA: CRA International, *Impact on the Economy of the American Clean Energy and Security Act of 2009 (H.R. 2454)* (May 2009). CBO: CBO, *The Use of Offsets to Reduce Greenhouse Gases*, (August 3, 2009).

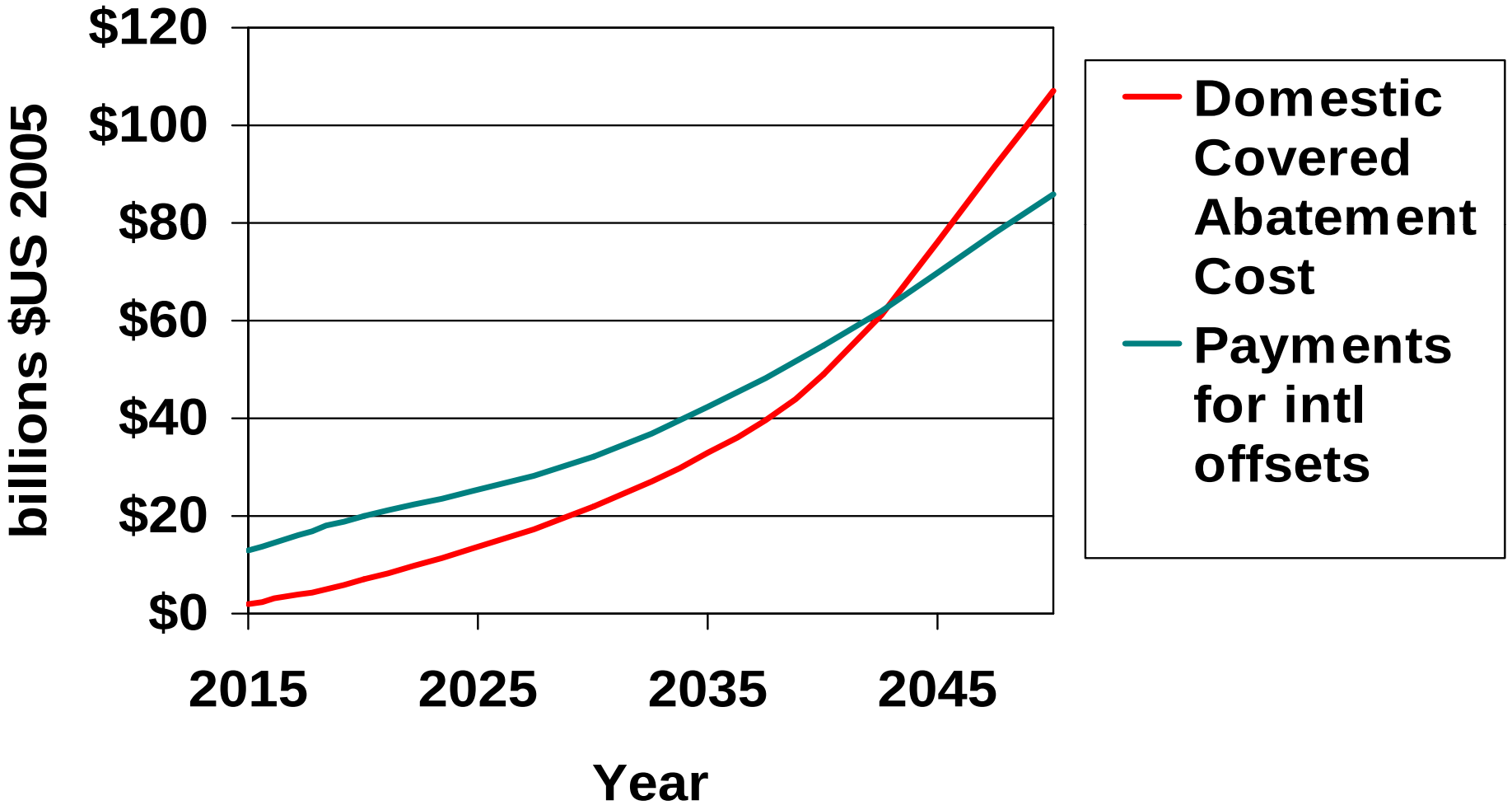
* Source: CRS Report R40809

EPA Analysis of HR 2454*

- Over $1.2 trillion in undiscounted international offset purchases projected through 2050
- In early years, international offset payments will be over six times the cost incurred for domestic abatement in covered sectors.

*http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf

EPA Analysis of HR 2454



*http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf

Can Supply Meet Projections? Lessons from the Clean Development Mechanism

- Credits valid for Kyoto Protocol compliance
- Much slower than projected issuance of credits; about 12 million tons CO2-e per month.
- Disproportionately industrial gas destruction in China. Truly additional?
- Less than 10% of volume needed for HR 2454

Source: M. Wara, http://cantwell.senate.gov/issues/Dr.%20Michael%20Wara.pdf

Conclusion

- Offsets introduce cost containment, complexity, and economic and environmental uncertainty.
- Raises question of other possible ways to control costs.
  - » Safety valve
  - » Price collar
  - » Carbon tax