Forest (& agriculture) carbon policy: design and coordination insights from recent modeling efforts

Steven Rose (EPRI)

May 21, 2009

EPRI Global Climate Change Research Seminar, May 20-21, 2009 Washington, DC

Overview

- Mitigation potential in current results

- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

- The price?

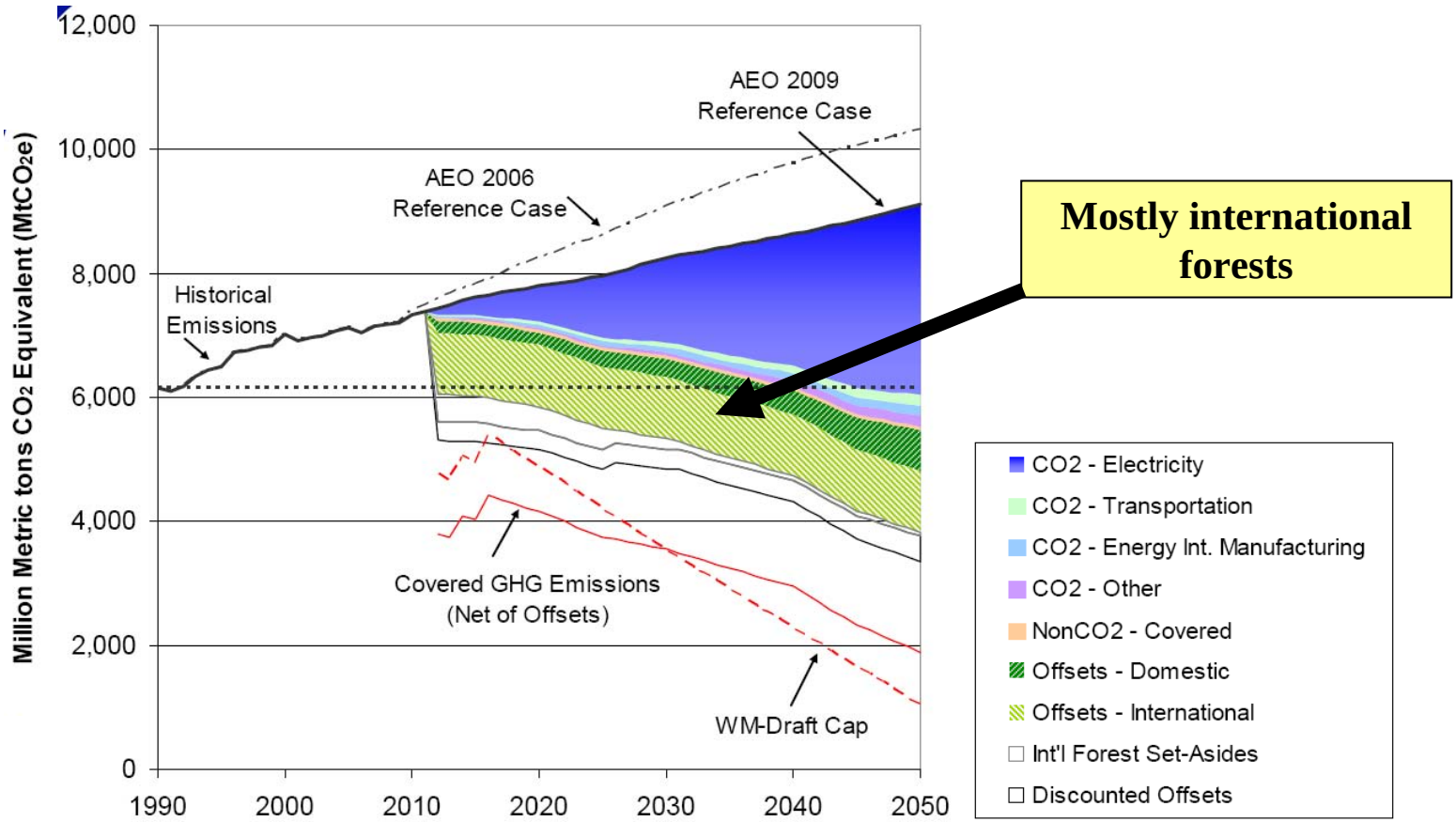
Overview

- Mitigation potential in current results

- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

- The price?

Land has a potentially large mitigation role – in domestic offset programs

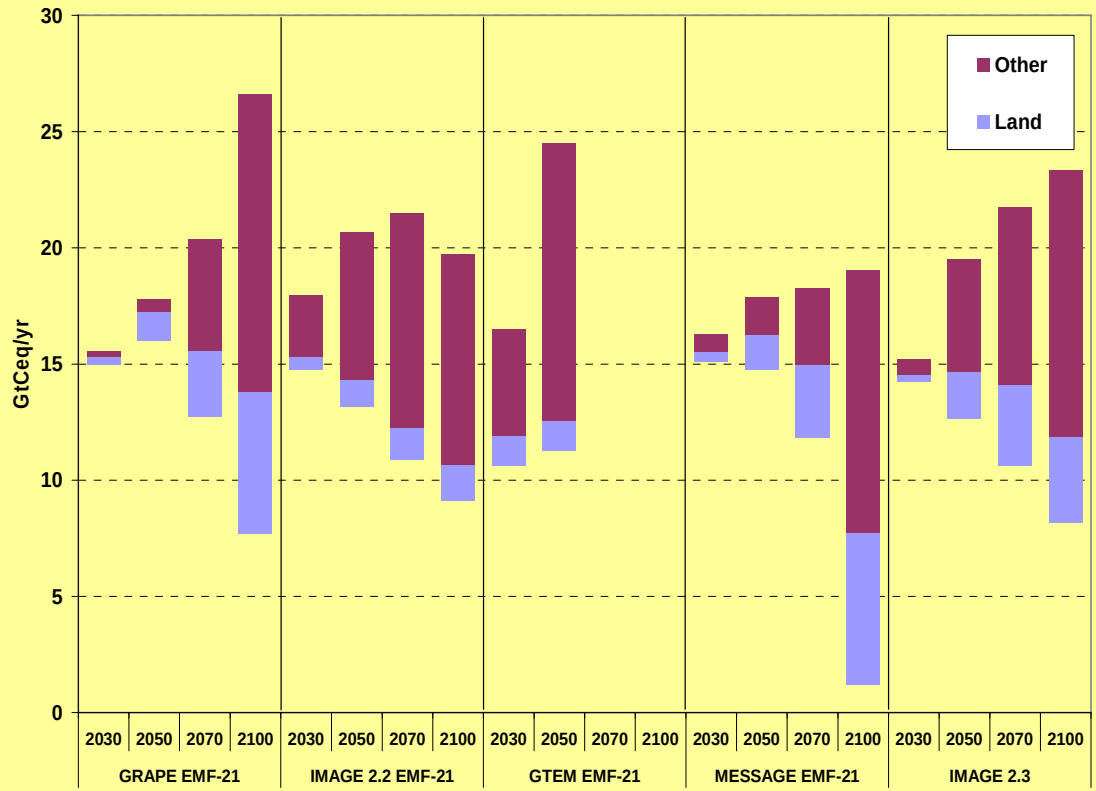


Source: U.S. EPA Preliminary Analysis of the Waxman-Markey Discussion Draft (4/20/2009)

Land has a potentially large mitigation role – in climate stabilization

- All land-based mitigation: 15 – 40% of cumulative abatement across the century (Rose et al., 2008)
  - Forestry: 4 – 15%
- Others – forestry could provide 70% of abatement over the next few decades for stabilization at 550 ppm CO_2 (Tavoni et al., 2007)

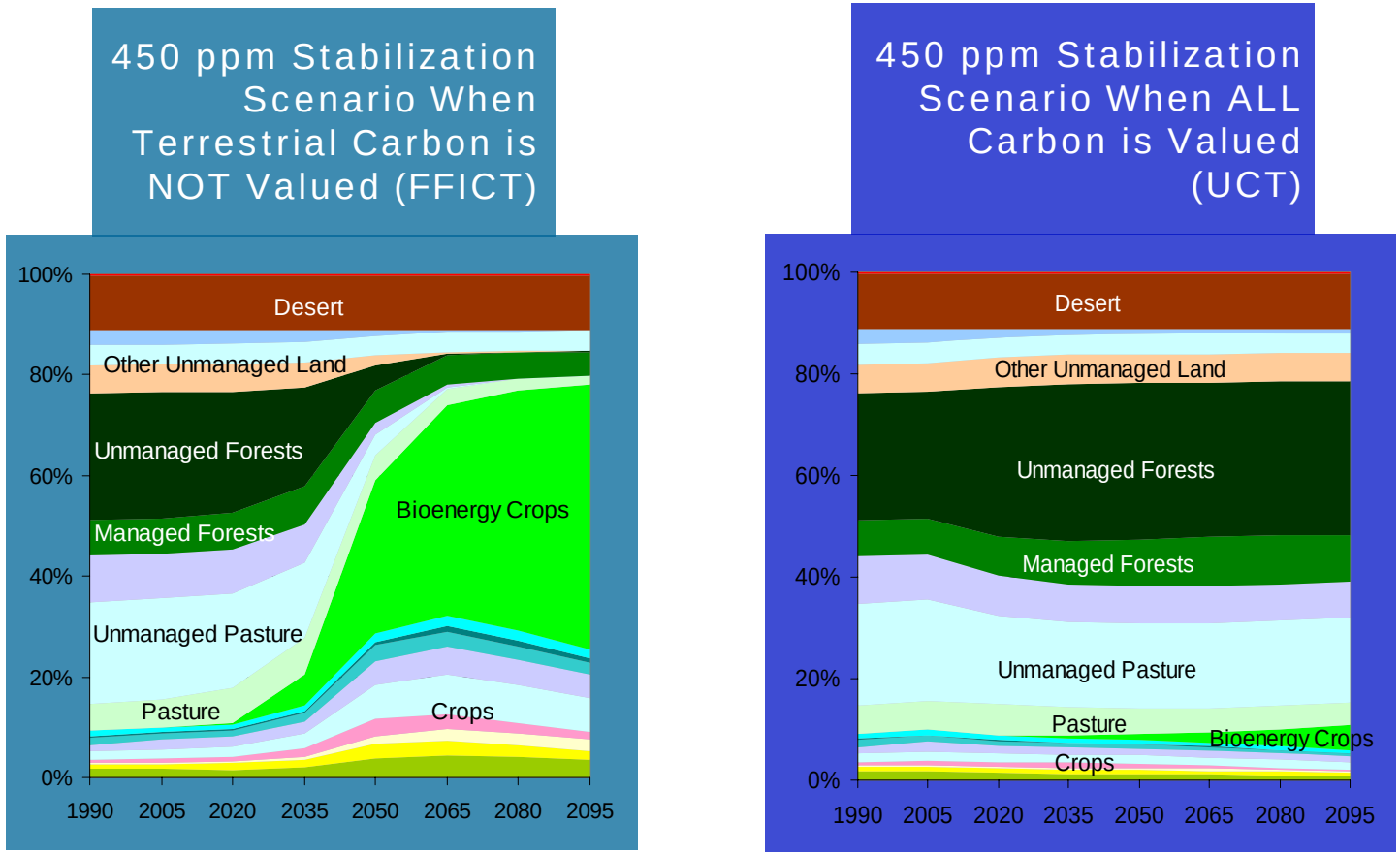
Annual abatement for 4.5 W/m2 scenarios



Source: Rose et al. (2008)

Pricing terrestrial carbon could reduce stabilization cost

~$1000/tC ($270/tCO$_2$) reduction in 2080



Source: Wise et al. (2008)

However, all assume a

comprehensive, immediate, and global

forest (and land-use) carbon policy

What if it is not?

Overview

- Mitigation potential in current results

- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

- The price?

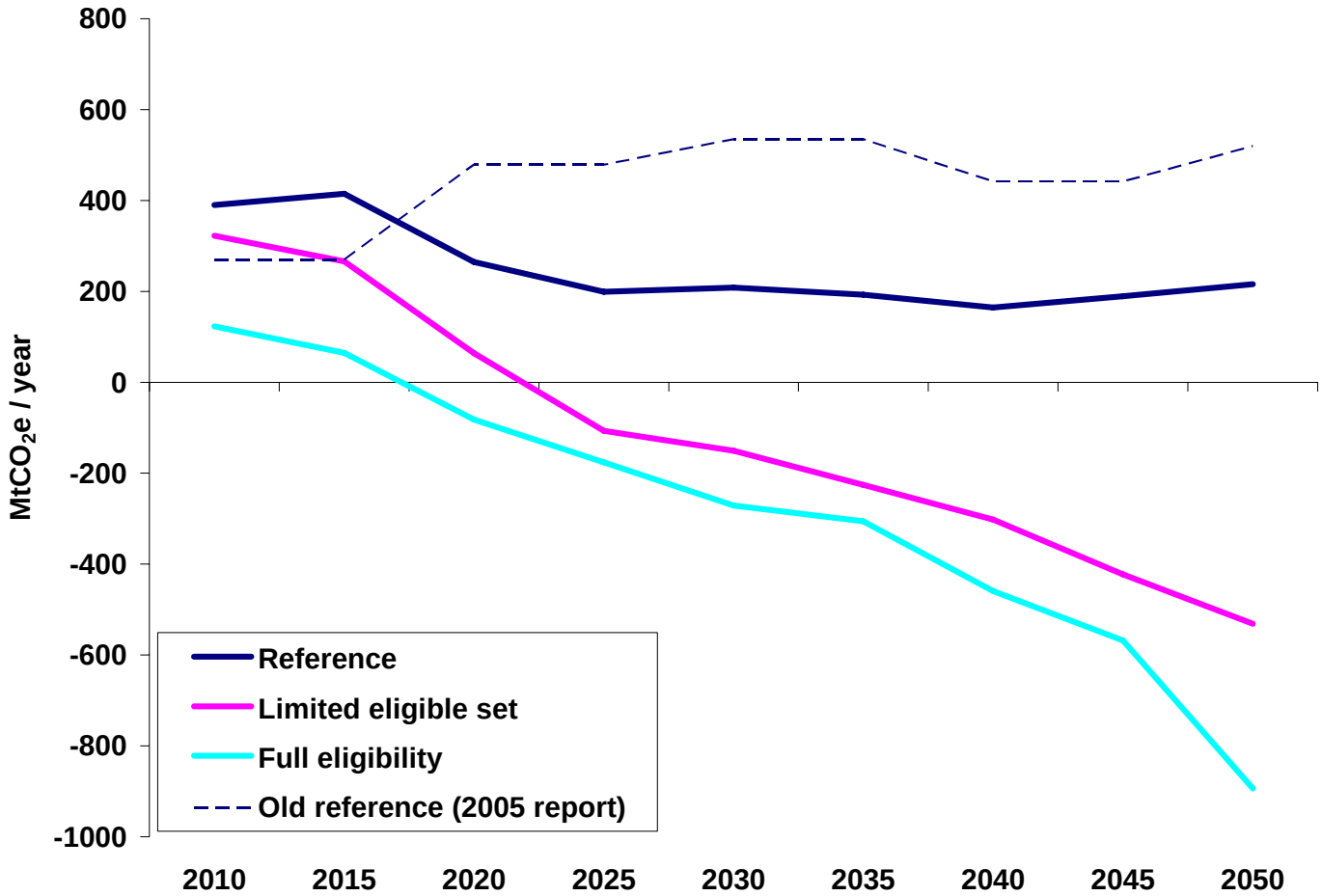
US abatement potential

- Long recognized implementation issues – e.g., baseline setting, additionality, measurement/monitoring/verification systems, leakage, and permanence
- Rationale for limiting or discounting the set of eligible mitigation activities
- We're evaluating the implications of limiting and discounting sets of eligible U.S. activities, and updating estimates of mitigation potential in general
- For instance, consider the following limited set
  - Capped activities: bioenergy, fossil fuel combustion
  - Offset activities: afforestation, manure management

(not included: forest management, crop soil carbon, fertilizer N_2O, other livestock CH_4, rice CH_4)

Limiting the set of eligible options

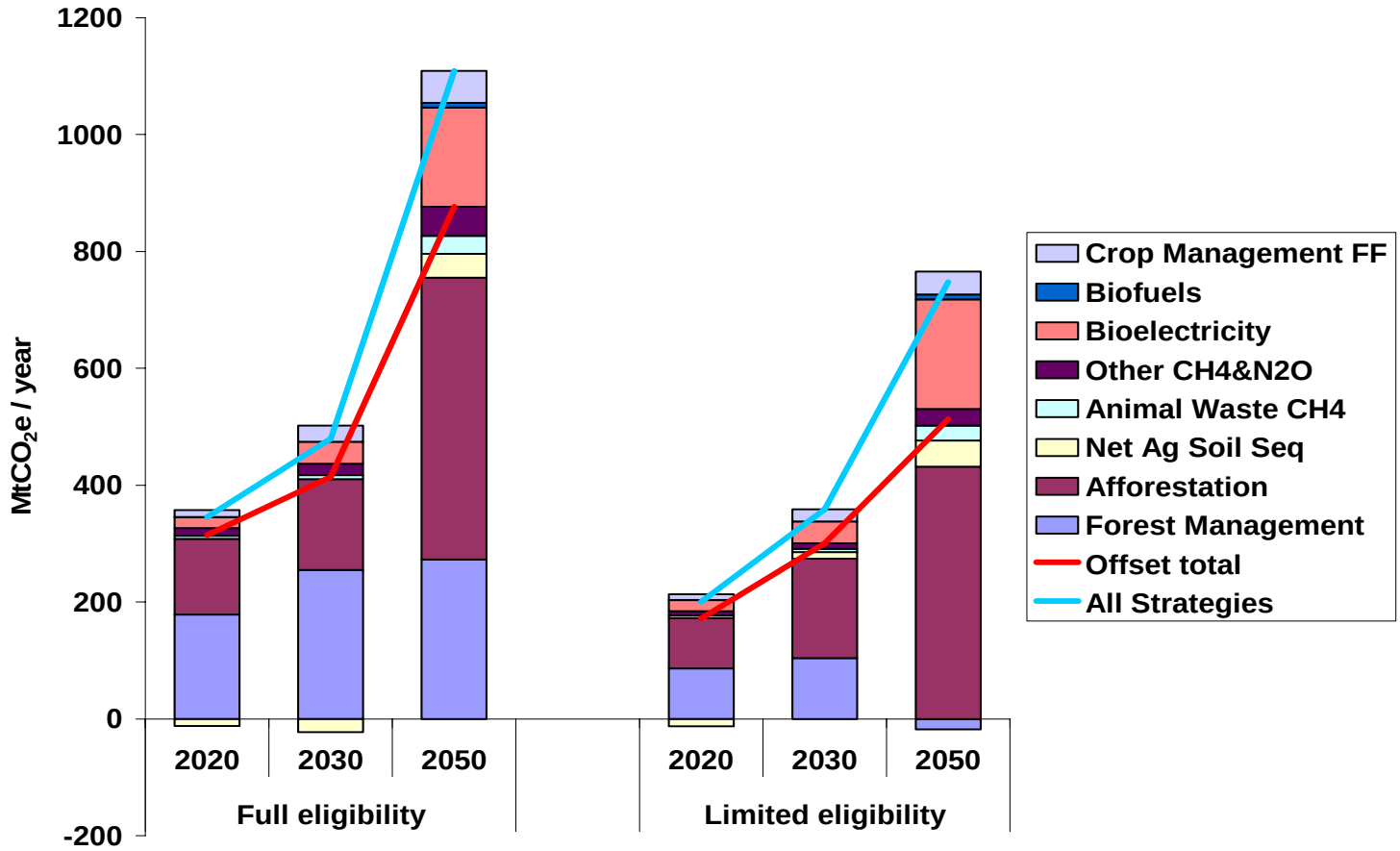
e.g., $15/tCO$_2$e (in 2010) + 5%/yr



Preliminary results. Subject to change. Please do not cite!

EPRI ELECTRIC POWER RESEARCH INSTITUTE

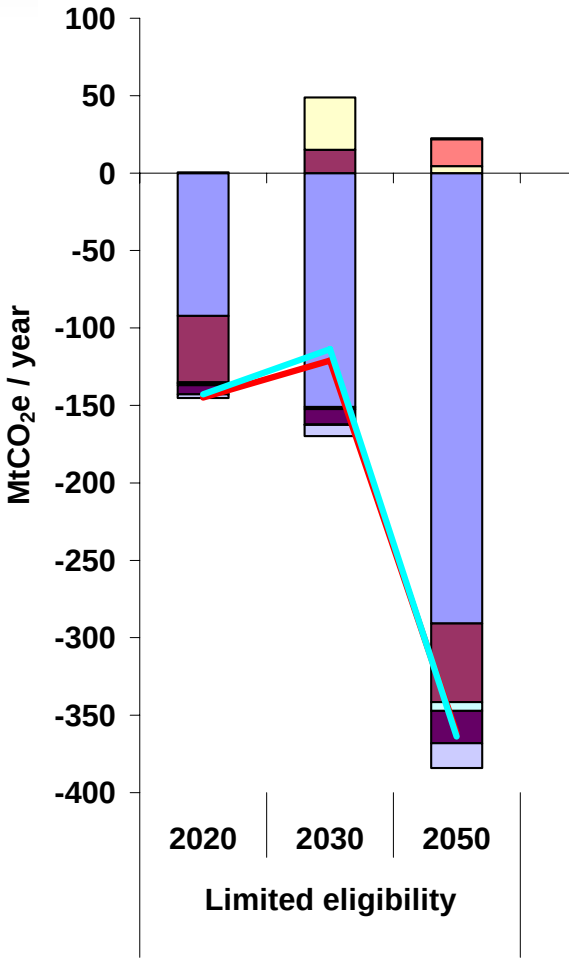
Reduced mitigation potential – both ineligible and eligible activities



Preliminary results. Subject to change. Please do not cite!

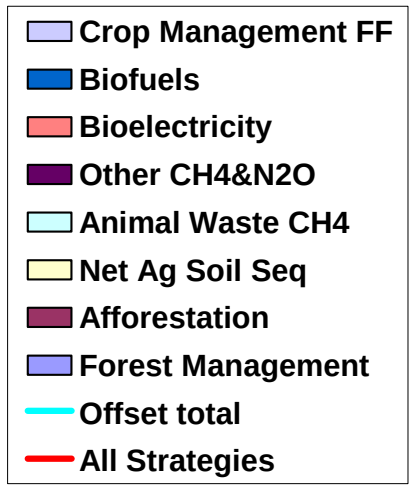
EPRI ELECTRIC POWER RESEARCH INSTITUTE

Large reduction in forest management; negative responses for eligible offset and capped activities



Difference limited eligibility from full

	2010-30	2010-50
Offset-ineligible	-61%	-58%
Offset-eligible	-21%	-11%
Capped	-8%	-4%
Total	-44%	-30%



Preliminary results. Subject to change. Please do not cite!

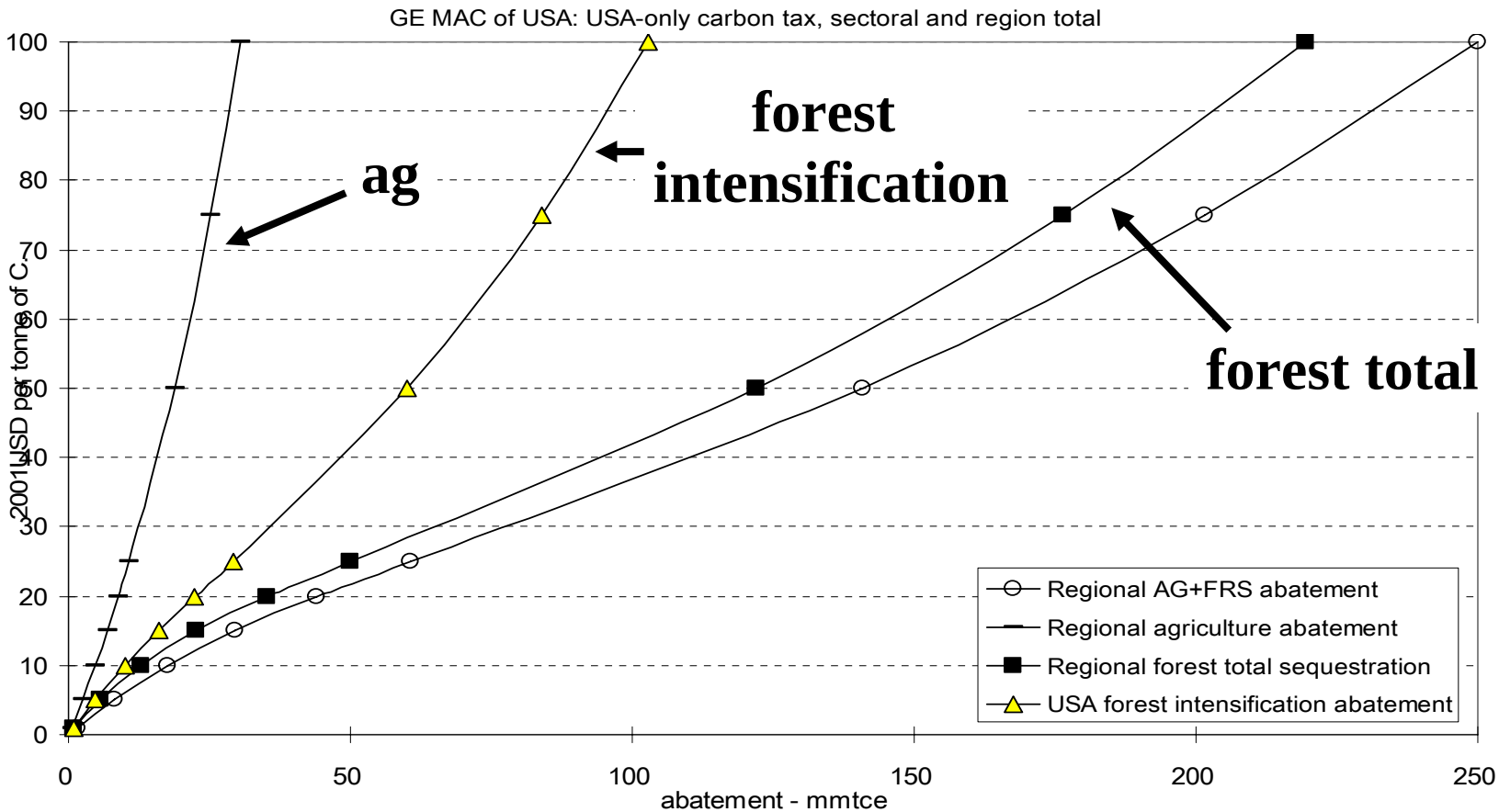
Overview

- Mitigation potential in current results

- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

- The price?

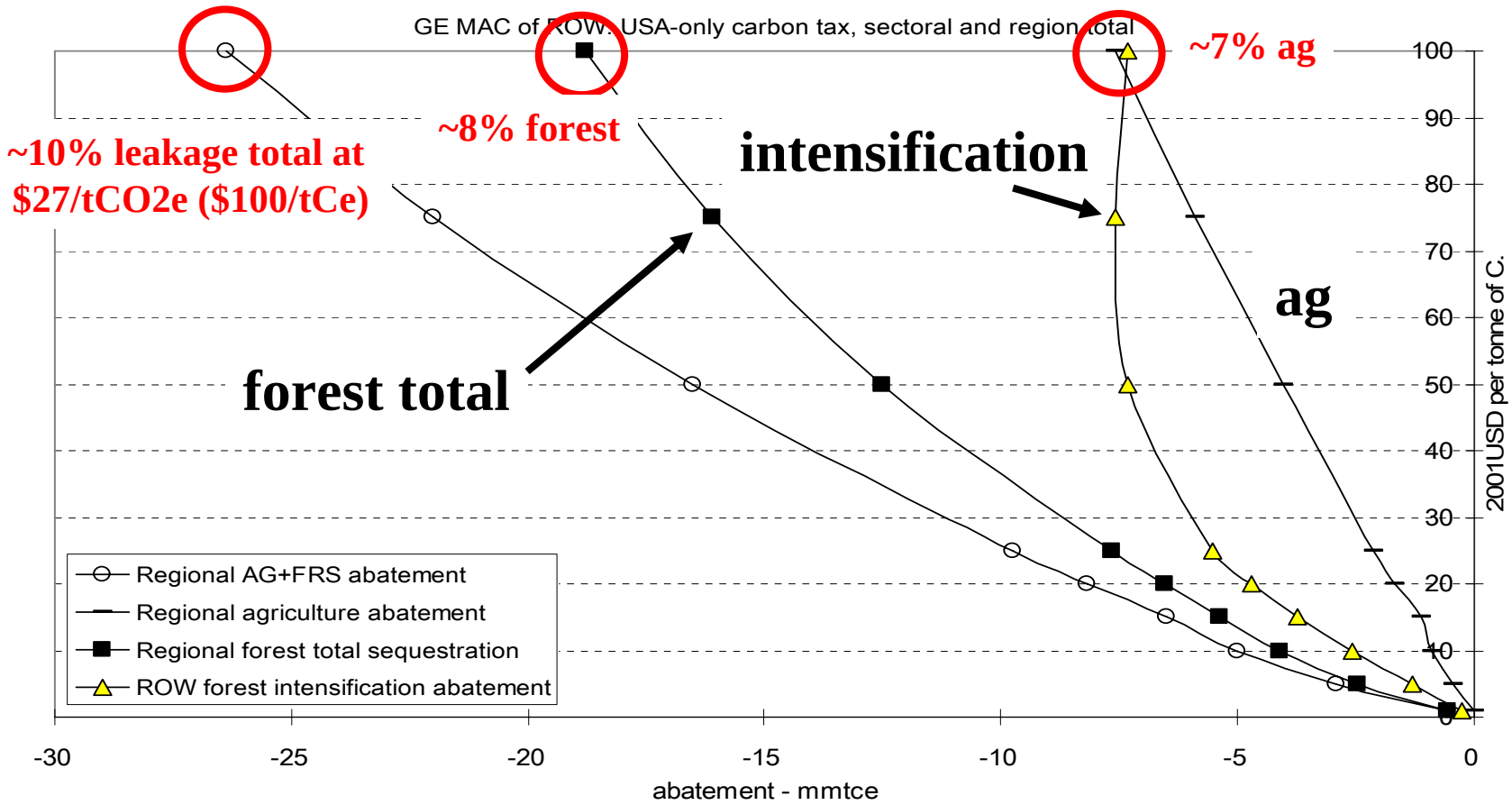
US ag & forest abatement supply w/ US only carbon tax (global economy-wide modeling)



Source: Golub et al. (2009)

International emissions leakage

ROW ag & forest abatement supply w/ US only carbon tax

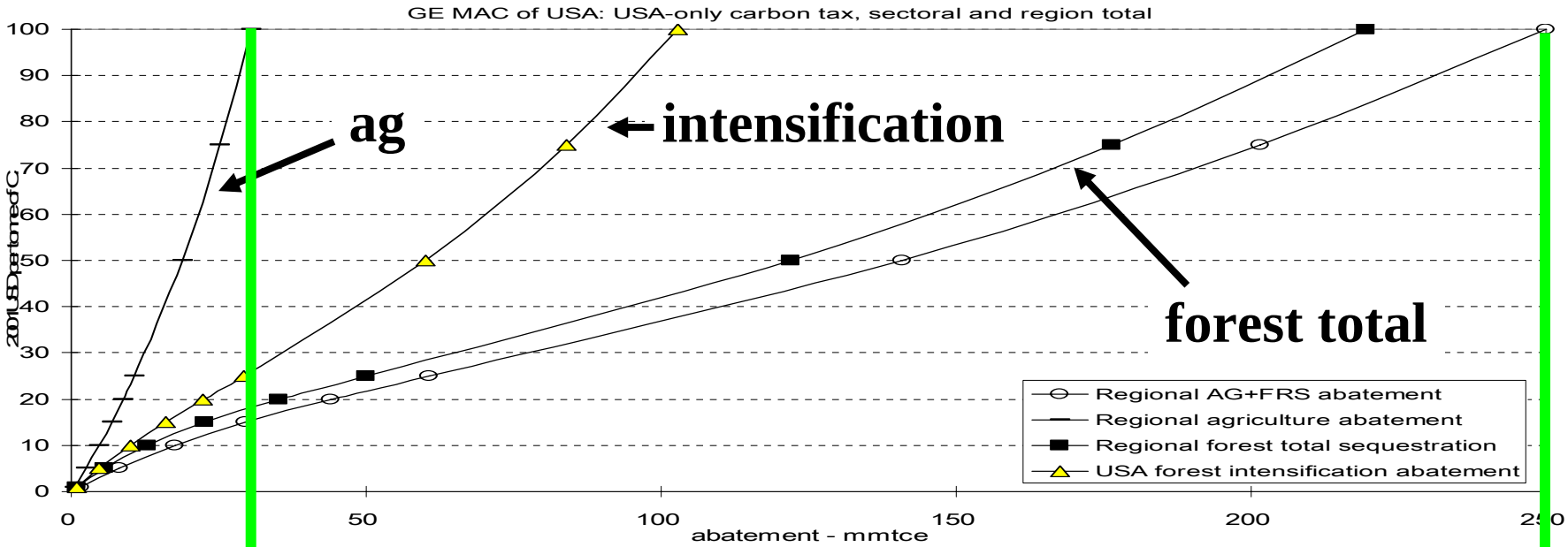


EPRI ELECTRIC POWER RESEARCH INSTITUTE

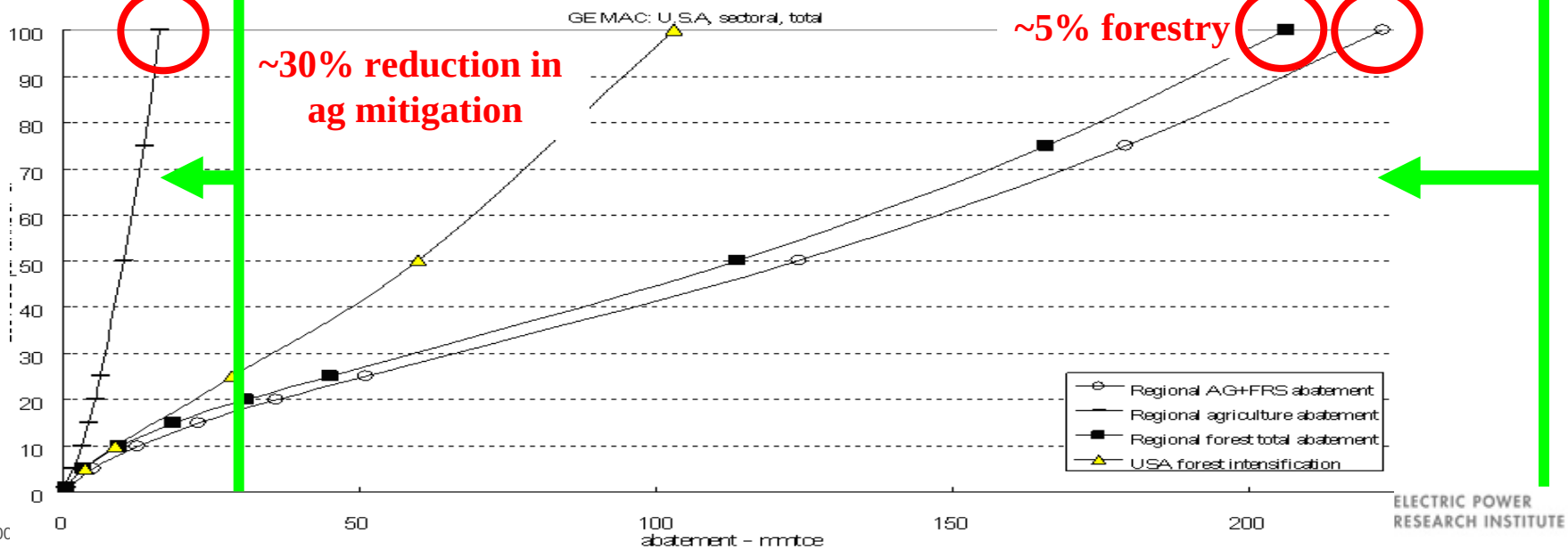
A global mitigation incentive…

- Manages leakage, but
- Affects mitigation potential

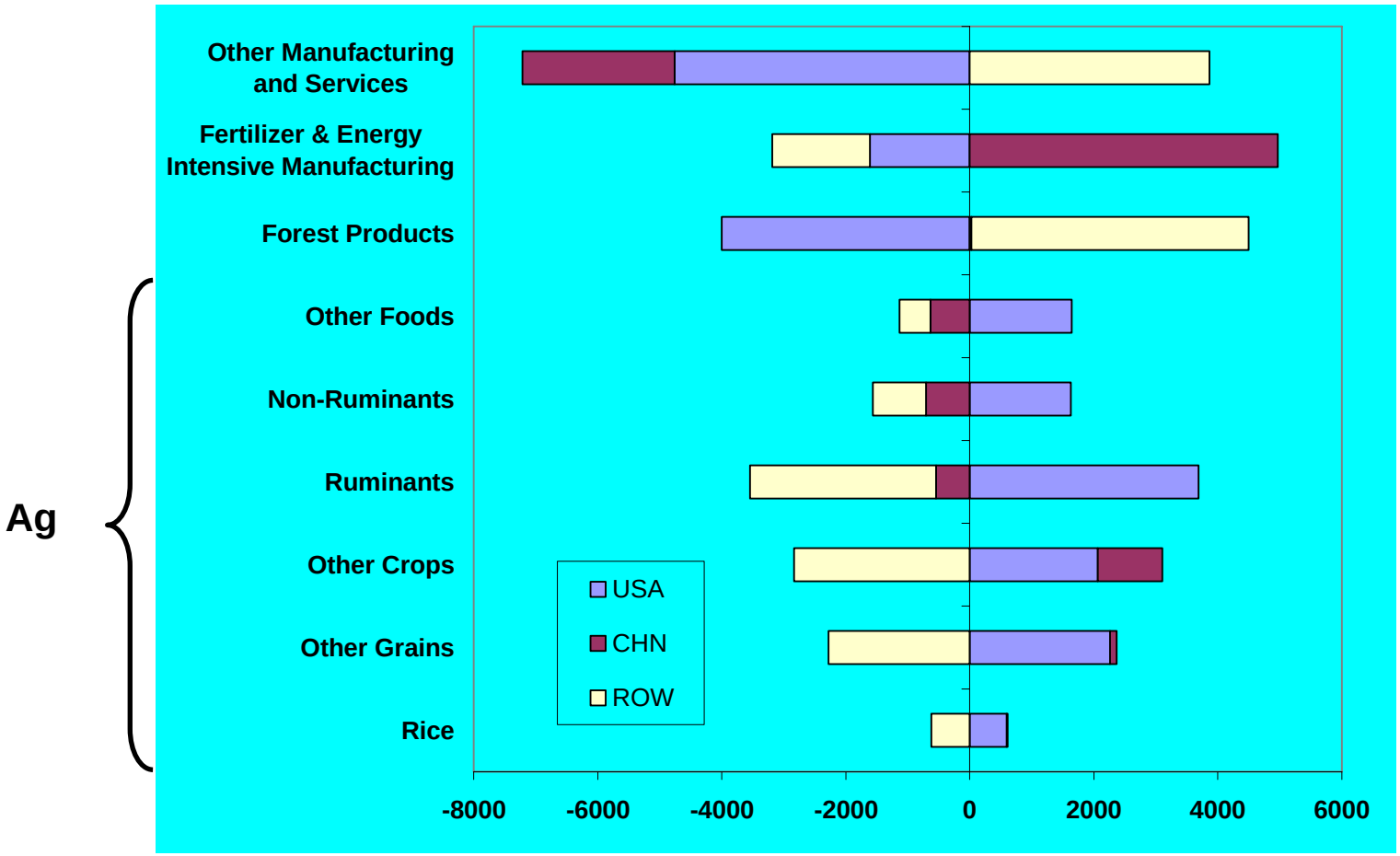
USA sectoral mitigation w/ US only carbon tax



USA sectoral mitigation w/ global carbon tax



Net export changes with global tax of $27/tCO$_2$e ($100/tCe) (million $/year)



Overview

- Mitigation potential in current results

- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

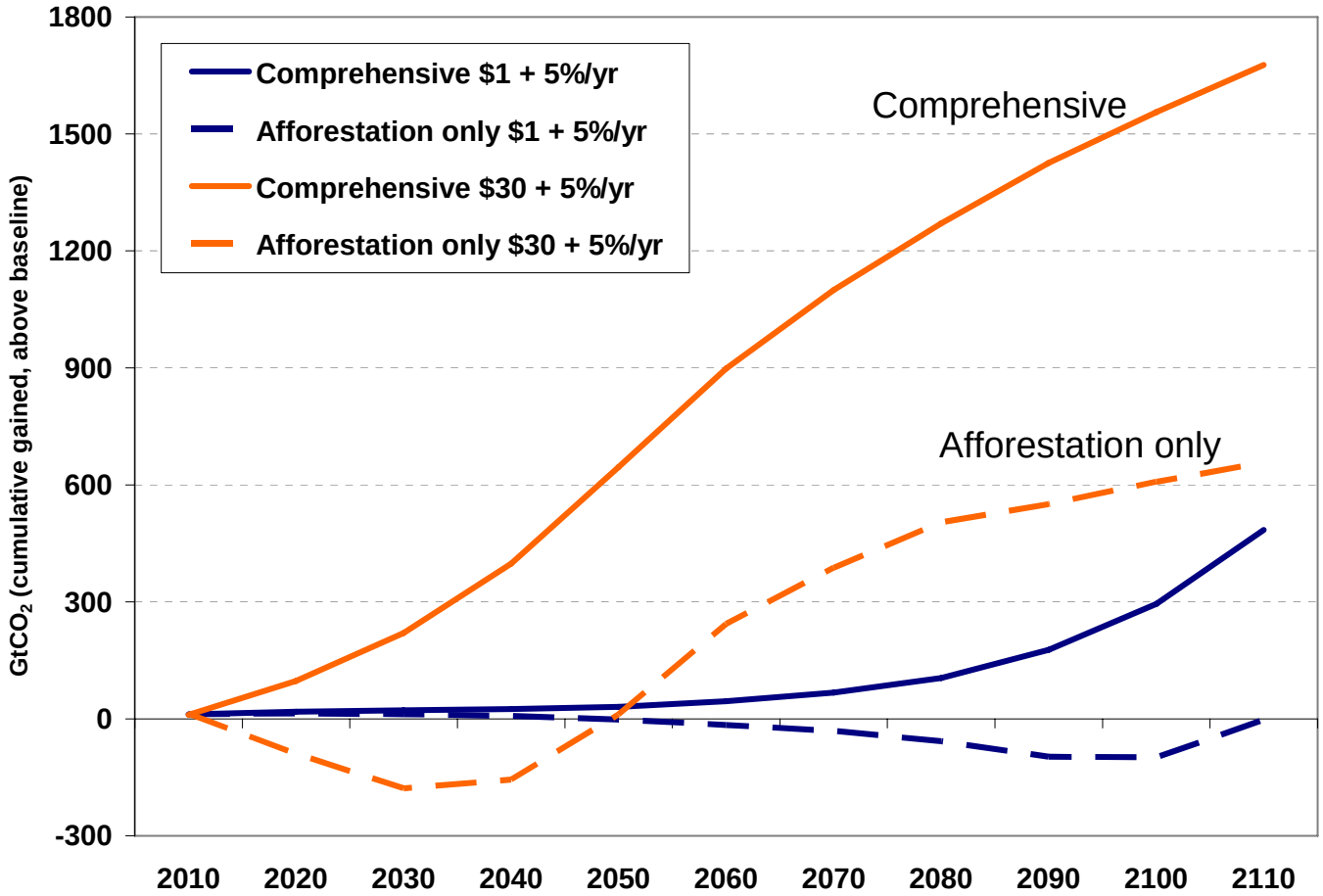
- The price?

Global forest carbon policy pathways

- Forest carbon policy likely to develop incrementally (geographically, sectorally, within sectors) – and may never be comprehensive
- What are the implications?
- The implementation issues have led to a policy preference for some forest carbon management options (i.e., afforestation)

Large scale afforestation could accelerate deforestation

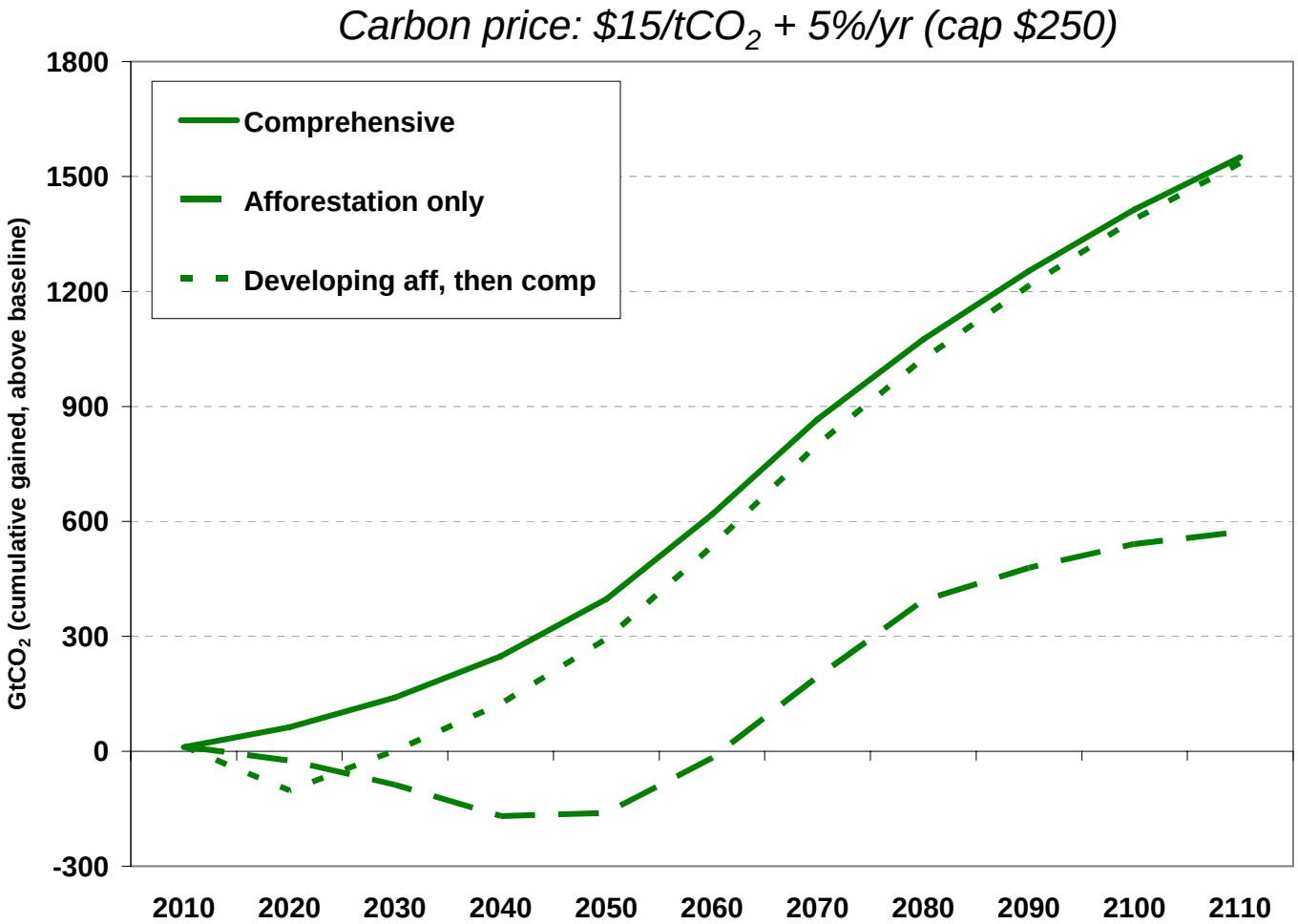
- Comprehensive = (afforestation, avoided deforestation (RED), and forest management)
- Increased bioenergy demand will increase cost of additional forest carbon



Source: Rose and Sohngen (forthcoming)

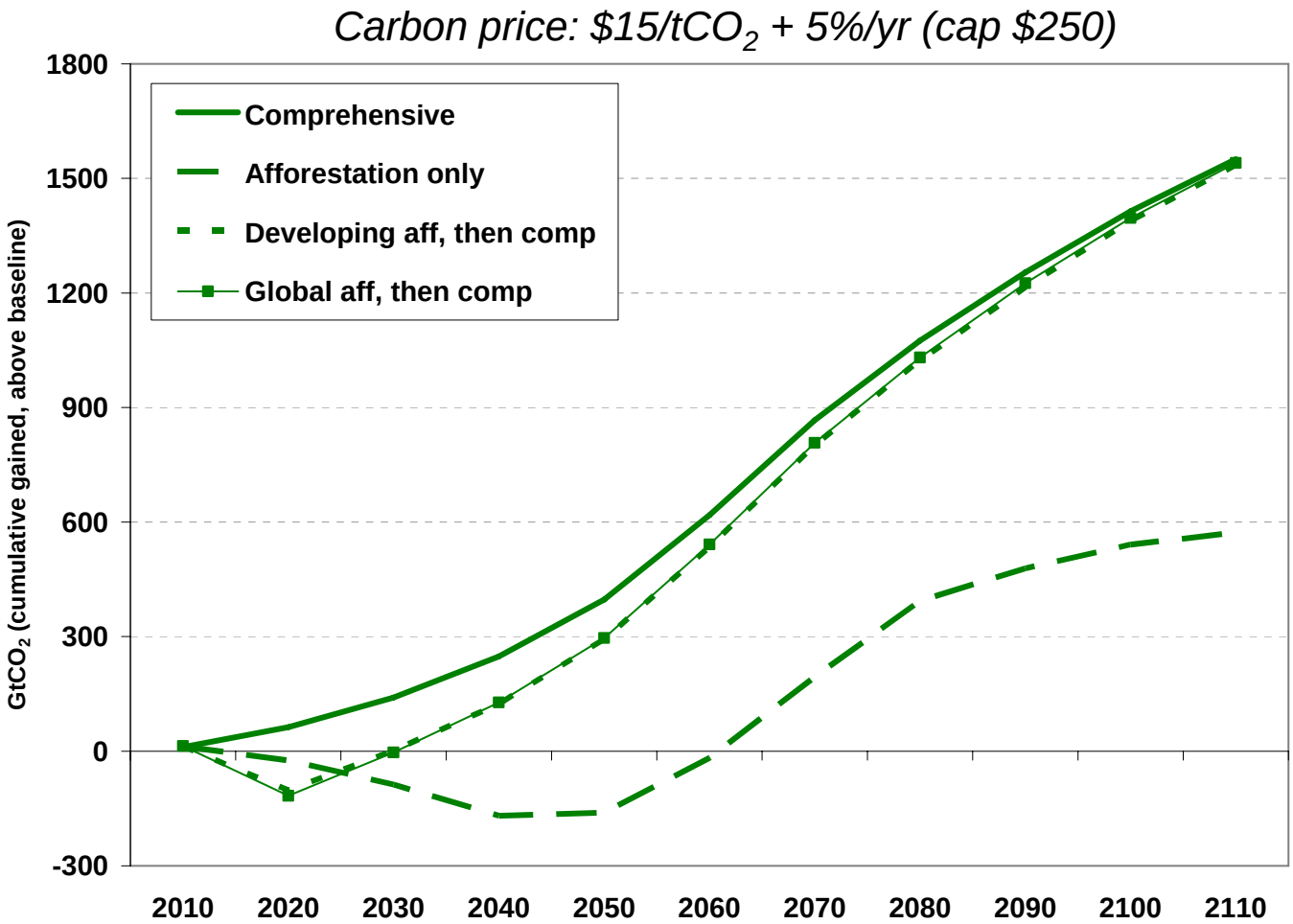
EPRI ELECTRIC POWER RESEARCH INSTITUTE

Developing – afforestation to 2025, then comprehensive
Developed – comprehensive all periods



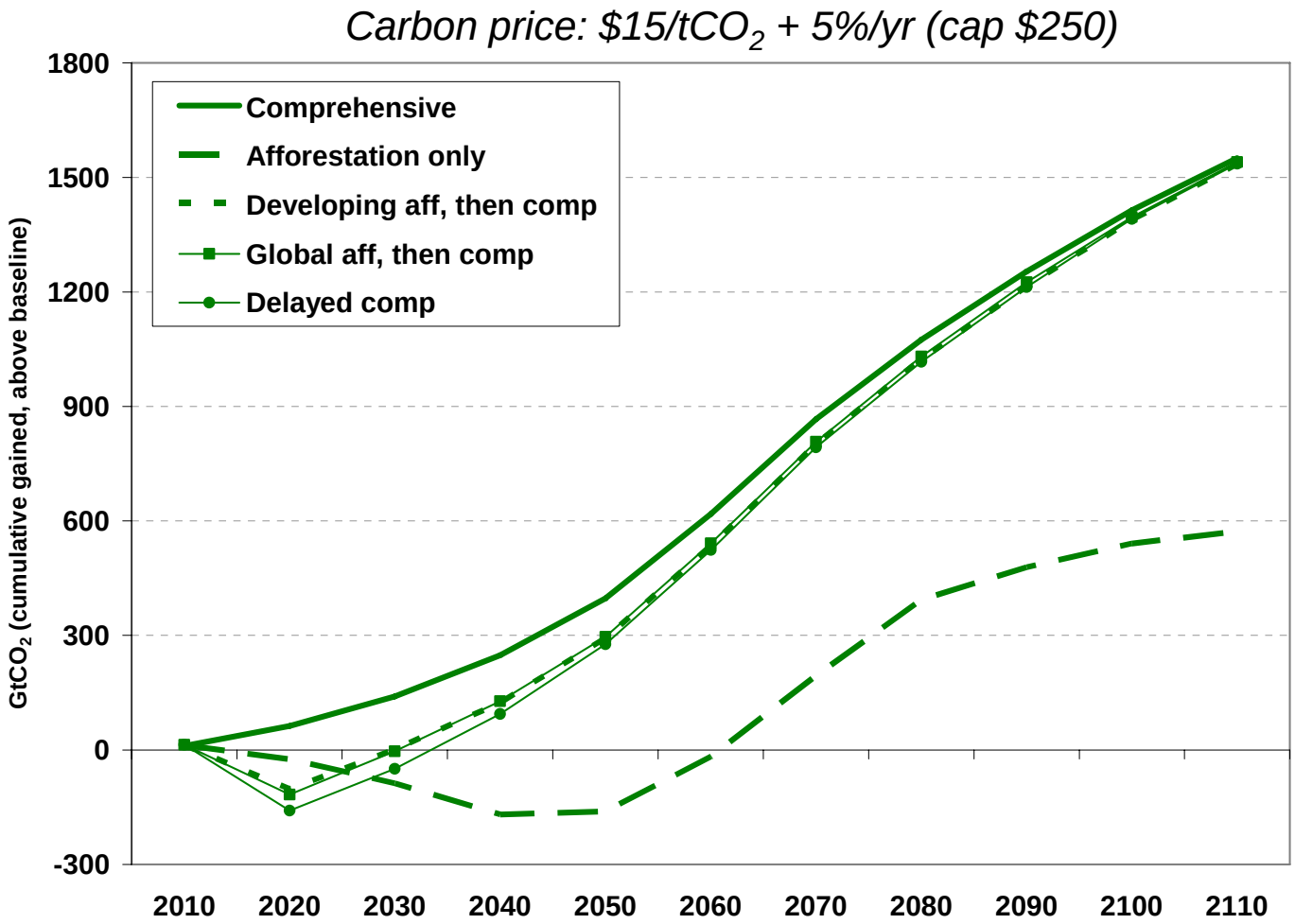
Source: Rose and Sohngen (forthcoming)

Global – afforestation to 2025, then comprehensive



Source: Rose and Sohngen (forthcoming)

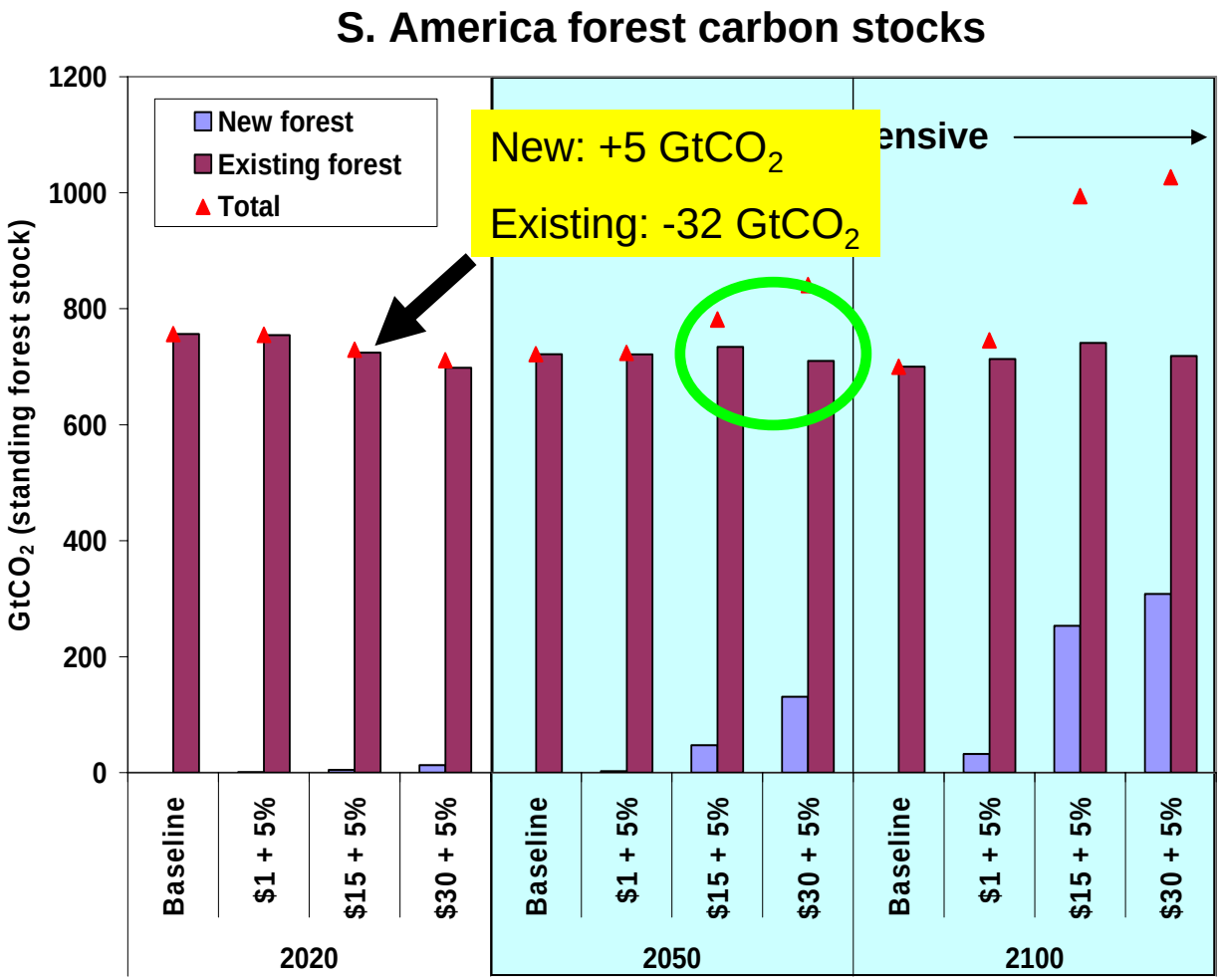
Global – nothing to 2025, then comprehensive



Source: Rose and Sohngen (forthcoming)

Forest changes

e.g., Developing afforestation to 2025, then comprehensive policy



Overview

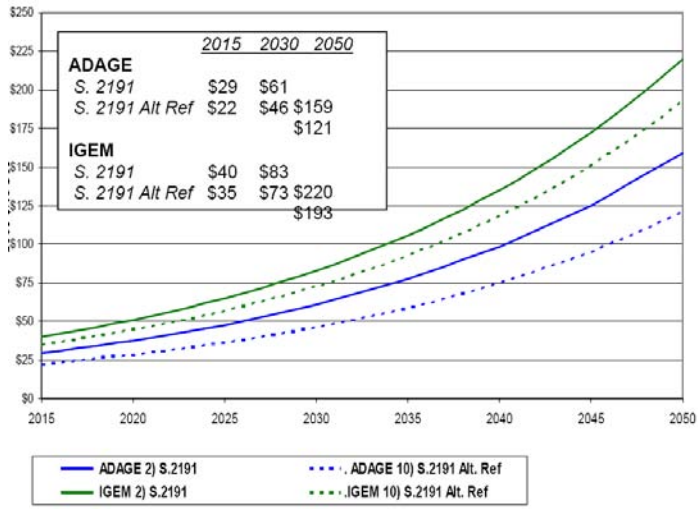
- Mitigation potential in current results

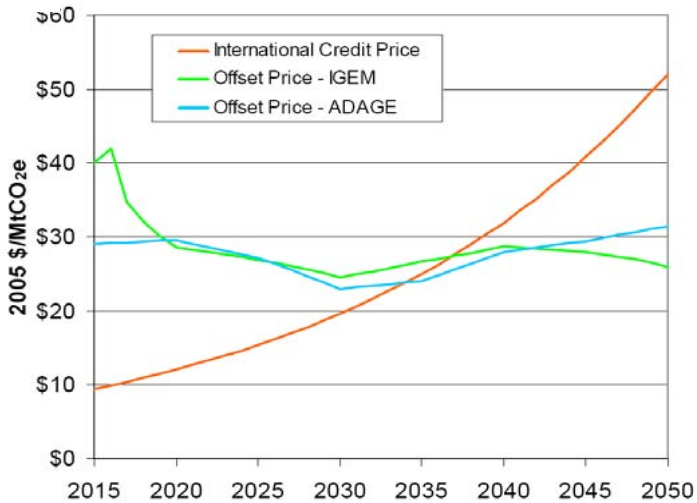
- New modeling
  - US abatement potential
    - Limiting/discounting the set of eligible options
  - International implications and policy synchronization
  - Evaluating global forest carbon policy pathways

- The price?

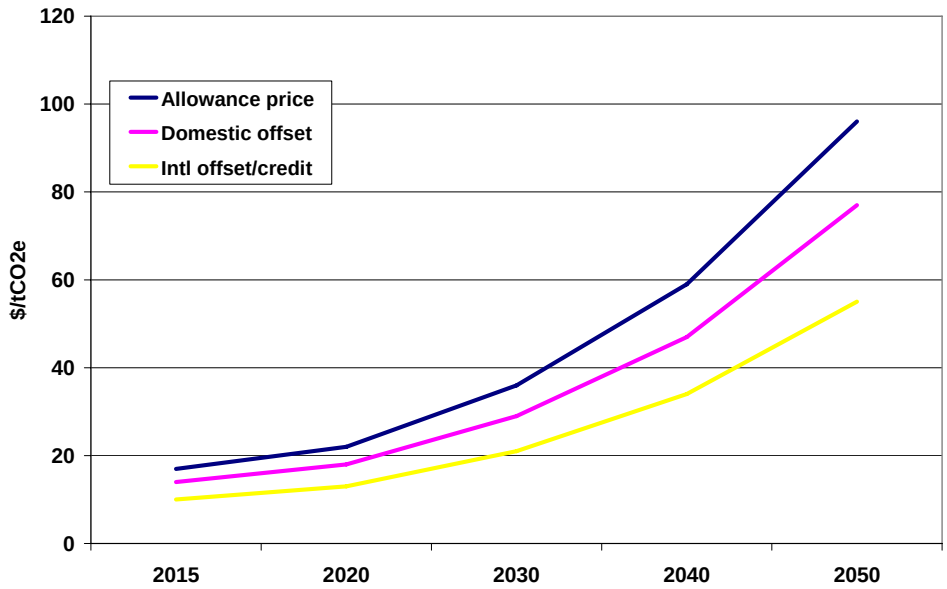
Secondary market

EPA Lieberman-Warner GHG Prices





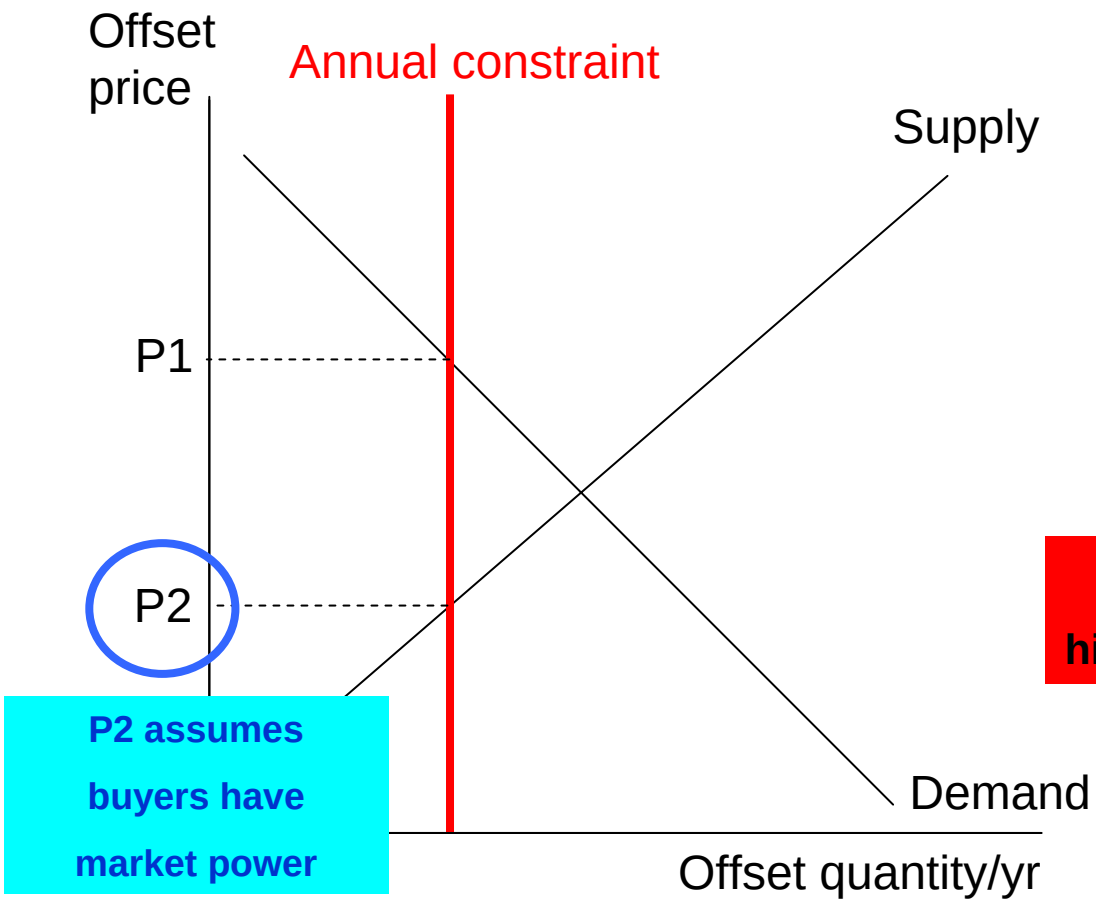
EPA Waxman-Markey ADAGE GHG Prices



EPRI ELECTRIC POWER RESEARCH INSTITUTE

Supply cost vs. market price

Who will have the market power?



P2 assumes buyers have market power

Another issue of constraint design – cumulative offset constraints (vs. annual) will increase fungibility

Bottom-line: price could be higher than shown in current analyses

Key insights

- **Forest (and agriculture) greenhouse gas mitigation potential is a function of…**
  - Climate policy design choices
  - Market and technological conditions
  - Climate policies abroad, and non-climate policies (domestic and international)
- **Forest carbon policy unlikely to be comprehensive, immediate, and global. Valuable to assess the implications in order to design more effective policies**
- **Global forestry (& agriculture) activities are not independent – i.e., not stackable**
  - Less than comprehensive policies will have leakage, but interactions between activities are even more complex
  - Abatement potential for an activity depends on the GHG incentives for other activities
  - Domestic mitigation potential is a function of international climate policy
  - Expectations of comprehensive policies can help manage leakage
- **Essential to consider interactions – through markets & biophysical conditions**
  - Between activities, countries, and over time
- **Buyers may not have market power – offset prices could be higher**
- **Forest policy transition will have welfare consequences – for climate objectives and for the mitigation burden placed on regions and other sectors**

Thank you!

Steven Rose
Global Climate Change Research Group
EPRI
(202) 293-6183
srose@epri.com