



Estimating Market Supply and Demand for Offsets from a U.S. Perspective: A New Approach

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Together...Shaping the Future of Electricity



- U.S. non-profit “501(c)(3)” organization founded 1973
- Scientific research consortium established to perform objective electricity research for the public benefit
 - Generation, including renewables
 - Environment
 - Power Delivery, Markets & Energy Efficiency
 - Nuclear
 - Technology Innovation
- Principal locations — Palo Alto, CA, Charlotte, NC and Knoxville, TN
- Members include Electric companies, federal / state / local government & OEMs, and includes:
 - >90% of electricity generated and delivered in the U.S.
 - More than 450 participants in over 40 countries

Today's Topics

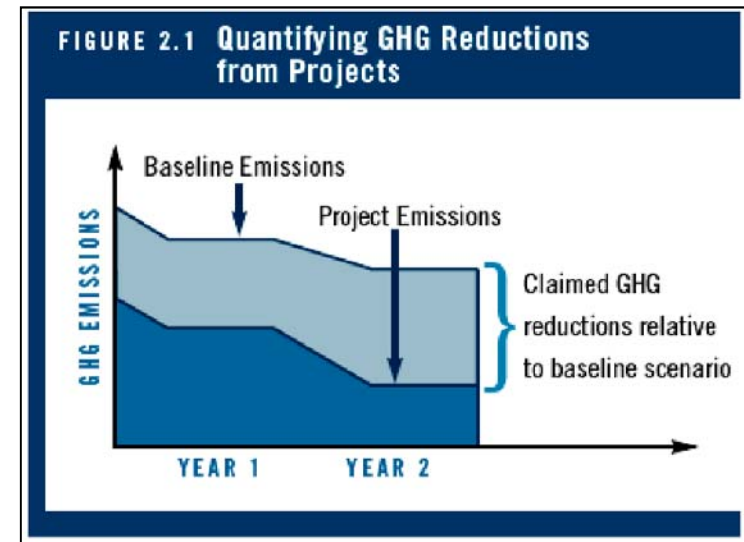
1. Definition and Importance of Offset from a U.S. Perspective
2. Potential Mitigation Supply
3. A New Approach to Estimating the Market Supply of Offsets

Analysis Team

- EPRI: Steve Rose, Adam Diamant, Tom Wilson
- Natsource: Rob Youngman, Aline Ribas, Ana Ariño, & Richard Rosenzweig
- RTI: Jeff Petrusa, Rob Beach, Mike Gallaher

Greenhouse Gas Offset Definition

- “Credits” for GHG emission *reductions, avoidance or sequestration* that occur in sectors or geographic regions **outside of an emissions cap**
- Offsets = Difference between “business-as-usual” and residual CO₂ emission



Source: *The Greenhouse Gas Protocol: Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects*, World Resources Institute (WRI) and World Business Council for Sustainable Development (WBSCD), 2007.

GHG emissions reductions must be *real, additional, permanent, measurable and verifiable.*

GHG Emissions Offsets Can Provide “Cost Containment” & Reduce Future CO₂ Costs

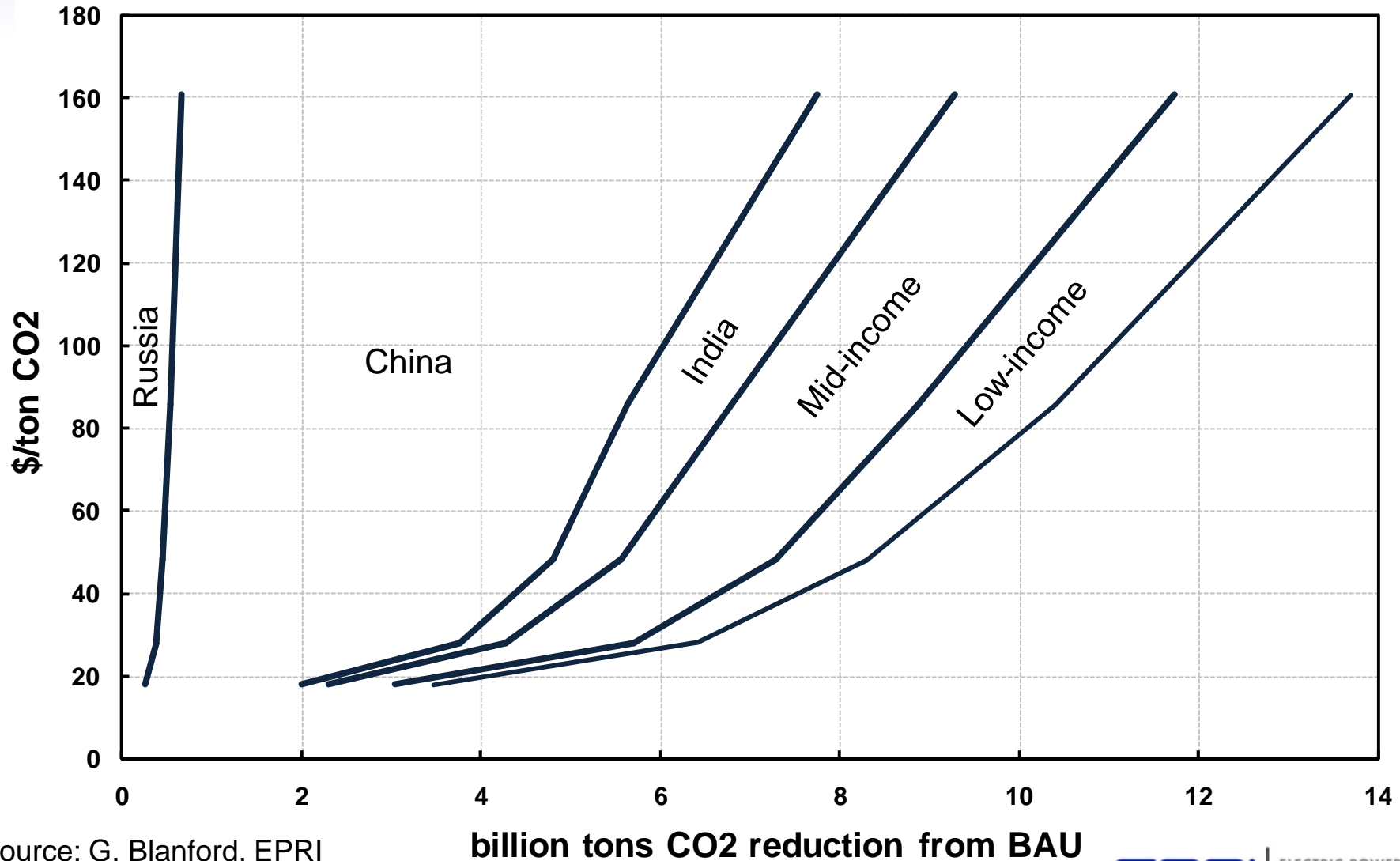
CBO Estimates of the Effects of Waxman-Markey (HR 2454) “With” and “Without” Offsets in 2030

	With Offsets	Without Offsets
Net economic cost (\$2007)	\$101B	\$248 B
CO ₂ allowance price (\$/tCO ₂ e)	\$40	\$138

“The cost savings to the economy generated by offsets could be substantial. CBO estimates that between 2012 and 2050 average **annual savings from offsets could be about 70 percent under ACESA.” (CBO Analysis of HR 2454, p. 8)**

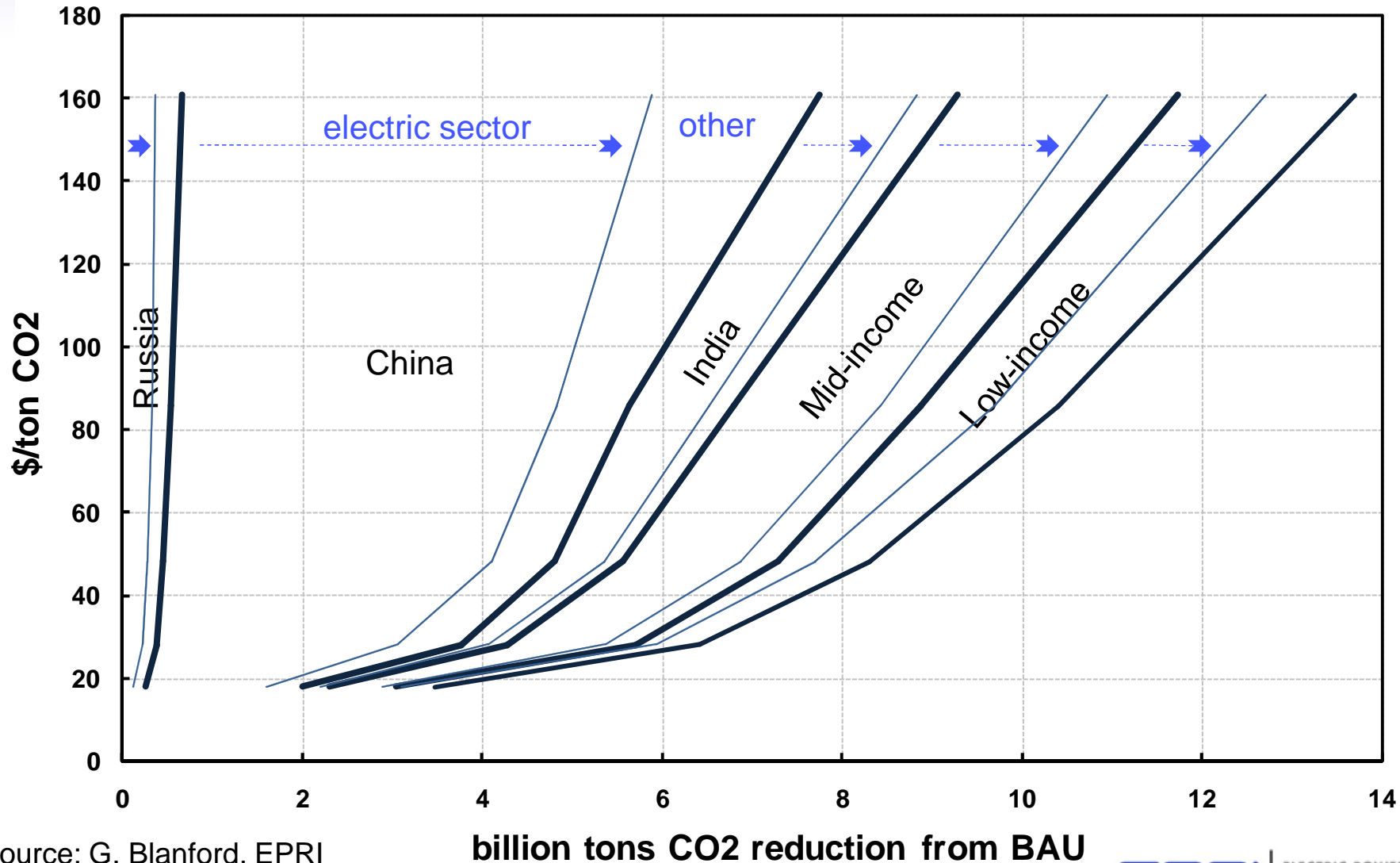
Source: “The Use of Offsets to Reduce Greenhouse Gases,” Economic and Budget Issues Brief, Congressional Budget Office, August 3, 2009, Table 1.

MERGE Results: Energy-related CO₂ by Region Non-OECD (2030)



Source: G. Blanford, EPRI

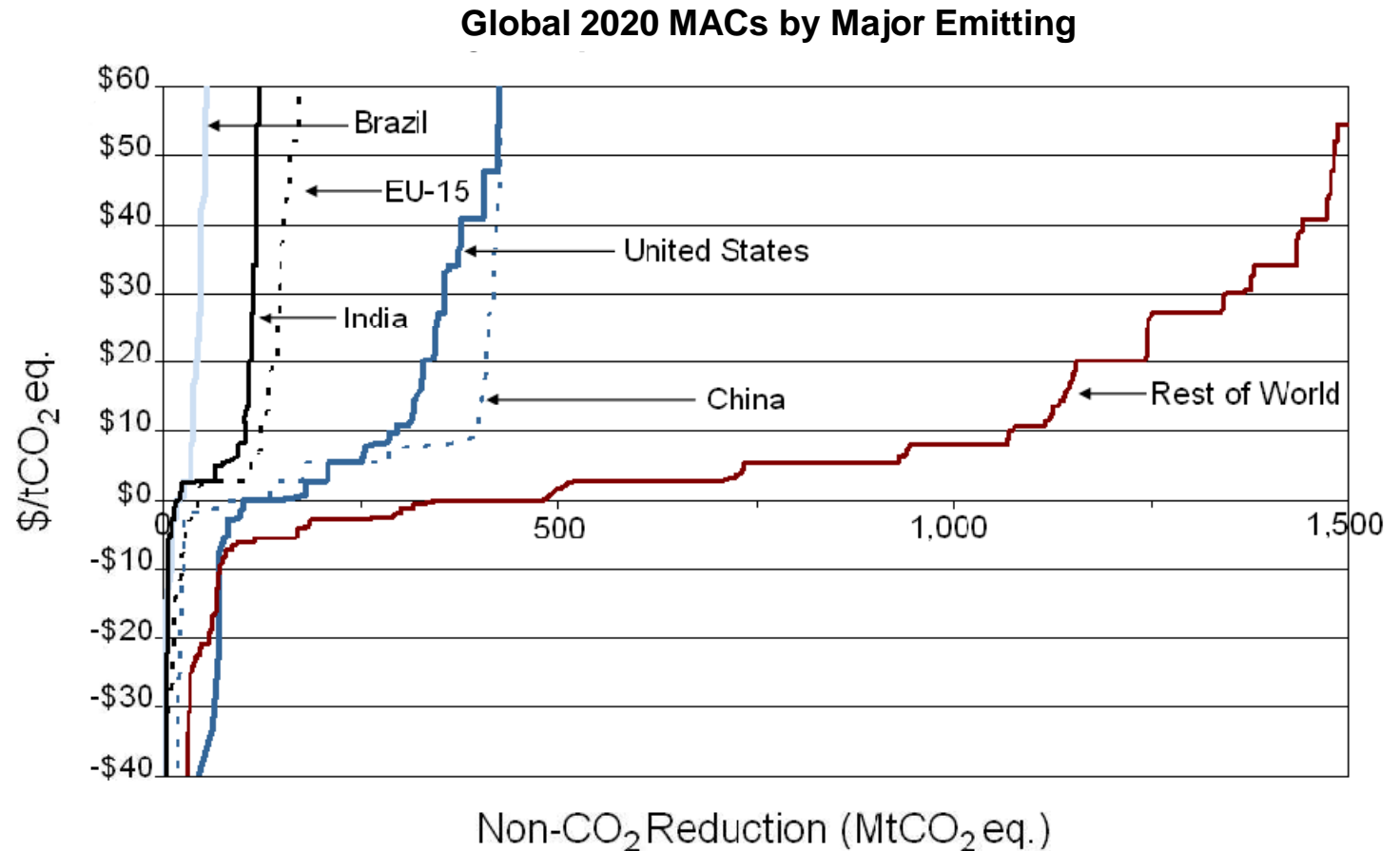
MERGE Results: 70% of Energy-related Potential is In the Electric Sector



Source: G. Blanford, EPRI

Non-CO₂ Marginal Abatement Costs

China, the US, the EU, India and Brazil emit the most non-CO₂ GHGs. As the largest emitters, these countries offer important mitigation opportunities.



Source: US EPA, 2006

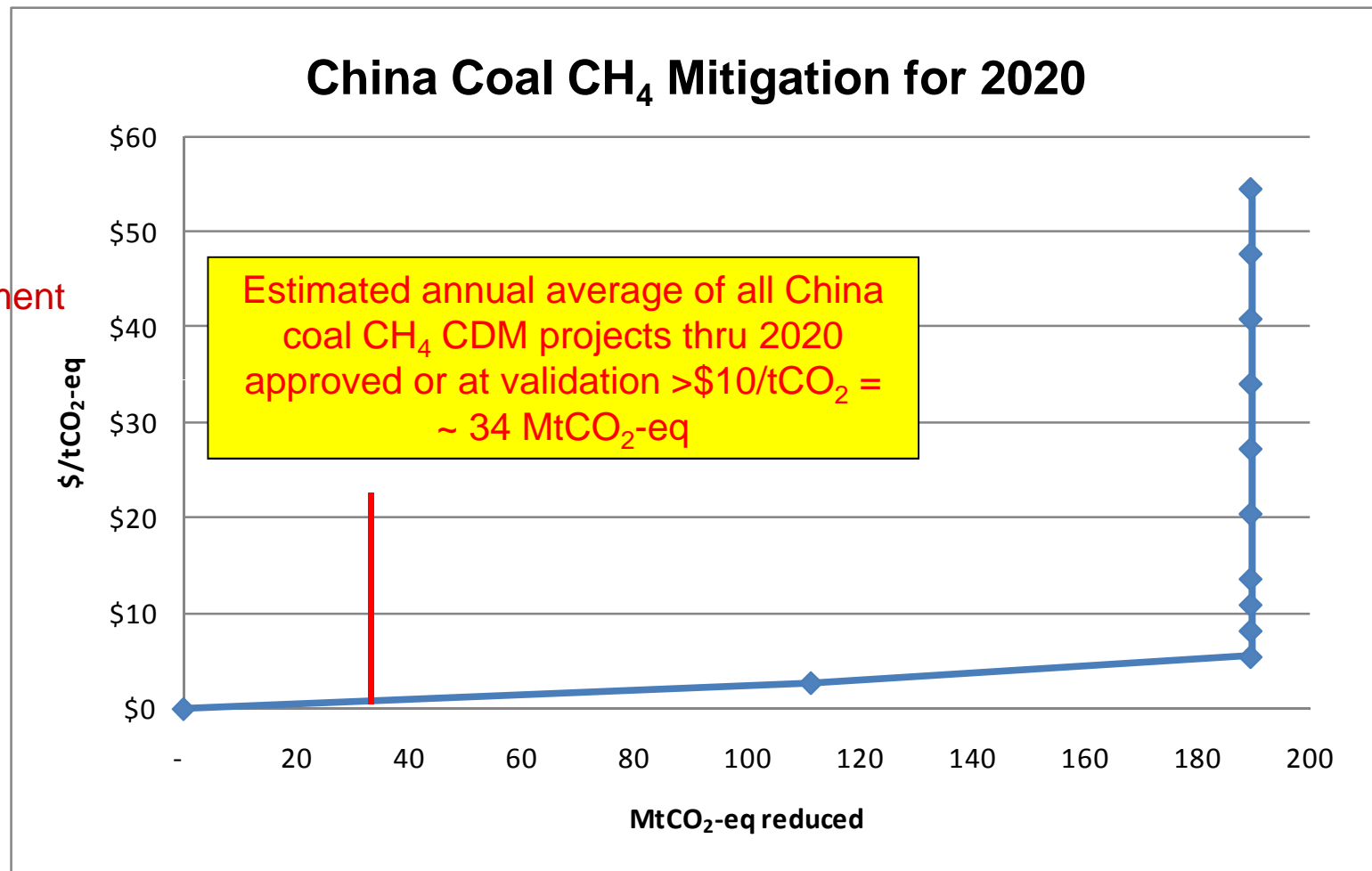
Problems with Existing Estimates of Offset Supplies

- Omissions – existing analyses assume no transaction costs, investment risks, and limits on availability. Those analyses attempting to refine offset supply estimates, have used arbitrary adjustments and other mechanisms.
- Project experience – experience to date in the CDM suggests that immediate offset supplies (e.g., Coal-mine methane destruction in China) are very limited.
- Simplistic – existing analyses of future offset supplies are based assumption of full and perfect emissions trading. There is insufficient attention to the policy specifics.

Need to Develop a *New Approach* that is Policy Realistic

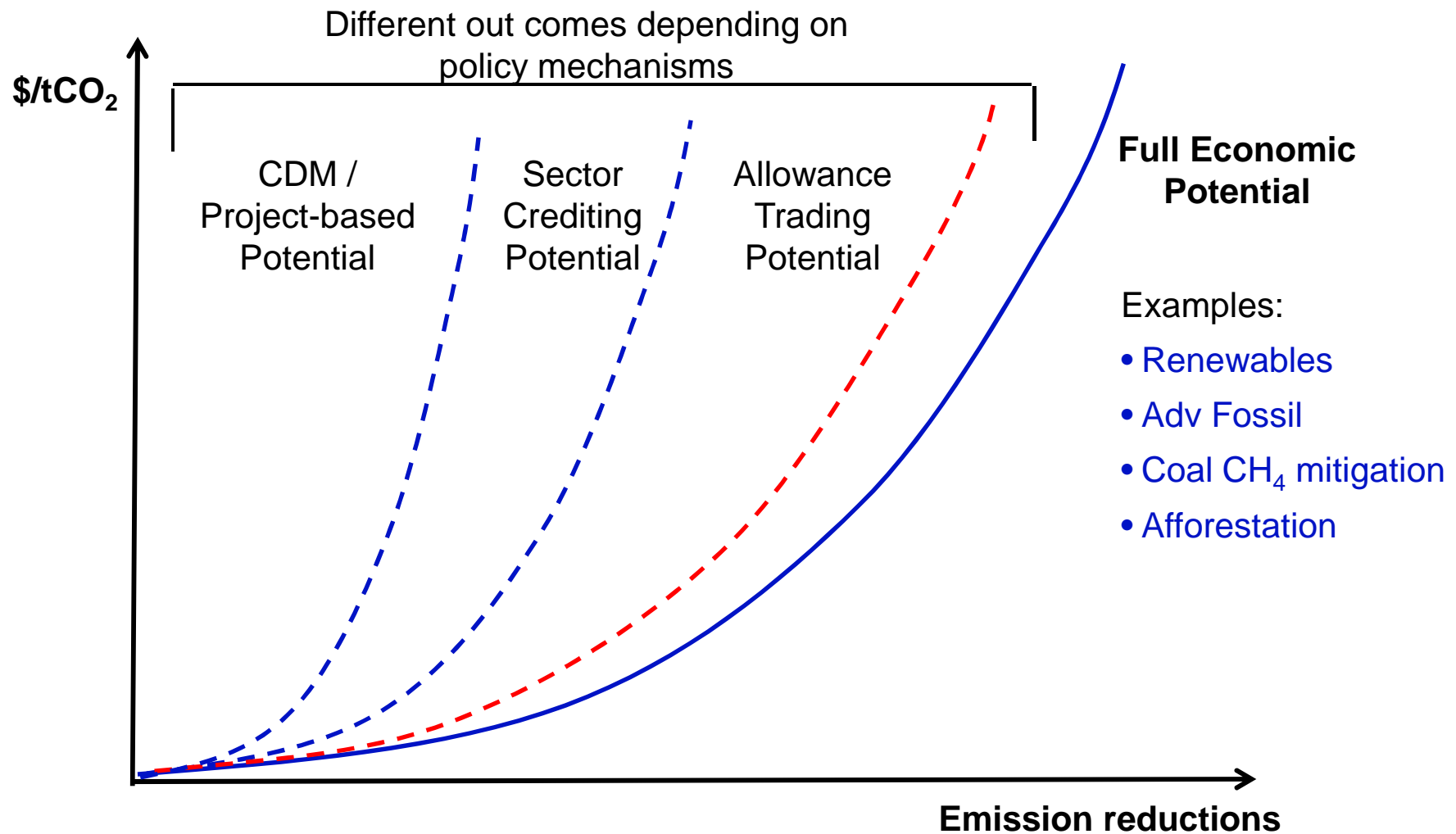
Greater Risk:

- Counterparty
- Project/Investment
- Government/Regulatory
- Lack of transparency



Source: US EPA, 2006

From Economic to “Policy” Mitigation Estimates

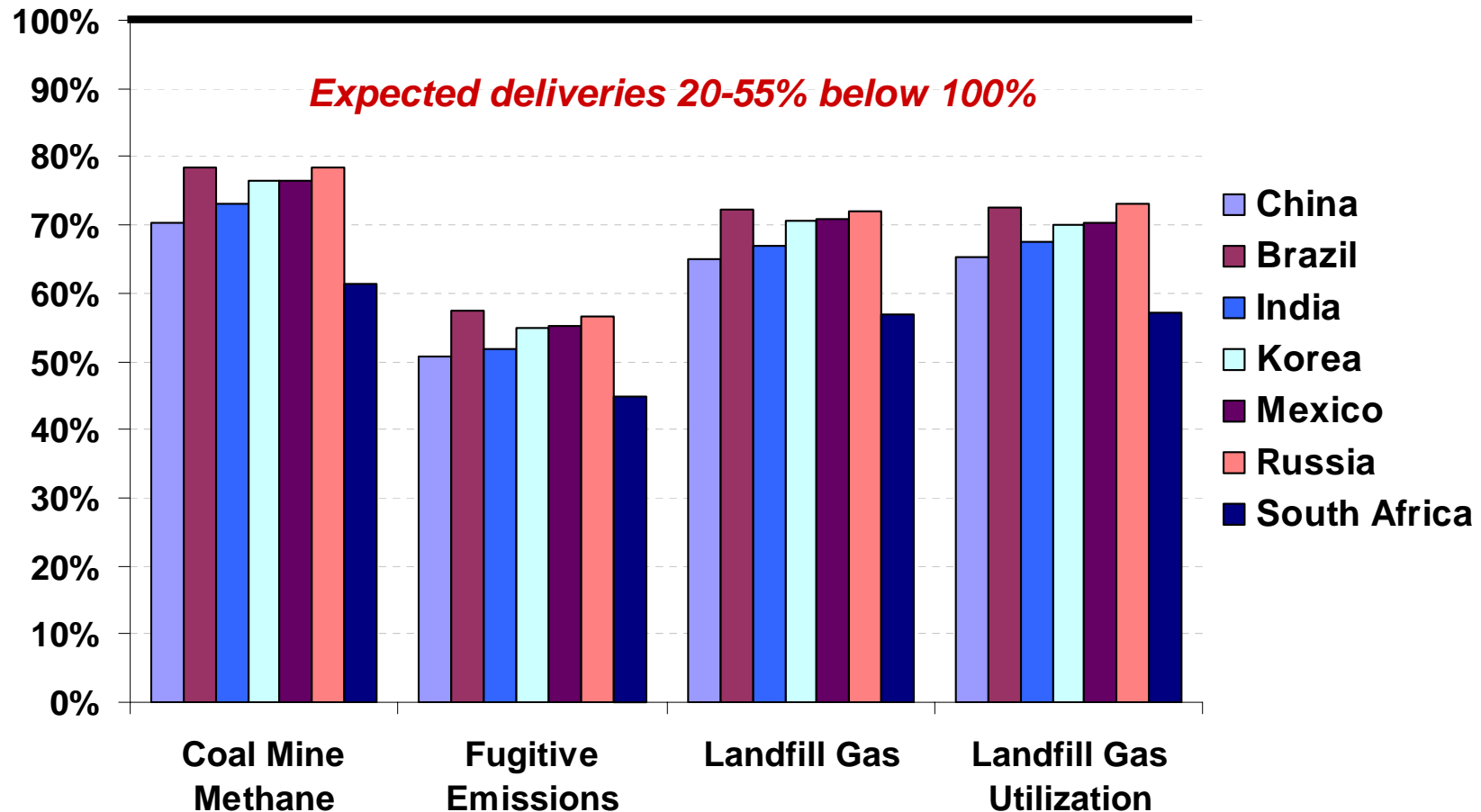


Project Based Delivery rates

- Natsource financial project delivery likelihood assessment
 - based on extensive project evaluation and project investment experience
- Projects evaluated in terms of five risk factors
 - Country
 - Country Investment Risk (CI)
 - Country Carbon Regulatory Risk (CCR)
 - Proponent Risk (PR)
 - Project
 - Project Country Performance Risk (PCP)
 - Project Technology Performance Risk (PTP)
- Representative factors generated for 201 countries (158 non-Annex 1) and 65 project types

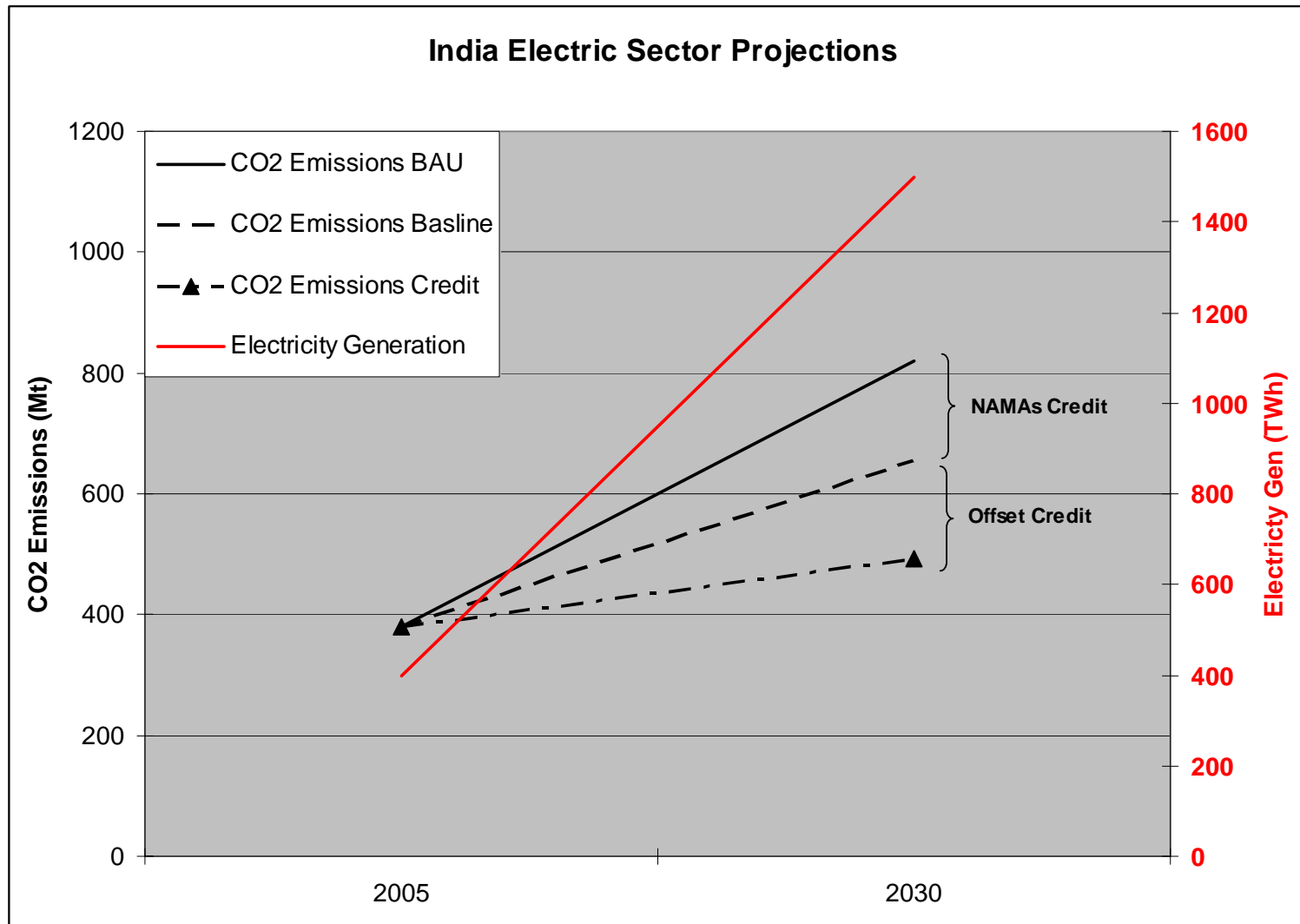
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Expected overall delivery rates – sample

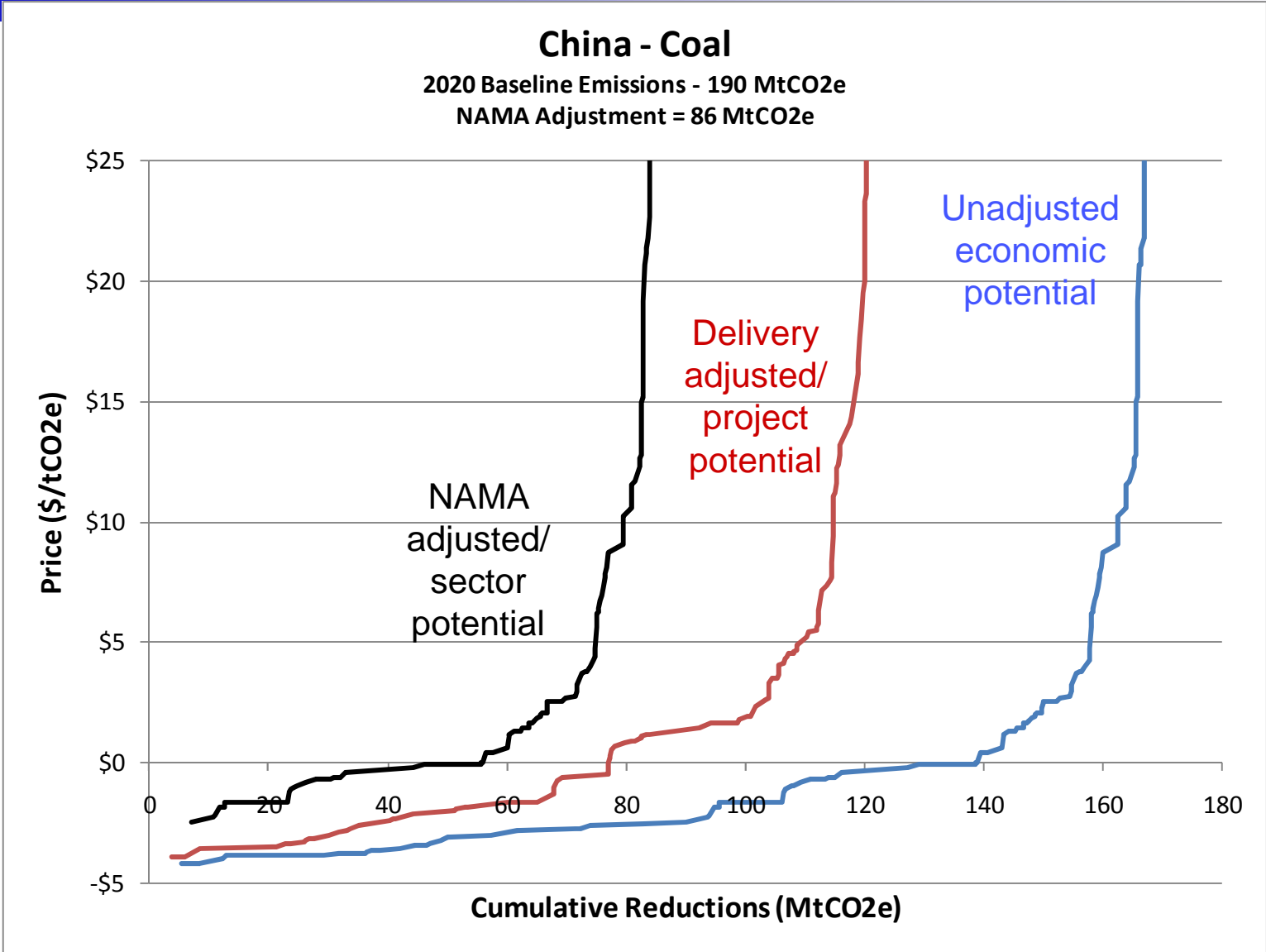


From Natsource data we constructed Monte Carlo simulations and derived expected delivery rates – assumed technology and country factors are independent (but factors in each group not)

Example of Sector-based Crediting

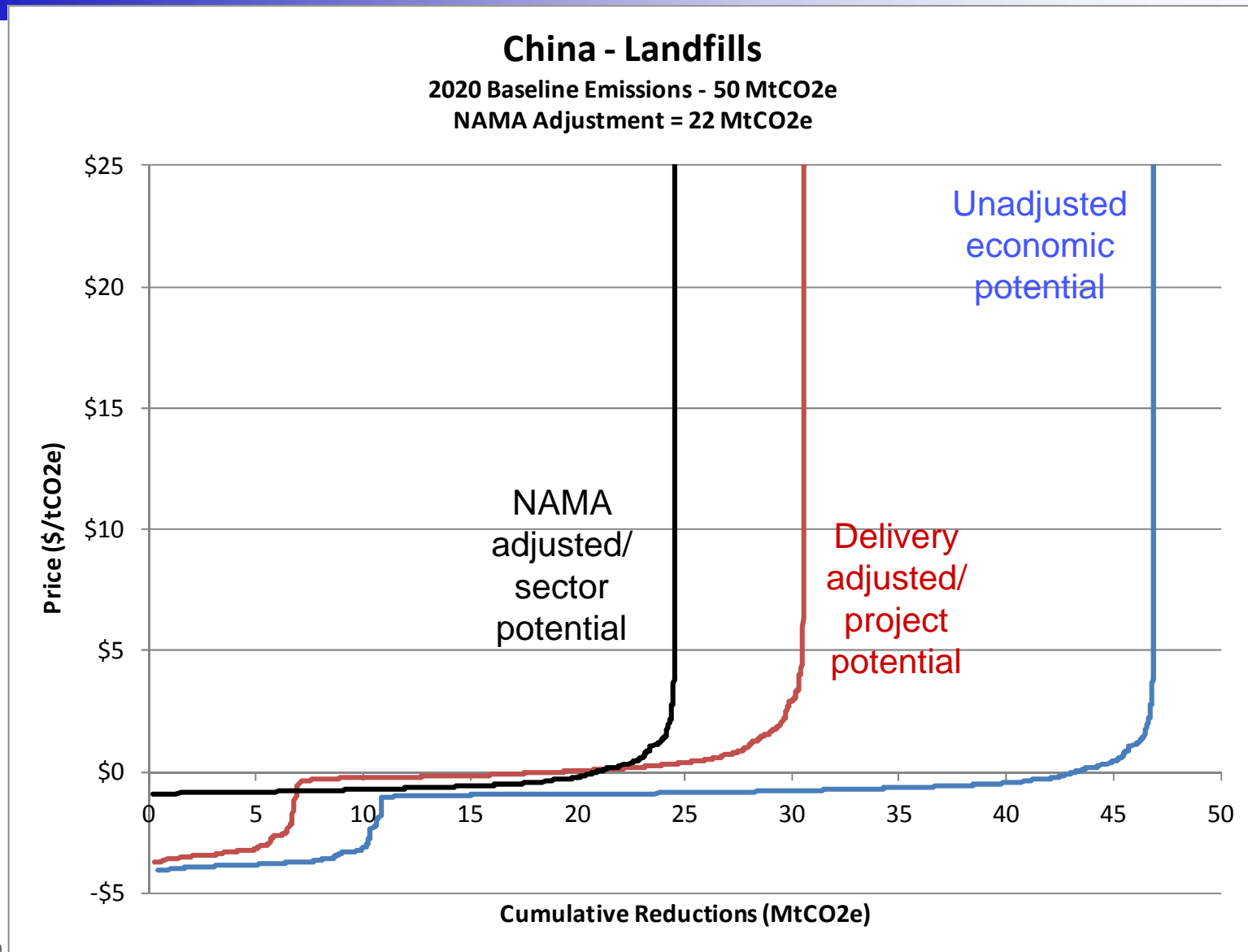


Example: China – Coal Mine Methane

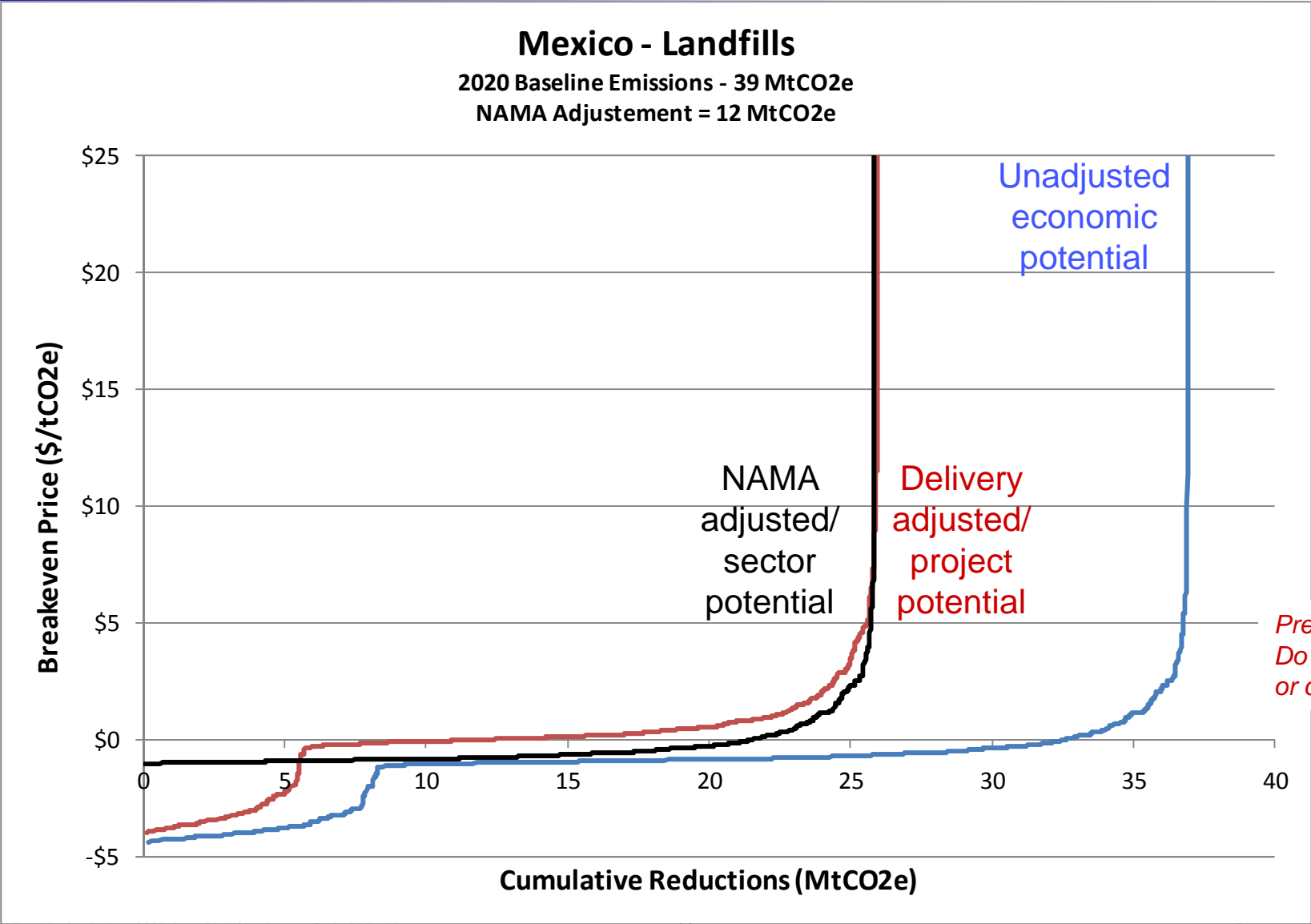


*Preliminary.
 Do not quote
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Example: China – Landfill Methane



Example: Mexico – Landfill Methane



Next Steps & Conclusions

- Apply adjustments to more sectors, especially energy and land-use mitigation.
- Offsets Analyses (estimates of non-allowance GHG mitigation potential) need to be updated and more policy realistic. Current analyses are too optimistic.
- Policy Challenge is to balance between:

**Lower domestic
carbon price**

**Developing
country
participation
(NAMAs)**

