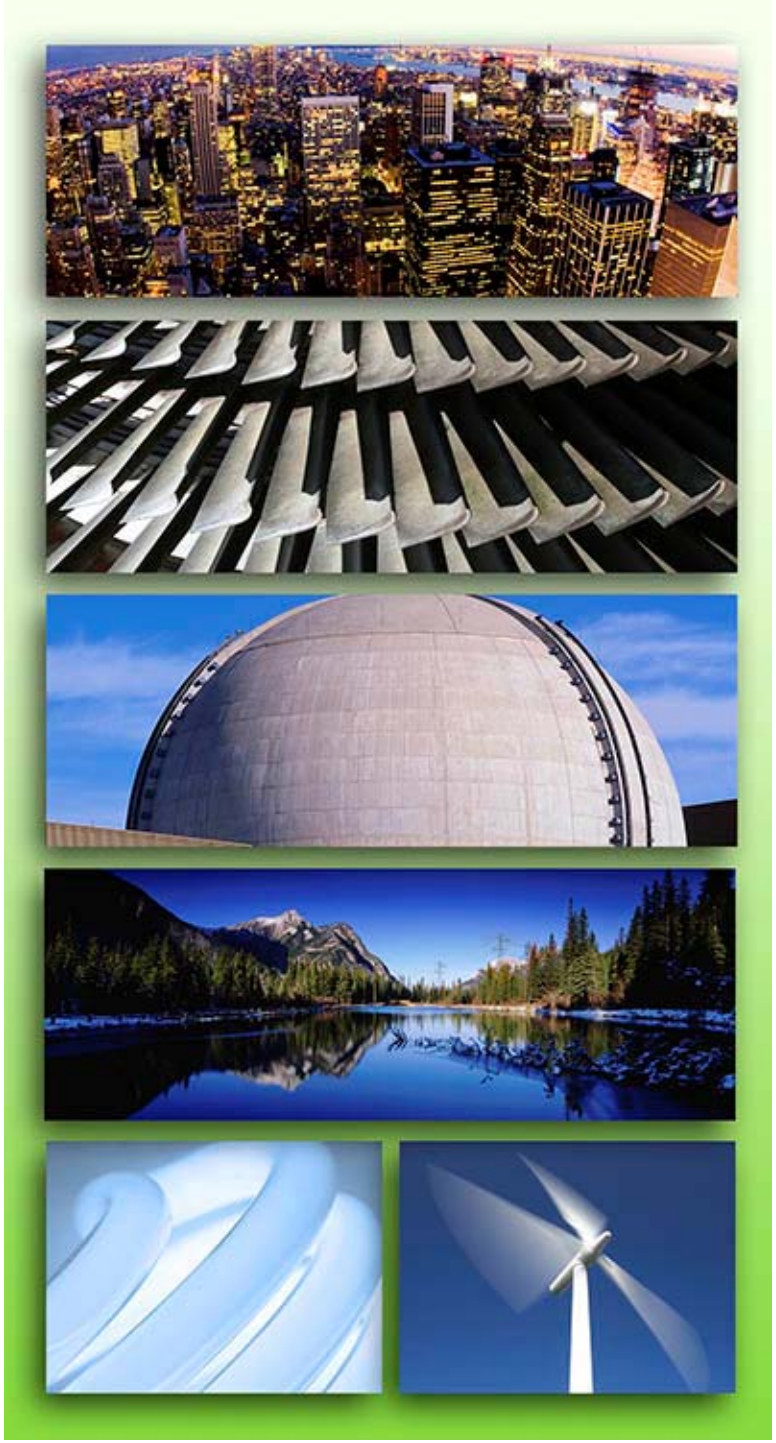

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EPRI Webcast:
GHG Emissions Offsets from Reduced Deforestation and Degradation (REDD)

Conference Call Information:

Toll-free: +1 (888) 645-7312

Participant code: 8748

Webcast Recording Notice

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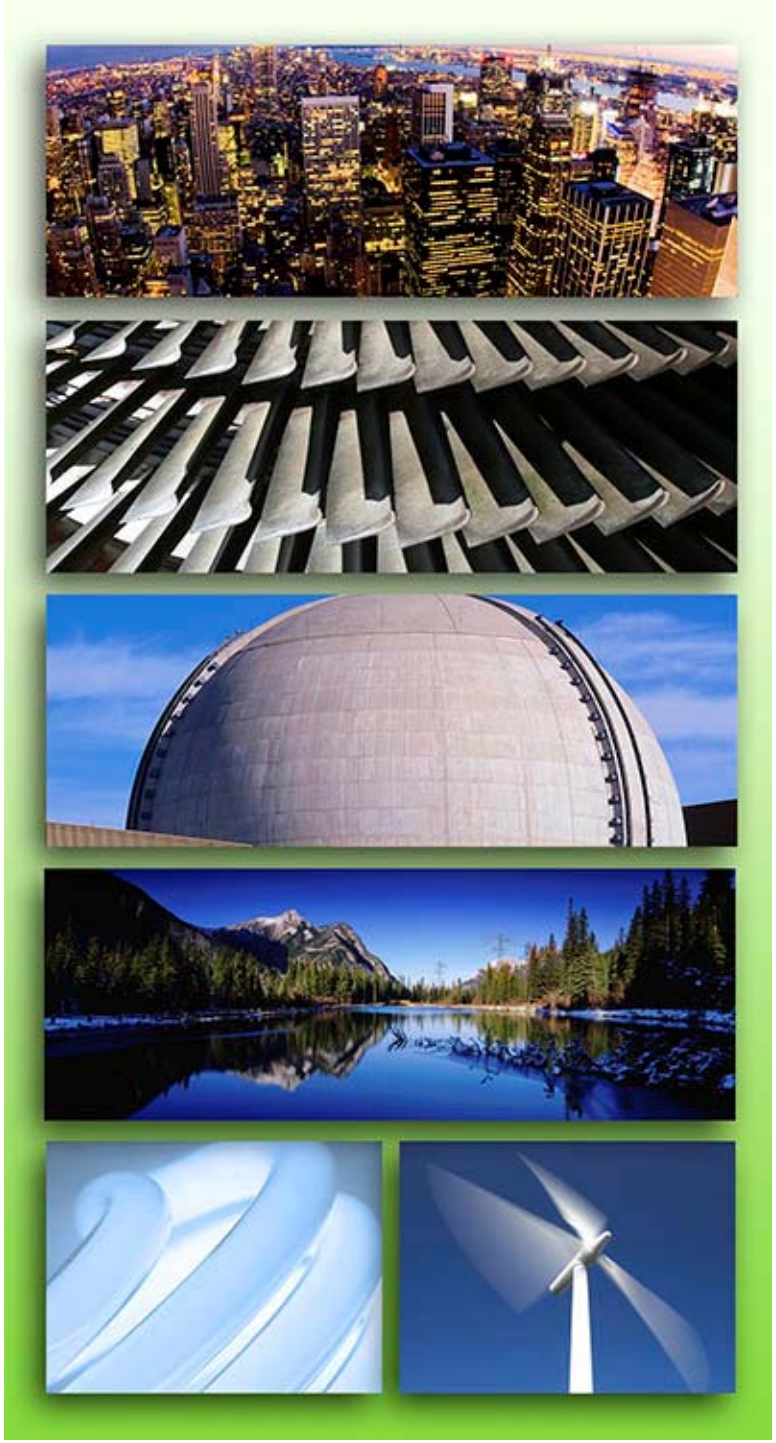

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Overview of Reduced Emissions from Deforestation and Degradation (REDD)

Summary of EPRI GHG Emissions Offset Policy Dialogue Workshop 5
Originally Held May 13, 2009

Adam Diamant
Senior Project Manager
Global Climate Research Program

Today's Topics

- Background – EPRI GHG Offsets Policy Dialogue
- The key role of tropical deforestation in climate change
- REDD technical issues
  - Developing country institutional capacity / governance
  - Appropriate baselines
  - Measurement, monitoring and verification (MM&V)
  - National versus sub-national programs
- REDD and the post-2012 international climate negotiations
- REDD and H.R. 2454 ("Waxman-Markey")

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Background – EPRI GHG Emissions Offset Policy Dialogue Project

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Goals of EPRI's GHG Emissions Policy Dialogue

- Inform key constituencies
- Provide a forum for discussion
- Build a common understanding of offset system design elements and issues
- Explore new ideas and approaches
- Discuss potential offset mechanisms

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EPRI Offset Policy Dialogue Participants

- Electric sector
- Financial sector
- Agriculture
- Oil and gas industry
- Industrial organizations
- Offset developers
- Congressional staff and CBO
- Federal agencies (EPA, State, Treasury, USDA)
- Non-governmental organizations (NGOs)
- Academics / research institutes

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Project Schedule

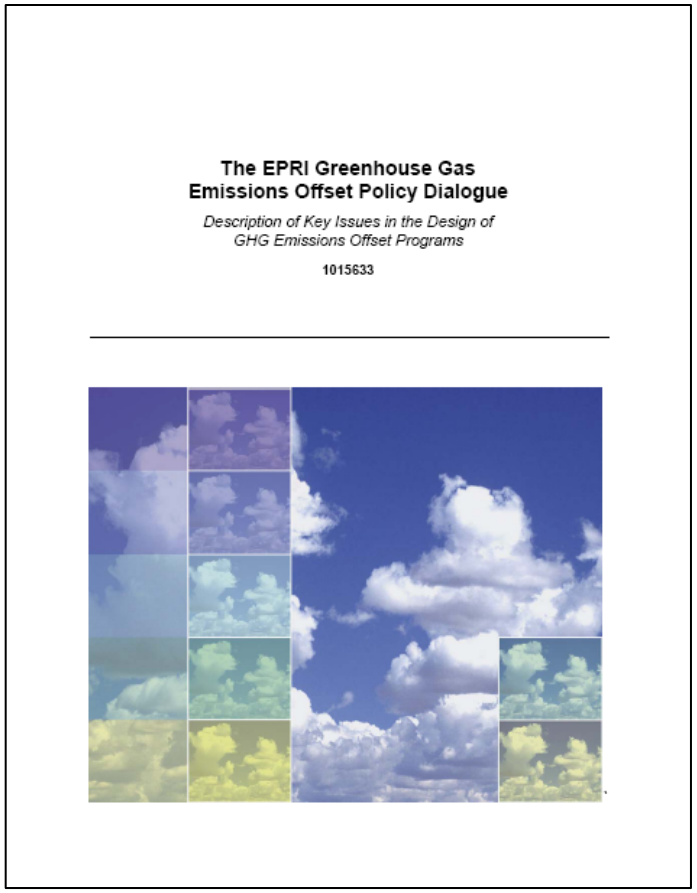
- 2008 Offset Workshops
  - June 26 – Workshop 1*(Existing Offset Systems)*
  - Sept. 10 – Workshop 2 *(Additionality & "Supplementarity" Limits)*
  - Nov. 20 – Workshop 3 *(Proposed Offset Policy Designs)*
- 2009 Offset Workshops
  - Feb. 19 – Workshop 4 (Forestry and Agriculture offsets)
  - May 13 – Workshop 5 (Reduced Emissions Deforestation and Degradation, e.g., "REDD")
  - July 30 – Workshop 6 ("Road Testing" of Offset Methodologies)
- EPRI Project Reports
  - 2008 – "The EPRI Greenhouse Gas Emissions Offset Policy Dialogue: Description of Key Issues in the Design of GHG Emissions Offset Programs." EPRI document # 1015633
  - 2009 – *Final project report to be published December 2009*

5th Workshop Meeting Materials

- Background paper on "*Key Issues in Designing Mechanisms for Reducing Emissions from Deforestation and Degradation*"
- Speaker presentations and other workshop materials to be available online at: http://globalclimate.epri.com/Greenhouse_Gas_Emissions_Offsets.html

Key EPRI Documents

- *"Guidance for Electric Companies on the Use of Forest Carbon Sequestration Projects to Offset Greenhouse Gas Emissions*" (2006) EPRI document #1012576.
- *"A Comprehensive Overview of Project-Based Mechanisms to Offset Greenhouse Gas Emissions" (*2007) EPRI document # 1014085
- *The EPRI Greenhouse Gas Emissions Offset Policy Dialogue: Description of Key Issues in the Design of GHG Emissions Offset Programs* (2008). EPRI document #1015633.


The EPRI Greenhouse Gas
Emissions Offset Policy Dialogue

Description of Key Issues in the Design of GHG Emissions Offset Programs

1015633

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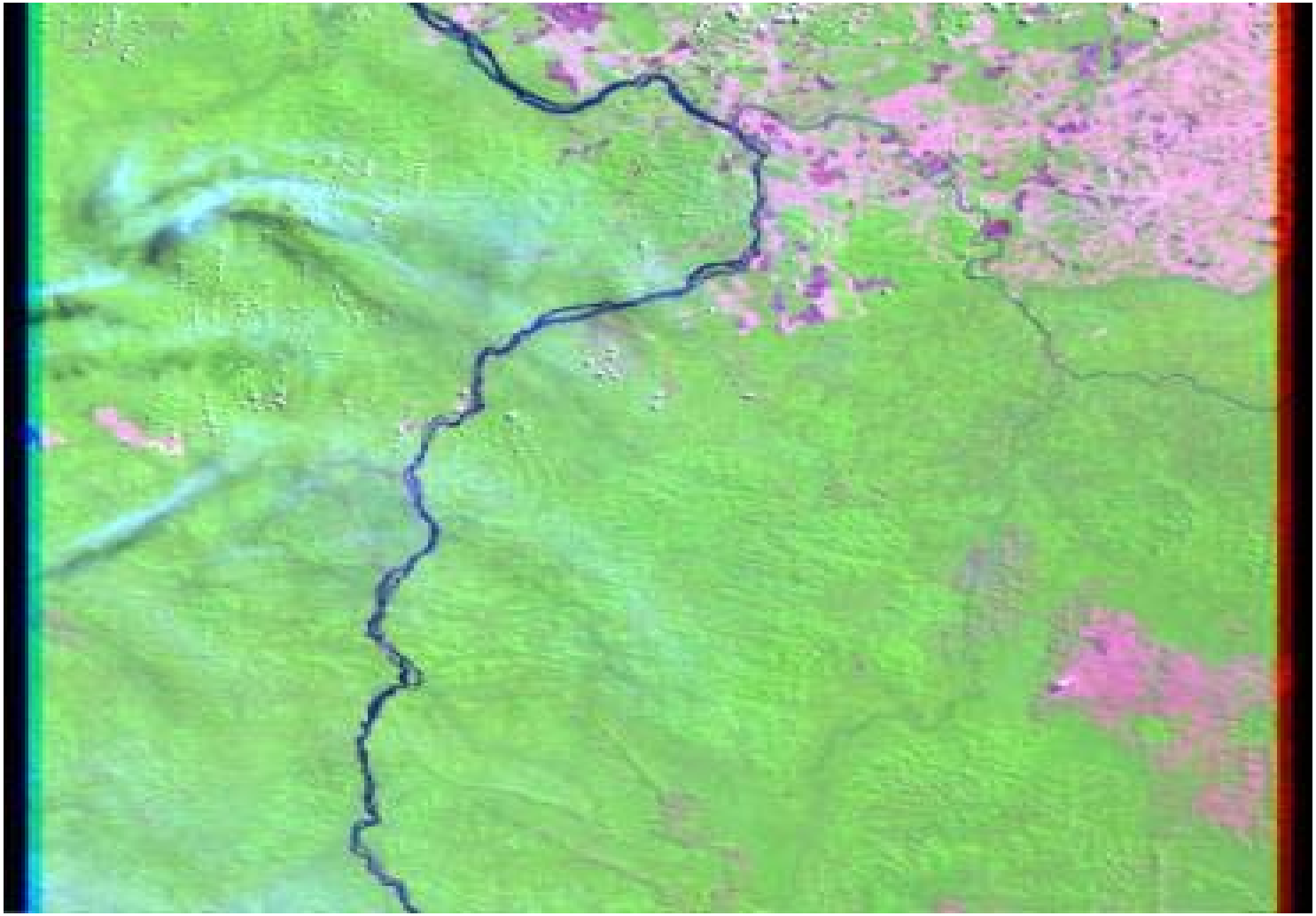
The Key Role of Tropical Deforestation as a Driver of Global Climate Change



What are RED, REDD and REDD+?

- RED = Reducing Emissions from **Deforestation**
- REDD = "…" **Deforestation** and (forest) **Degradation**
- REDD+ = "…" **Deforestation,** (forest) **Degradation +** other **forest carbon stock changes**
  - Deforestation is the *conversion of forest land to another land use*, such that there is a *long-term reduction of forest cover to below a 10% canopy* cover threshold.
  - Forest degradation refers to "…changes within the forest which *negatively affect the structure or function of the stand or site*, and thereby lower the capacity to supply products and/or services… [It] takes the form of *large canopy gaps, fragmentation, active fire, and burned area, [and] is often caused by selective logging operations*, which usually do not reduce canopy cover to as great an extent as full land conversion."

Notes: Definitions by CIFOR and FAO.

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Key Role of LULUCF in Global Climate Change

- LULUCF is the 2nd largest source of annual global CO_2 emissions after fossil fuel consumption.[1]
  - Annual fossil CO_2 emissions = 26.4 $GtCO_2$ (2000-2005)
  - Annual LULUCF CO_2 emissions = 5.8 $GtCO_2$ (since 1990)
- LULUCF accounts for ~20% of annual global CO_2 emissions!
- FAO estimates global deforestation at 13 million ha/yr (1990-2005)[2].
  - Brazil accounted for ~50% of global deforestation in the humid tropics 2000-05
  - Amazonian deforestation accounted for ~60% of the total 2000-05

Notes: 1. IPPC 2008, AR4, Working Group 1.
2. FAO, Global Forests Resource Assessment 2005.

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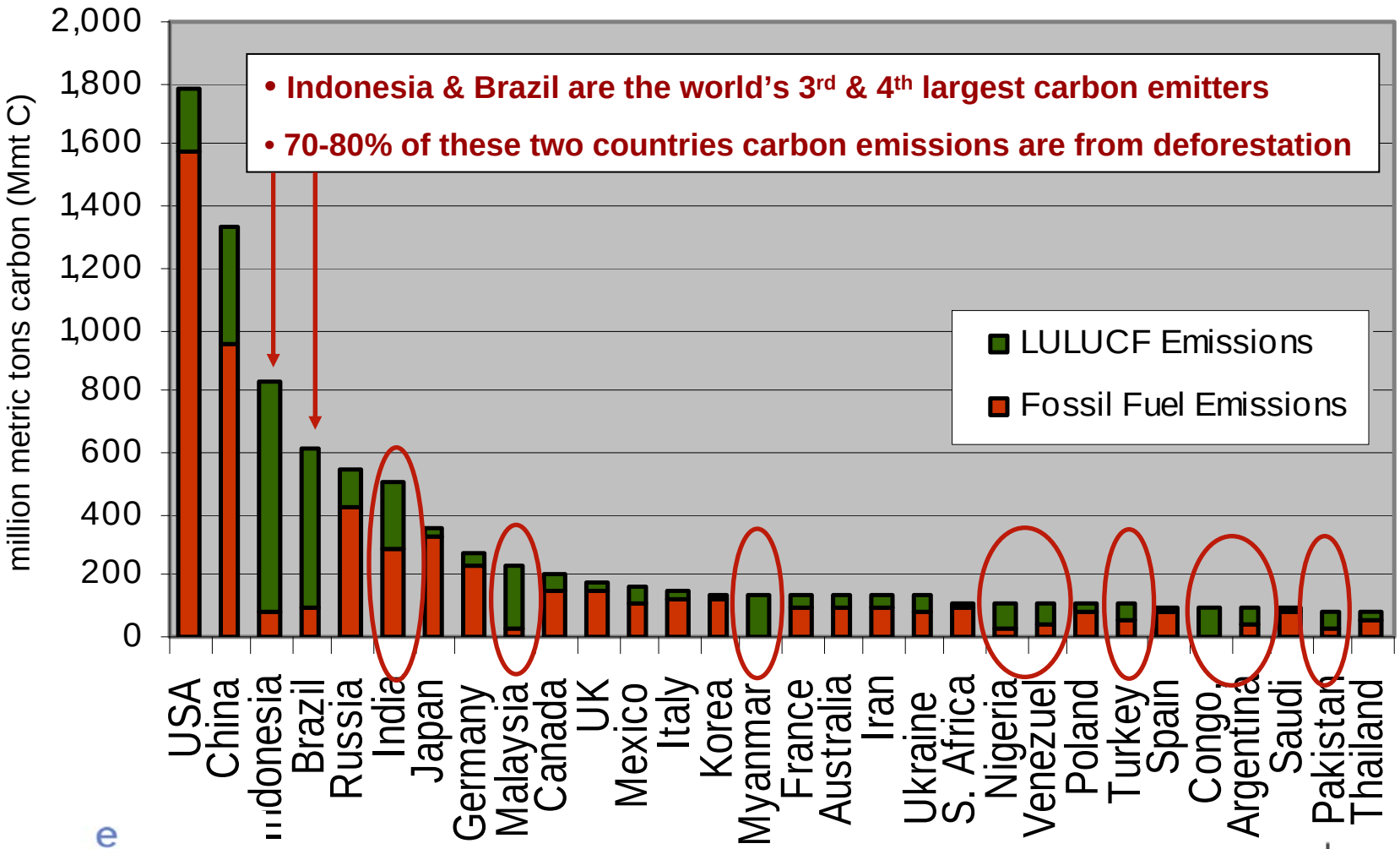
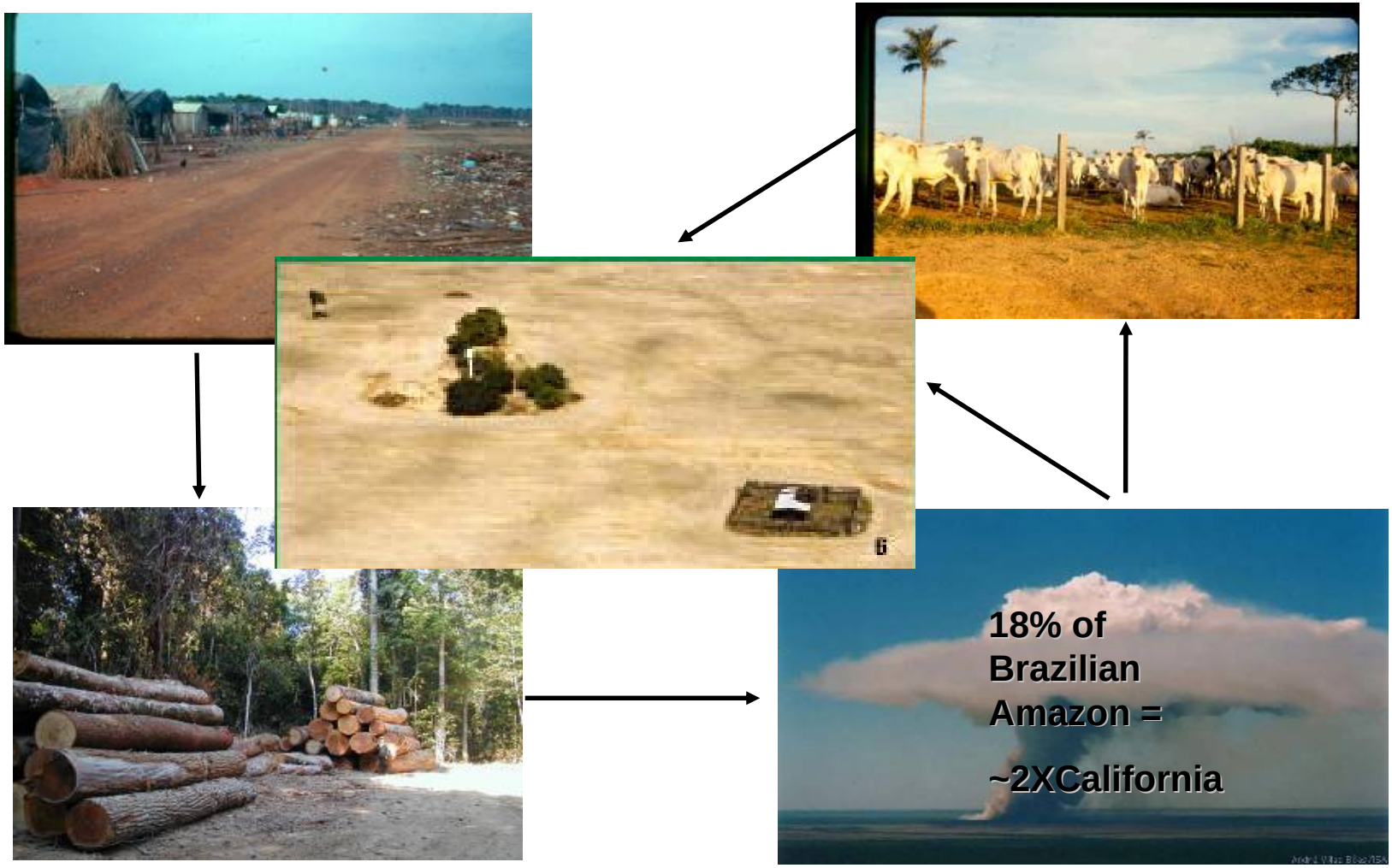
Carbon Emissions of Top 30 Countries in 2000



Drivers of Deforestation – Many Activities are Worth More Money Today Than Living Forest



Developing Countries Need Institutional Capacity & Effective Governance for REDD

- Government stability
- Rule of law
- Enforcement capability
- Effective control of corruption
- Recognition and respect for private property rights
- Measurement, monitoring and verification
- Respect and inclusion of indigenous peoples

Some Concerns About Including REDD in Domestic and international Climate Policy

- Some claim REDD offsets could “flood” the carbon market, dramatically reduce CO_2 prices and reduce incentives for investment in CO_2 abatement and low-emitting generation.
- Some claim REDD-based offsets will take away control of forest resources from indigenous groups and destroy their culture and ways of life.
- Concern about sending $US to developing countries such as Brazil and Indonesia in exchange for emissions abatement.
- National versus sub-national REDD programs.
- Technical challenges
  - Measurement, monitoring and verification (MMV)
  - Baseline and additionality determinations
  - Permanence and Leakage

Opportunity for REDD-Based Mitigation

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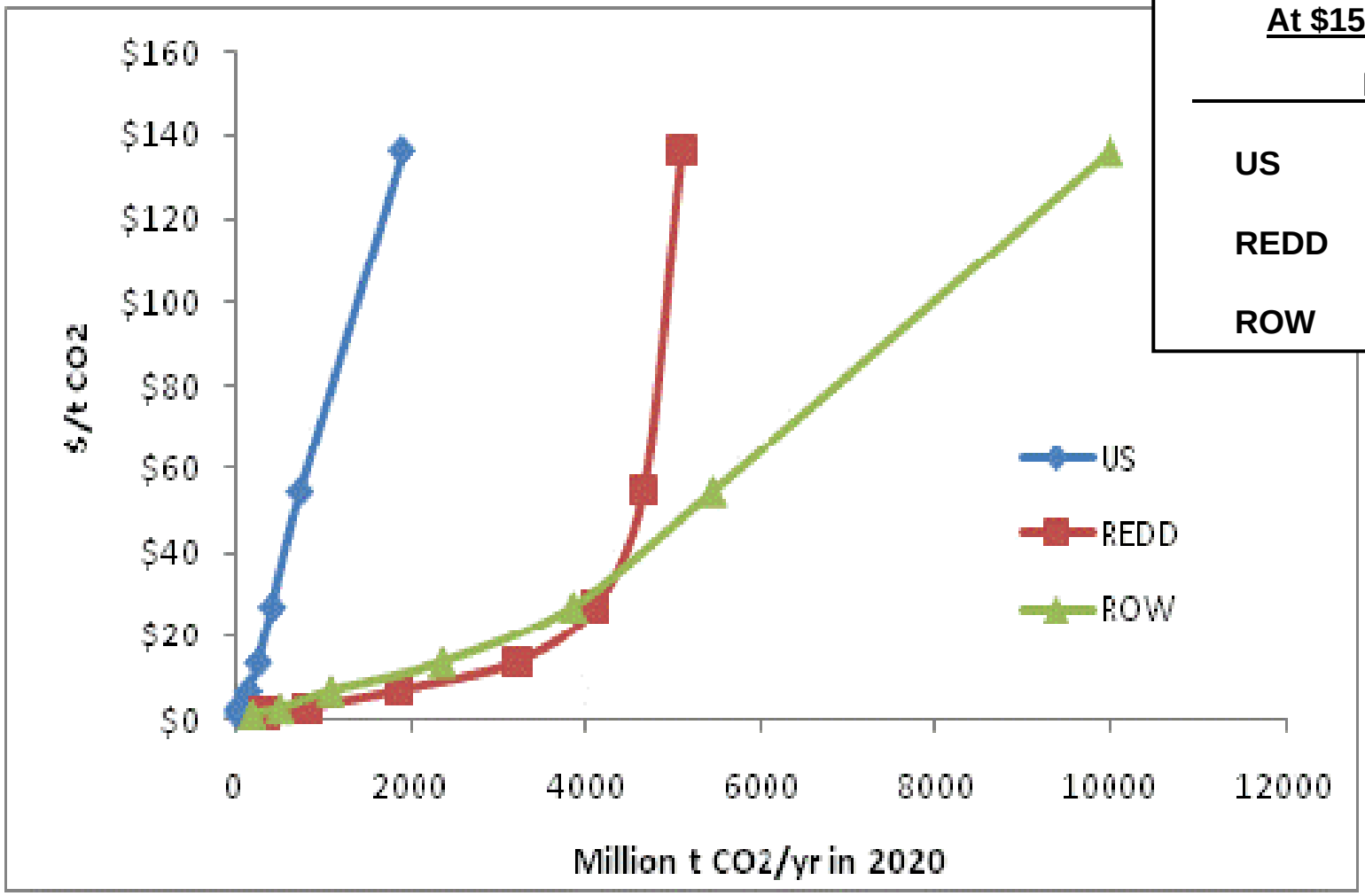
REDD Mitigation Potential

Comparison to US and ROW (Estimates for 2020)



At $15/t CO_2	$MMtCO_2/yr$
US	271
REDD	3,312
ROW	2,530

Source: Global Timber Model (Sohngen and Mendelsohn, 2007; Sohngen and Sedjo, 2006)

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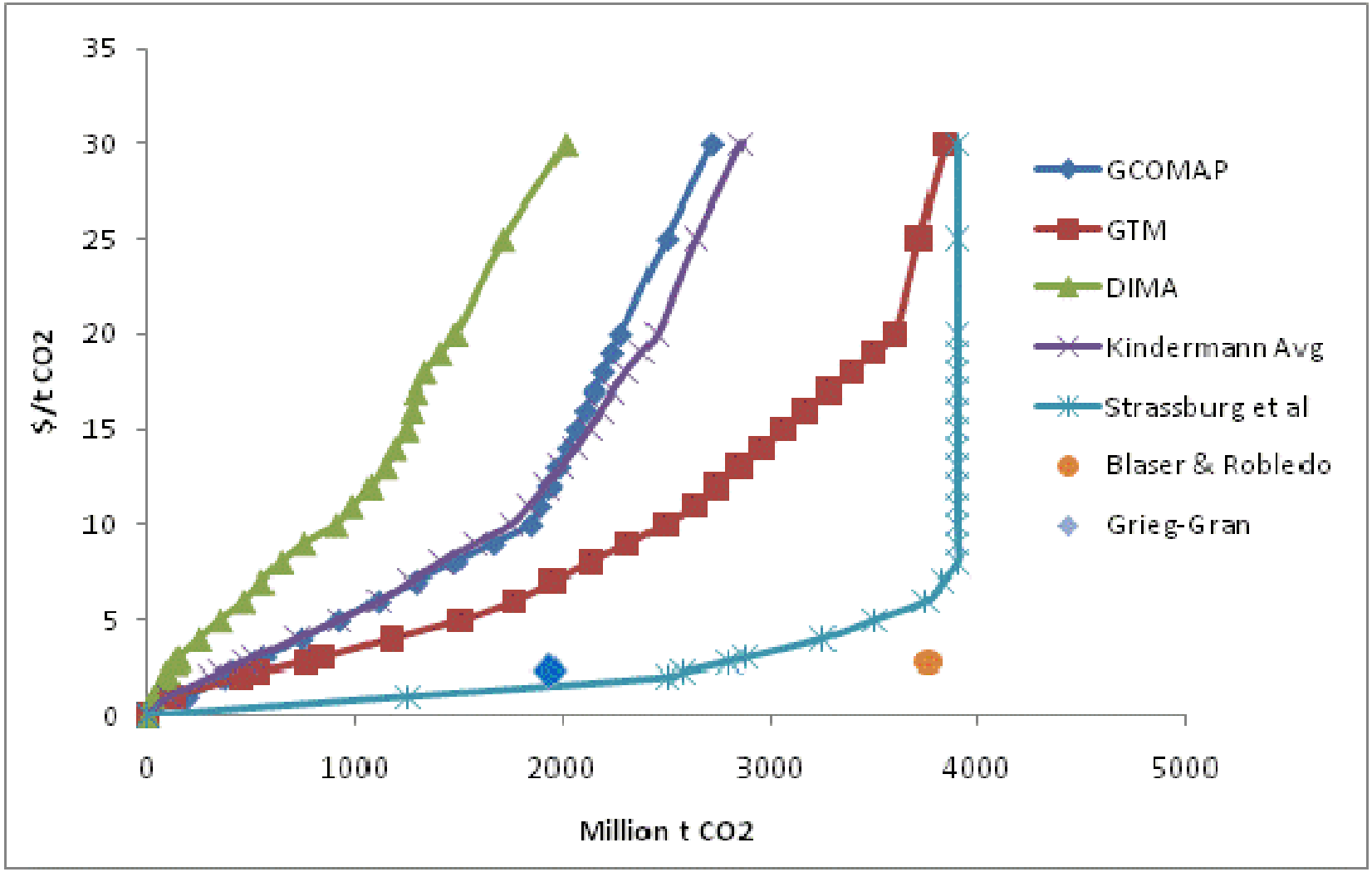
REDD: Range of Costs ($/t$CO_2$)



Source: Murray et al., (2009)

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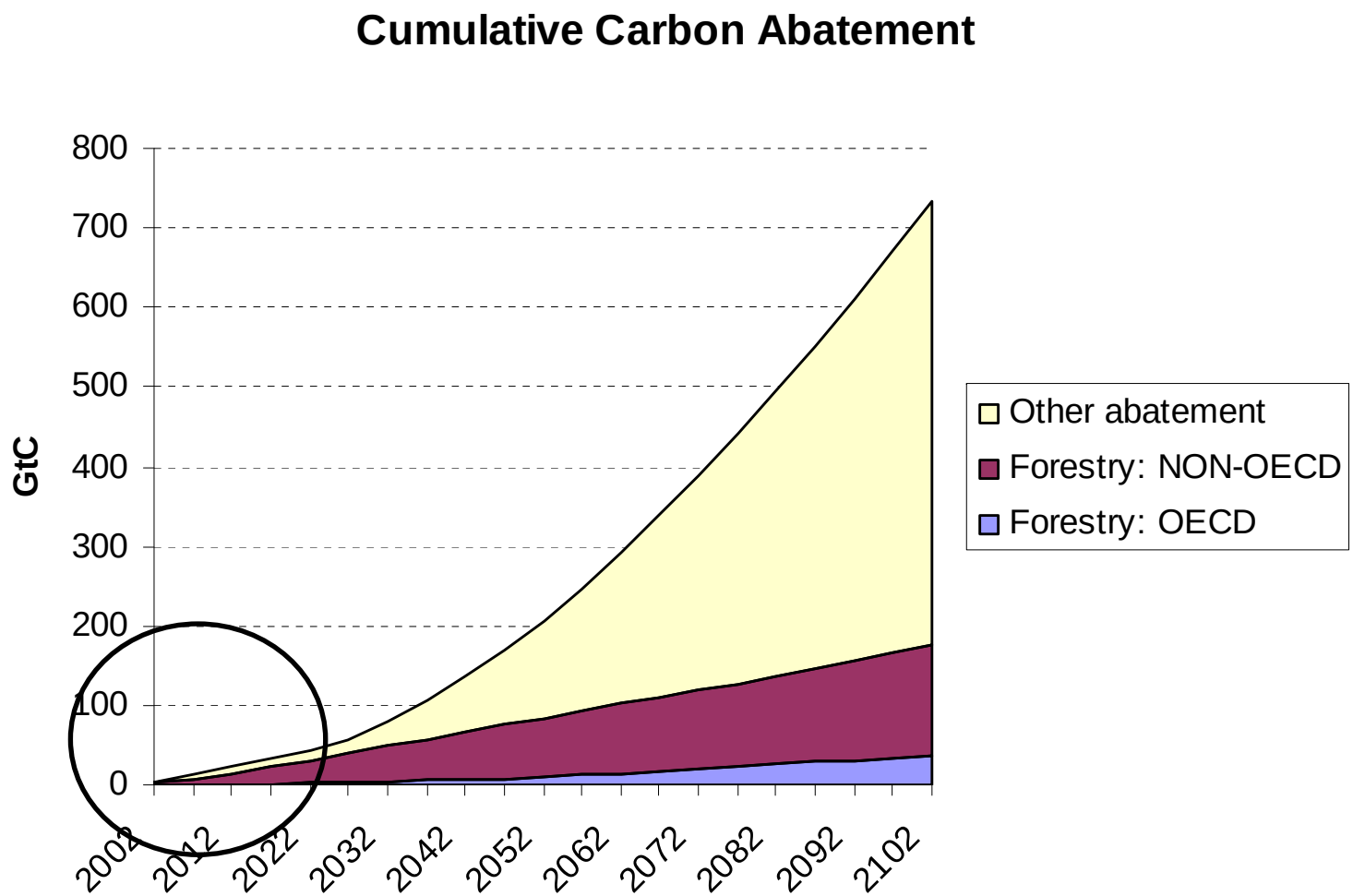
REDD is >70% of Abatement Potential Over the Next 25 Years (for 550 PPM Stabilization)



Source: Tavoni, Sohngen, and Bosetti (2007)

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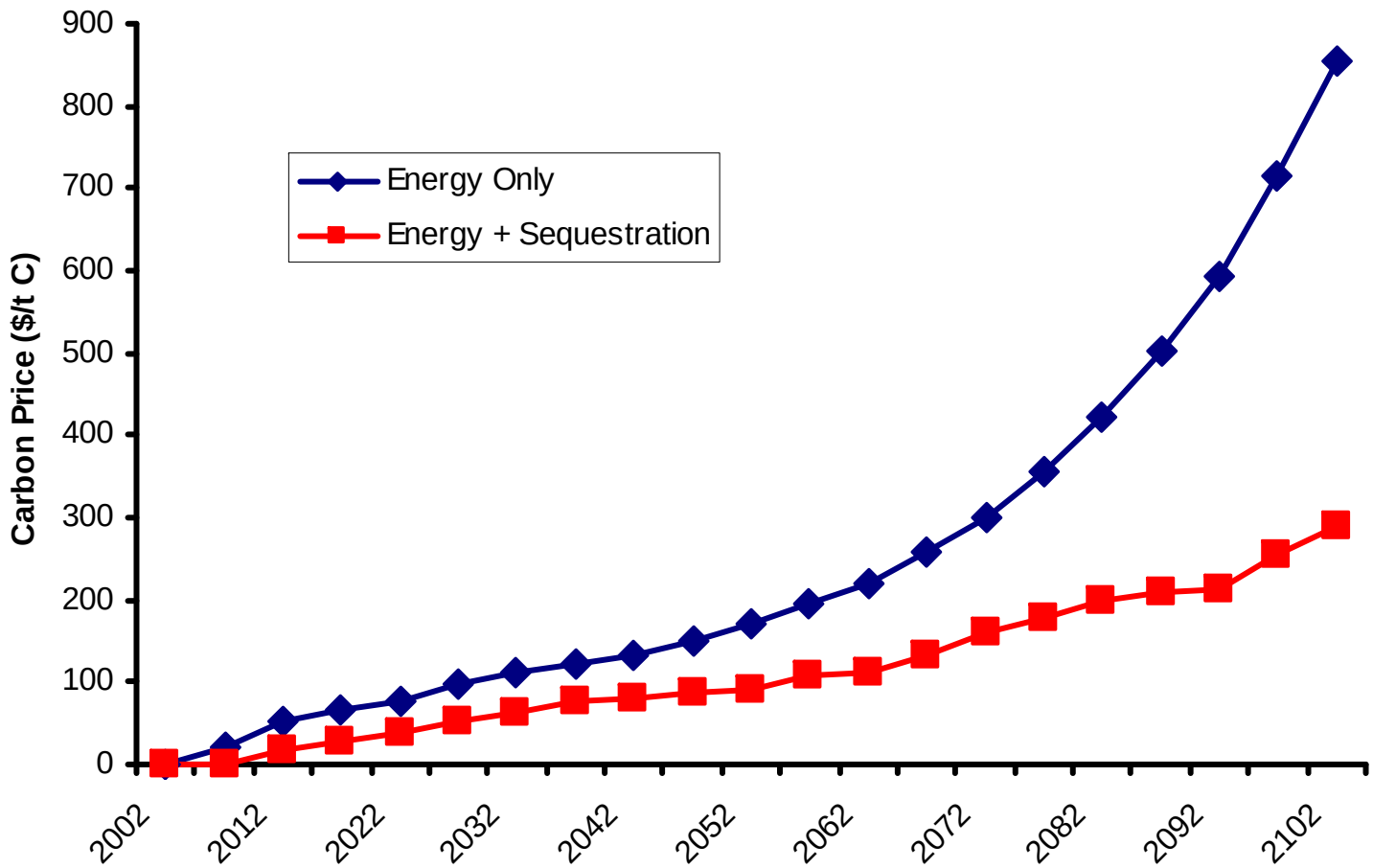
REDD Reduces Carbon prices by 40-50% Over the Next Century



Source: Tavoni, Sohngen, and Bosetti (2007)

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Costs/Benefits

Stabilization at 550 ppm

	US	Other Temperate	Tropics	Total
	Present Value of Carbon Asset (Billion US$)			
Baseline	$111	$594	$1,153	$1,858
Scenario	$168	$919	$2,024	$3,111
Gain	$57	$325	$871	**$1,253**

Benefit of Including Forests:
Consumption gain = $3 trillion

Source: Tavoni, Sohngen, and Bosetti (2007)

Costs/Benefits

Stabilization at 550 ppm

	US	Other Temperate	Tropics	Total
	Present Value of Carbon Asset (Billion US$)			
Baseline	$111	$594	$1,153	$1,858
Scenario	$168	$919	$2,024	$3,111
Gain	$57	$325	$871	**$1,253**
Annual Value of Gain	$2.87	$16.37	**$43.88**	$63.12

Transfer to Developing Countries:

$44 billion per year

Average Payment = $70/ha/yr

Source: Tavoni, Sohngen, and Bosetti (2007)

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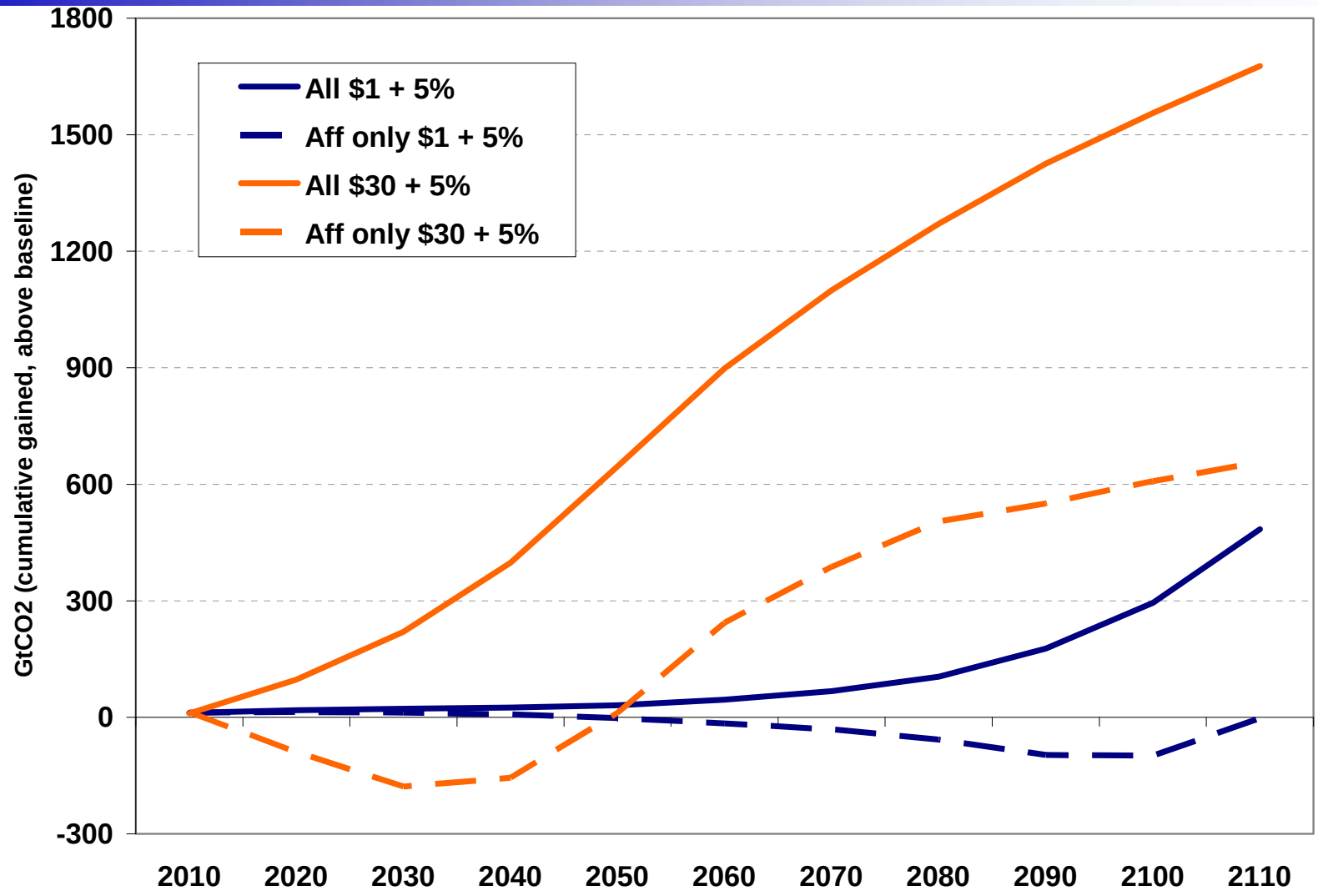
Can We Afford a Policy that Ignores Deforestation?



Source: Rose and Sohngen (forthcoming)

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REDD Baselines

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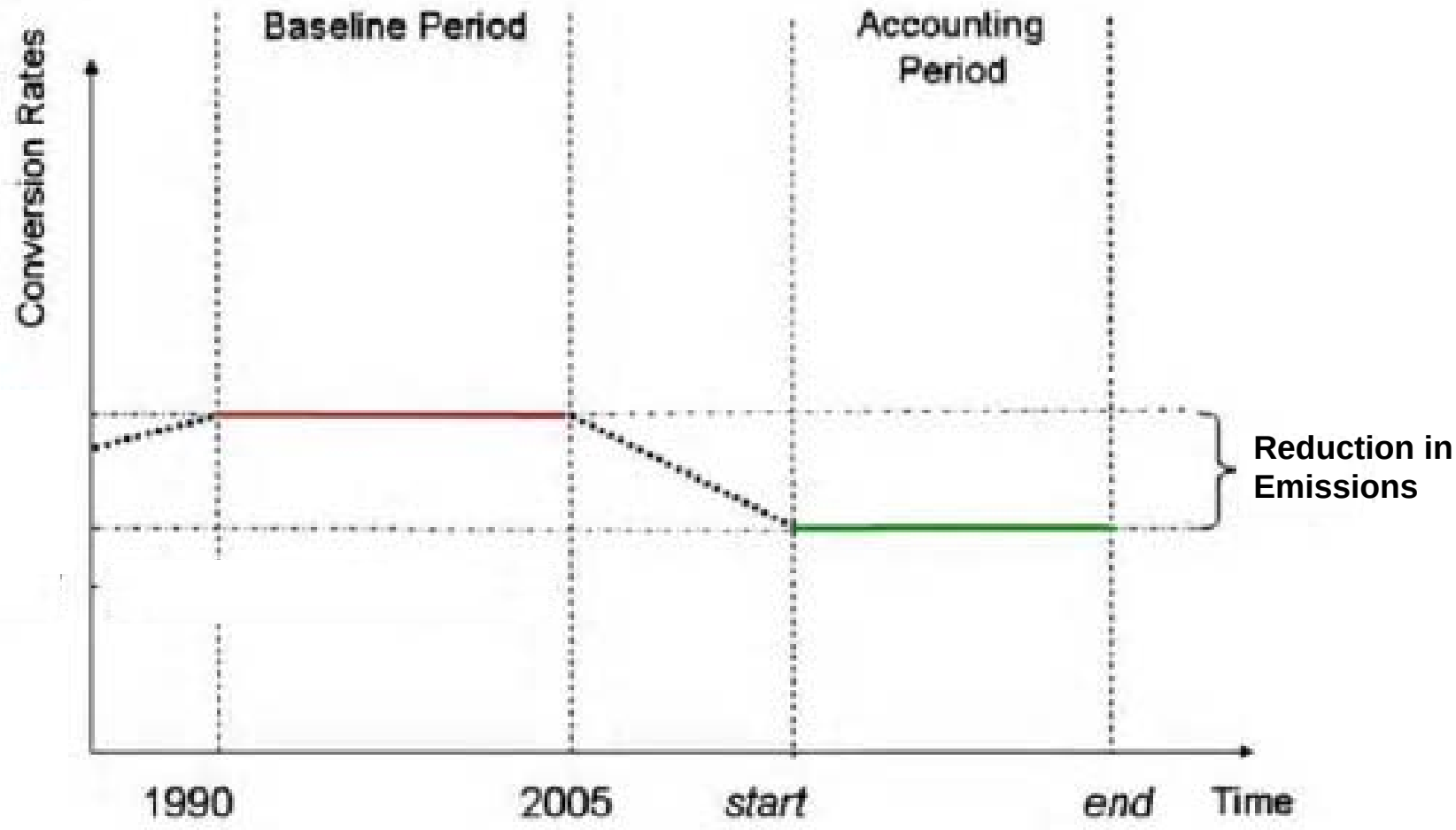
REDD Baselines

- Defining an appropriate baseline for deforestation rates and associated GHG emissions for countries participating in a REDD crediting mechanism is a fundamental challenge for creating REDD-based GHG offsets.
- There are several approaches to REDD baselines:
  - Historical average deforestation rates (e.g., last 5 years)
  - Stock / average emission baselines
  - Future Projections
    - *Model-based projections* which takes into account the drivers of deforestation and present and future responses under BAU
    - "*Economically rational*"' deforestation baseline
  - Policies designed to reduce or stop deforestation in a defined period of time (e.g., National Deforestation Emissions Baseline in the WM Discussion Draft)

Reference Levels Determine Countries' Level of Reduction and Payment



Source: Mollicone *et al*, 2007

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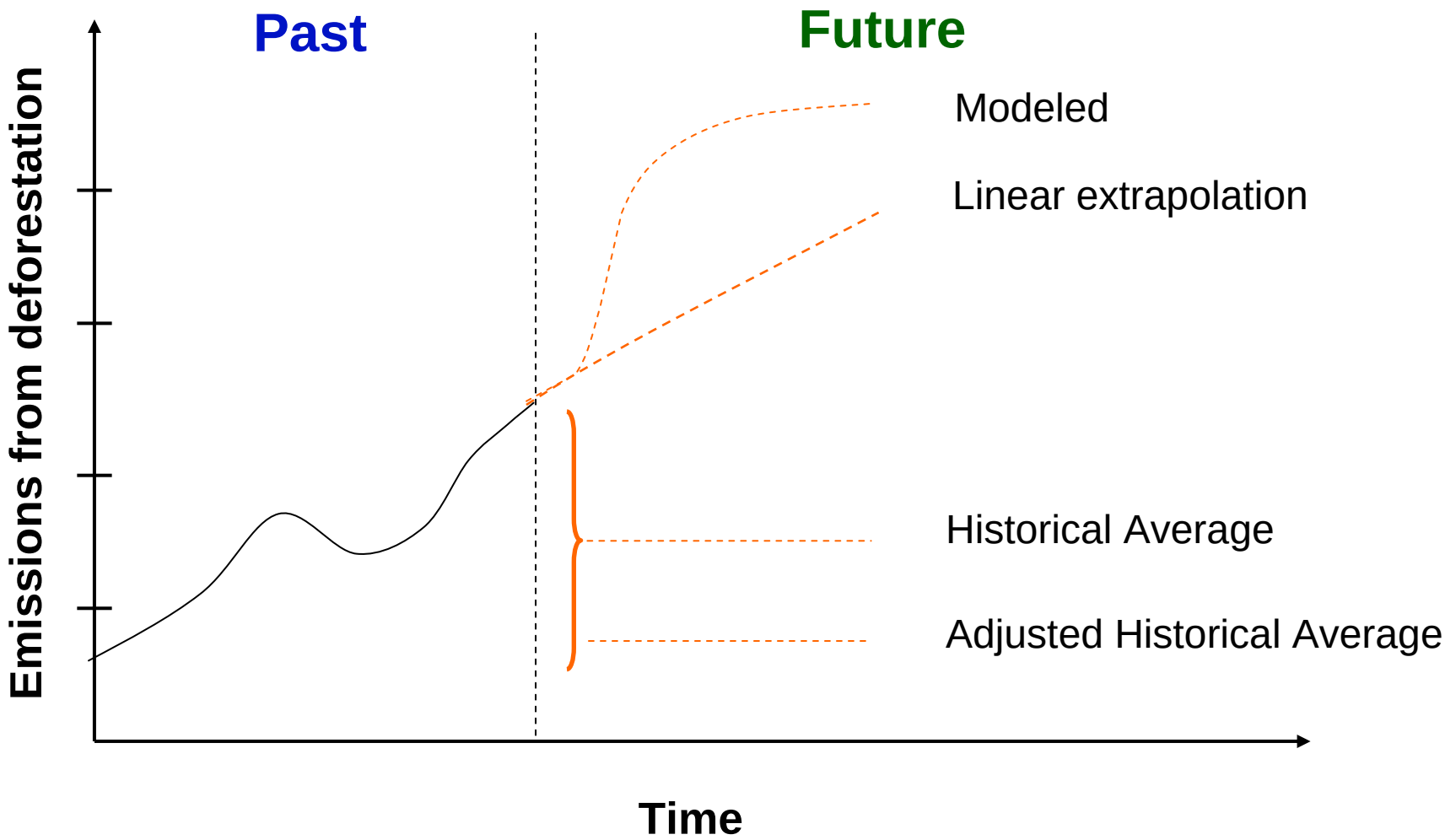
How to Determine the Reference Level?



Source: Based on presentation by Jonah Busch, Conservation International, Washington D.C., May 13, 2009.

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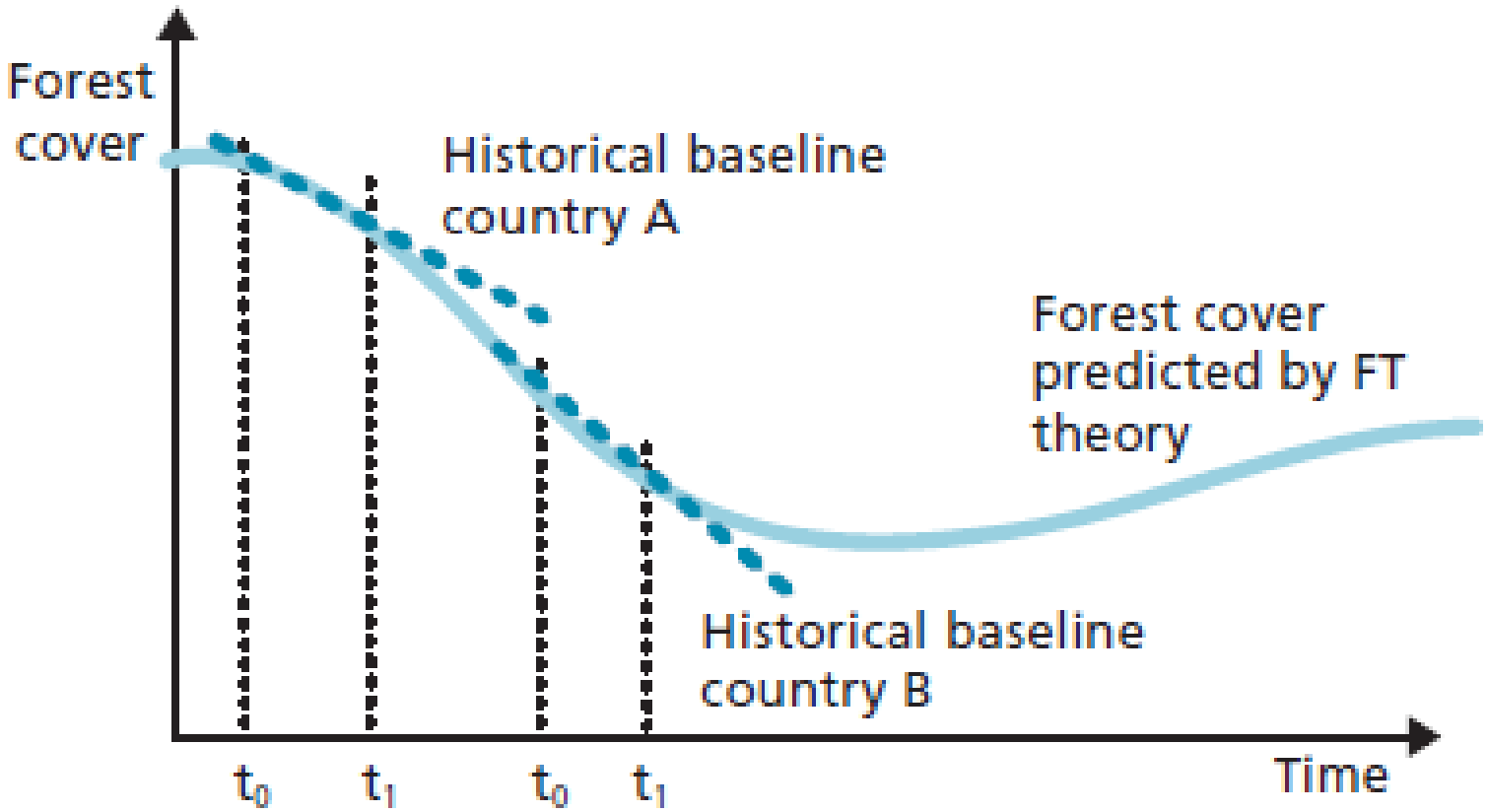
Forest Transition Curve
(Source: Angelsen et al, 2009)



- **Historical baselines under predict BAU in high forest countries (A)**
- **Historical baselines over predict BAU in low forest countries (B)**

Mather, A.S. (1992). The forest transition. *Area*, 24(4):367-379.

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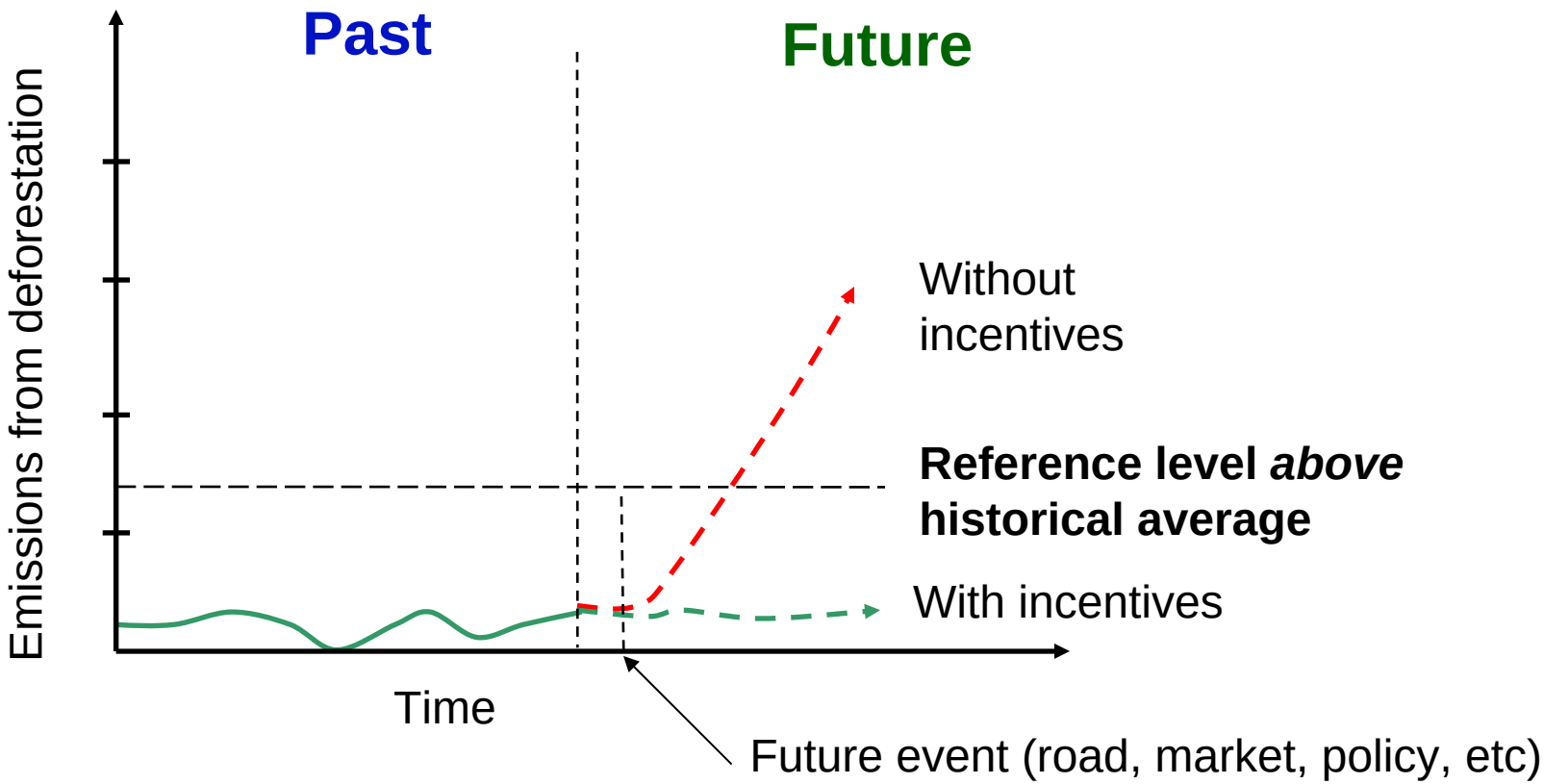
How to Prevent Emissions from Deforestation in Countries with Low Historic Deforestation Rates?



Source: Based on presentation by Jonah Busch, Conservation International, Washington D.C., May 13, 2009.

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REDD Reference Level Design Options Compared

Design option	Reference	Description
"Without REDD"	FAO FRA (2005)	Counterfactual business as usual scenario
"National historical"	Santilli *et al* (2005)	Reference rate is historical for all countries
"Higher than historical for countries with low deforestation rates"	Mollicone *et al* (2007); da Fonseca *et al* (2007)	Reference deforestation rate is 0.3% for low-deforestation countries; Baseline is historical for high deforestation countries
"Weighted average of national and global"	Strassburg *et al* (2008)	Reference rate is 0.6*global average rate+ 0.4*historical rate for all countries
"Flow withholding and stock payment"	Cattaneo *et al* (2008)	Reference rate is historical for all countries; 30% "withholding" on flow payments to pay for stock payments
"Uniform fraction of at-risk stock"	Ashton *et al* (2008)	Reference level is 1% of at-risk forest for all countries; 80% of total forest is assumed to be at-risk in all countries
"Cap and trade for REDD"	Eliasch (2008); For comparison only	Cap is historical for all countries; countries above cap must purchase credits

Source: Based on presentation by Jonah Busch, Conservation International, Washington D.C., May 13, 2009.

Measurement, Monitoring and Verification

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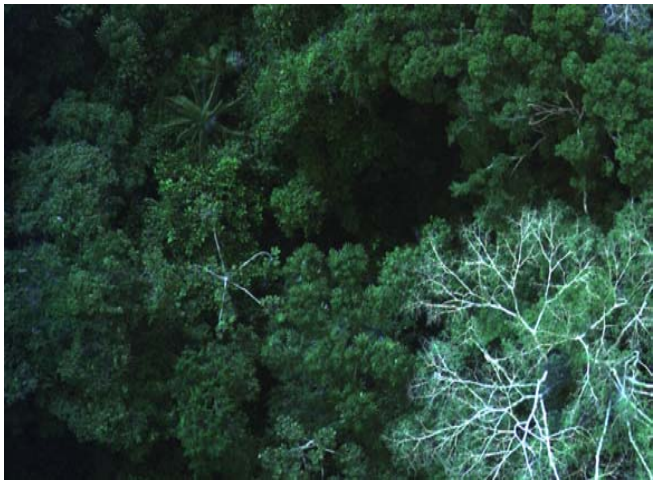
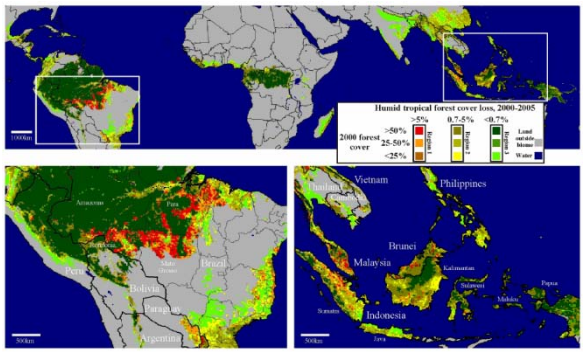
Measurement, Monitoring & Verification (MMV)



- Many parties believe it is difficult – if not impossible – to accurately conduct MMV to evaluate current rates of deforestation and potential future efforts to reduce deforestation.
- Two key issues:
  1. Can deforestation rates and avoided deforestation be accurately be measured and monitored?
  2. Can we use MM&V techniques to accurately measure GHG emissions from deforestation and REDD?
- What are the key technologies for doing REDD MMV?
  - Remote sensing / satellite imagery
  - Aerial techniques
  - On-the-ground approaches

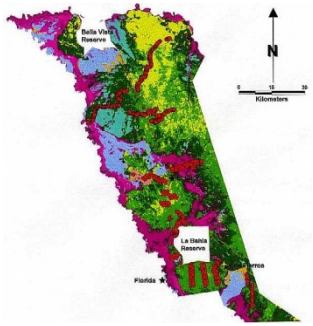
Deforestation Carbon Emissions/Yr = Area Cleared/Yr x Biomass Removed/unit area

PAN-TROPICAL



NATIONAL

PROJECT



Methods are in-hand to measure changes in forest area at pan-tropical, national, and project levels

Source: Based on presentation by Ruth DeFries, Columbia University, Washington D.C., May 13, 2009.

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Deforestation Carbon Emissions/Yr = Area Cleared/Yr x Biomass Removed/unit area

Initial Emissions + **Decomposition** − **Abandonment/Regrowth**

Need to know:
- Original biomass
- Emission factors for each component
- Time scale of interest

Possible at project level, but more difficult at national level

Source: Based on presentation by Ruth DeFries, Columbia University, Washington D.C., May 13, 2009.

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MMV Tools for REDD

	PROJECT LEVEL	NATIONAL LEVEL
Forest area change	✓ satellite and airborne	✓ satellite
Biomass	✓ airborne and ground data	extrapolation only
Emission factor (initial fire, decay, uptake)	modeled; field measurements	modeled

Source: Based on presentation by Ruth DeFries, Columbia University, Washington D.C., May 13, 2009.

Degradation is More Difficult to Assess

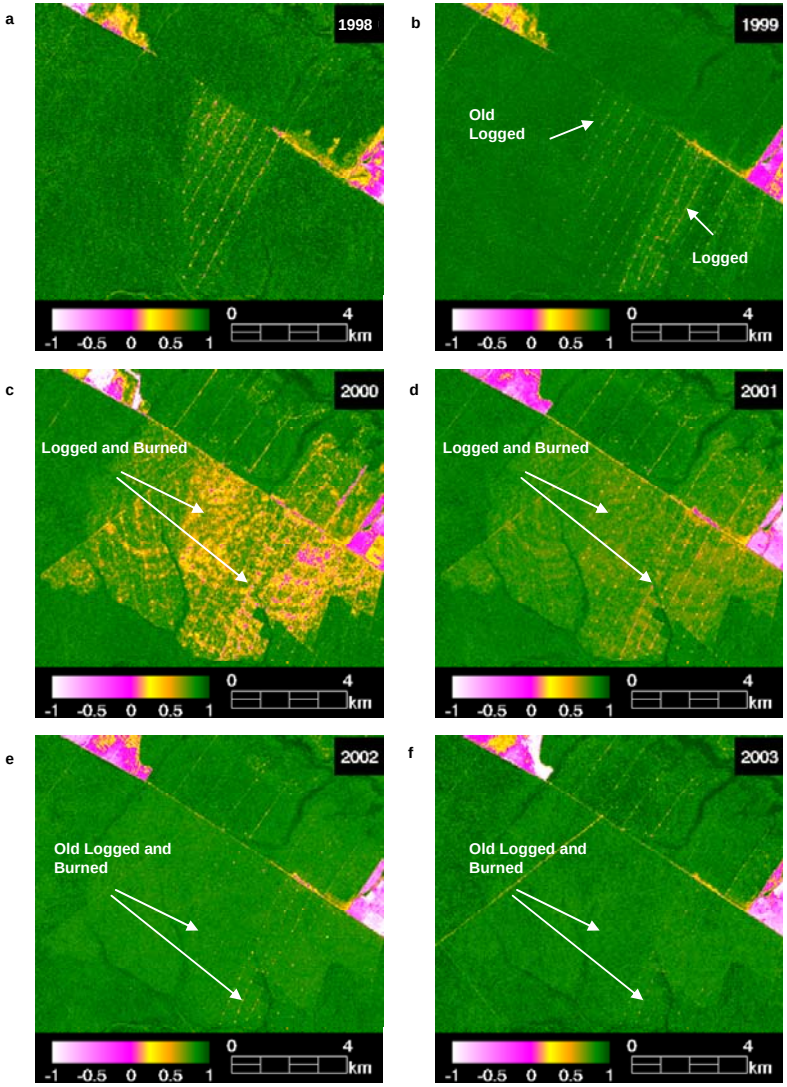

Photo above: Burned peat in central Kalimantan

Photo left: Logging in southern Amazon from satellite

Source: Based on presentation by Ruth DeFries, Columbia University, Washington D.C., May 13, 2009.

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MMV Conclusions

- Measuring change in forest area is now tractable at national scale
  - We know how to do this!
  - Must be based on satellite data
  - Requires building in-country technical capacity
  - Degradation is more difficult to quantify
- Biomass and emission factors are less certain
  - Possible at project level with ground and airborne data
  - Foreseeable in the future at national level
- Markets based on measurable and verifiable quantities can reasonably use default biomass and emission factors
- Simplicity is key for REDD reporting and verification

Source: Based on presentation by Ruth DeFries, Columbia University, Washington D.C., May 13, 2009.

National & Sub-national REDD Programs

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National v. Sub-national REDD Programs

- Key Question: Should REDD be conducted on a "national" or "sub-national" basis?
  - How can private capital be harnessed under a national program to fund REDD-based projects?
  - How can these projects generate offsets for use by compliance parties in a U.S. GHG cap and trade program?
- National – Require nations like Brazil to reduce emissions from deforestation on a national basis against a nationally established baseline.
- Sub-national – Allow sub-national activities and projects to be implemented that reduce deforestation and GHG emissions.

Emissions "Leakage"

- Efforts targeted to reduce [GHG] emissions in one place simply shift emissions to another location or sector where they remain *uncontrolled or uncounted*.[1]
  - For REDD, leakage can occur on a sub-national basis or across international borders
  - Recent modeling[2] demonstrates that climate policies that credit *only afforestation projects* (domestic and international) to generate GHG emission offsets, rather than afforestation, forest management and avoided deforestation, are likely to lead to increased deforestation in developing nations.

Notes: 1. Based on definition by Brian Murray, Nicholas Institute, EPRI Offsets Workshop 4, 2/19/09.
2. S. Rose and B. Sohngen, "Climate Policy Design and Forest Carbon Sequestration," working paper, April, 2009.

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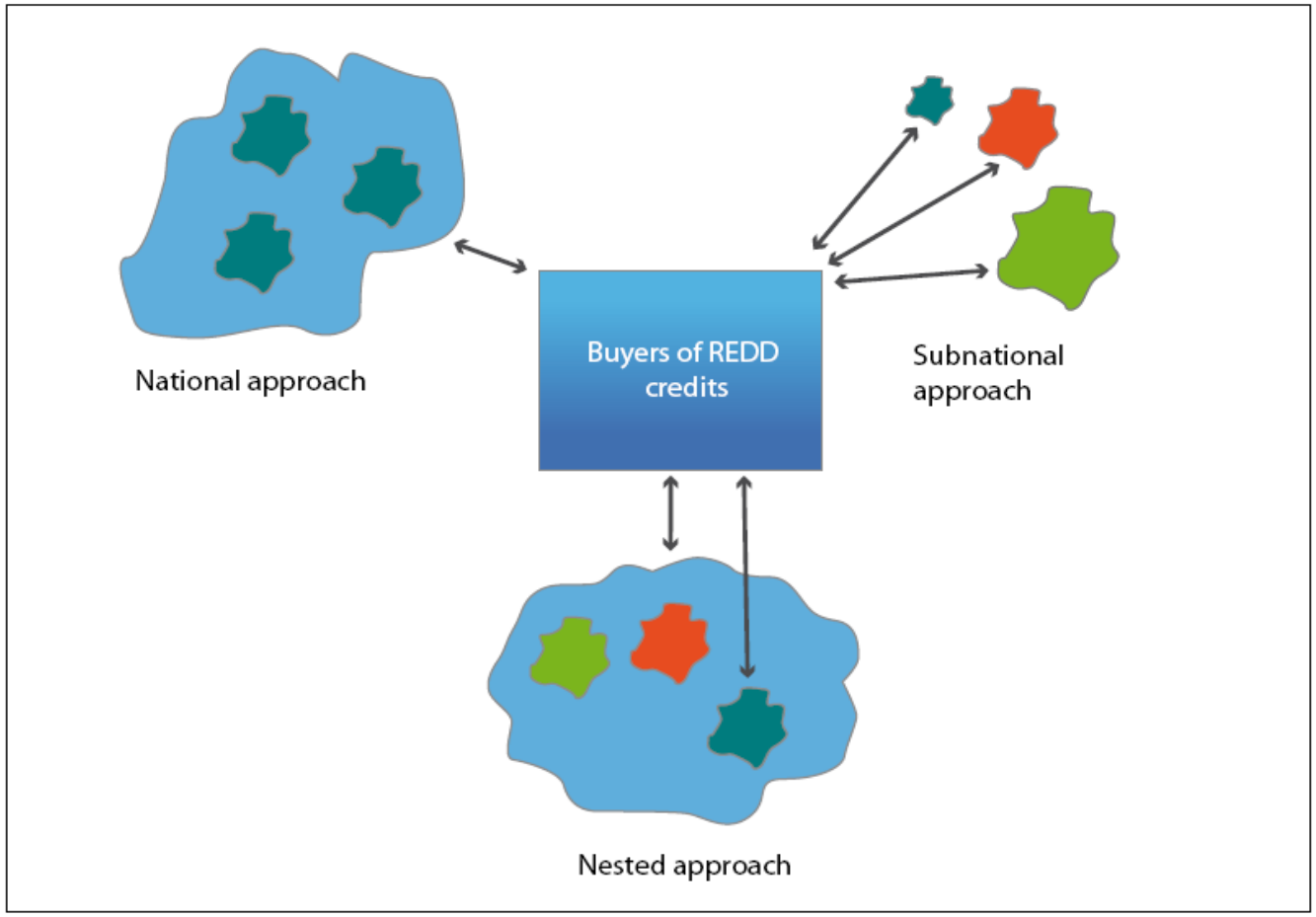
Various Possible Scales of REDD



Source: Angelsen, A., C. Streck, L. Peskett, J. Brown, and C. Luttrell. 2008. *What is the right scale for REDD?* In: Moving Ahead with REDD: Issues, Options and Implications

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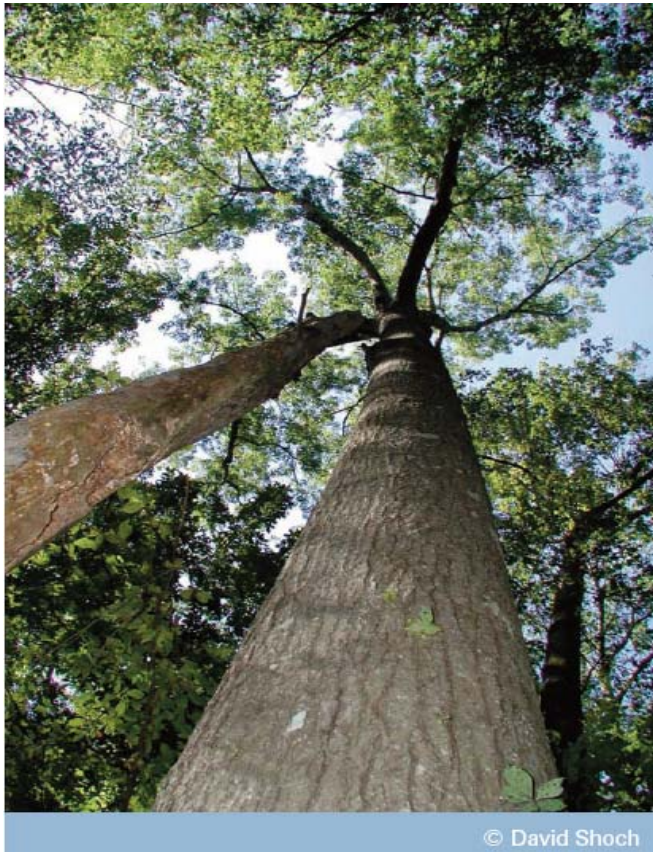
Sub-National Approaches

- Pros:
  - Direct control over drivers of deforestation and other factors, and project performance
  - Investment model is straightforward -- equity investment or purchases of emission offsets
  - Can help contribute to build essential institutions in countries with high rates of deforestation
- Cons:
  - Leakage risks are high
  - Does not achieve reductions at the necessary scale
  - Fails to engage many necessary tools and measures
  - Permanence risk is higher
- The Policy community focused on transitioning to national accounting, especially for larger countries, such as Brazil and Indonesia and others

Source: Based on presentation by Duncan Marsh, The Nature Conservancy, Washington D.C., May 13, 2009.

National Approaches

- Governments adopt a national baseline
- Goal would be to implement GHG reductions below the national baseline
  - Policies and measures
  - REDD offset projects
- Ways for private capital to engage
  - Purchasing offsets directly from national governments (perhaps through some kind of "pooling" mechanisms)
  - Direct investment in REDD projects. This approach would require risk-sharing and benefit-sharing agreements with national governments



Source: Based on presentation by Duncan Marsh, The Nature Conservancy, Washington D.C., May 13, 2009.

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A "Nested" Approach

- National accounting must be in place; all GHG emissions reductions must reconcile back to a national baseline.
- Governments would have the option to allow project developers to sell directly into the international market
  - Project-based reductions would need to be reconciled with international baseline.
- Should successful projects be compensated if the country fails to perform at the national level?
- Tools to manage this risk: Buffer reserves
  - Could be pooled internationally
  - May be useful even for national-only approaches

Source: Based on presentation by Duncan Marsh, The Nature Conservancy, Washington D.C., May 13, 2009.

The Role of REDD in the Post-2012 International Climate Negotiations

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The European View (1 of 2)

- Historic diffidence toward REDD (and forestry in general)
  - Payment for conservation services seen as morally hazardous
  - Monitoring viewed as difficult and uncertain
  - Deforestation is not part of the Kyoto accounting framework and deforestation explicitly excluded from CDM
  - Concern that REDD could lead to exclusion from carbon market of activities like new renewables that are political imperatives in the E.U.,
  - EU did not include forestry activities in EU ETS or permit forestry-based CDM offsets to be used for compliance
- The EU view is changing some
  - Commission Communication of 2007 acknowledged problem of deforestation
  - Admission of RED+Degradation agenda in the Bali roadmap
  - Inclusion of REDD funding as priority use for potential revenue from auctioning of allowances

Source: Based on presentation by Pedro Barata, Government of Portugal, Washington D.C., May 13, 2009.

European Concerns about REDD

- Monitoring, Reporting and Verification issues
  - Leakage issues
  - Reference-level / baseline issues
- REDD offsetting
  - Quality of offsets and institutional issues:
  - Governance (role of CDM EB-like institution), public participation
  - Legal issues (e.g., property rights, entitlements)
  - Relation to cap-and-trade schemes, fungibility across carbon market
- Complexity of relationship between market incentive and achieving reduced deforestation. Deforestation has many drivers, how does carbon finance deal with each of them appropriately?
- Over-supply of REDD credits could “flood” the carbon market
- Impact on overall compliance strategy (inter-temporal optimization):
  - Advanced technologies such as CCS may be displaced by REDD, if REDD-based offsets are low-cost and done at large scale

Source: Based on presentation by Pedro Barata, Government of Portugal, Washington D.C., May 13, 2009.

EU Post-2012 Proposals on REDD

- National governments should provide up to a $1B annually to developing countries to assist them with REDD capacity building.
- REDD-based offsets should only be permitted to be used by national governments for compliance with post-2012 climate mitigation obligations.
- Sub-national and project-based REDD projects should not be allowed to generate compliance-quality offsets for use by private entities.
- REDD actions should be embedded into the wider discussion on developing country "nationally appropriate mitigation action"
- "Staged" approach likely to be needed going forward, but "pilot" phase should be started immediately
  - Phase 1: Planning of policies and measures; capacity building, demonstration. Building inventory and measurement capacity. Financed by governments.
  - Phase 2: Planning of policies and measures, with monitoring of indicators related to changes in emissions/removals. Financed by governments.
  - Phase 3: "Policies and measures" lead to quantified emission reductions or stock enhancement. Performance indicator is CO_2-based. Financed by carbon market.

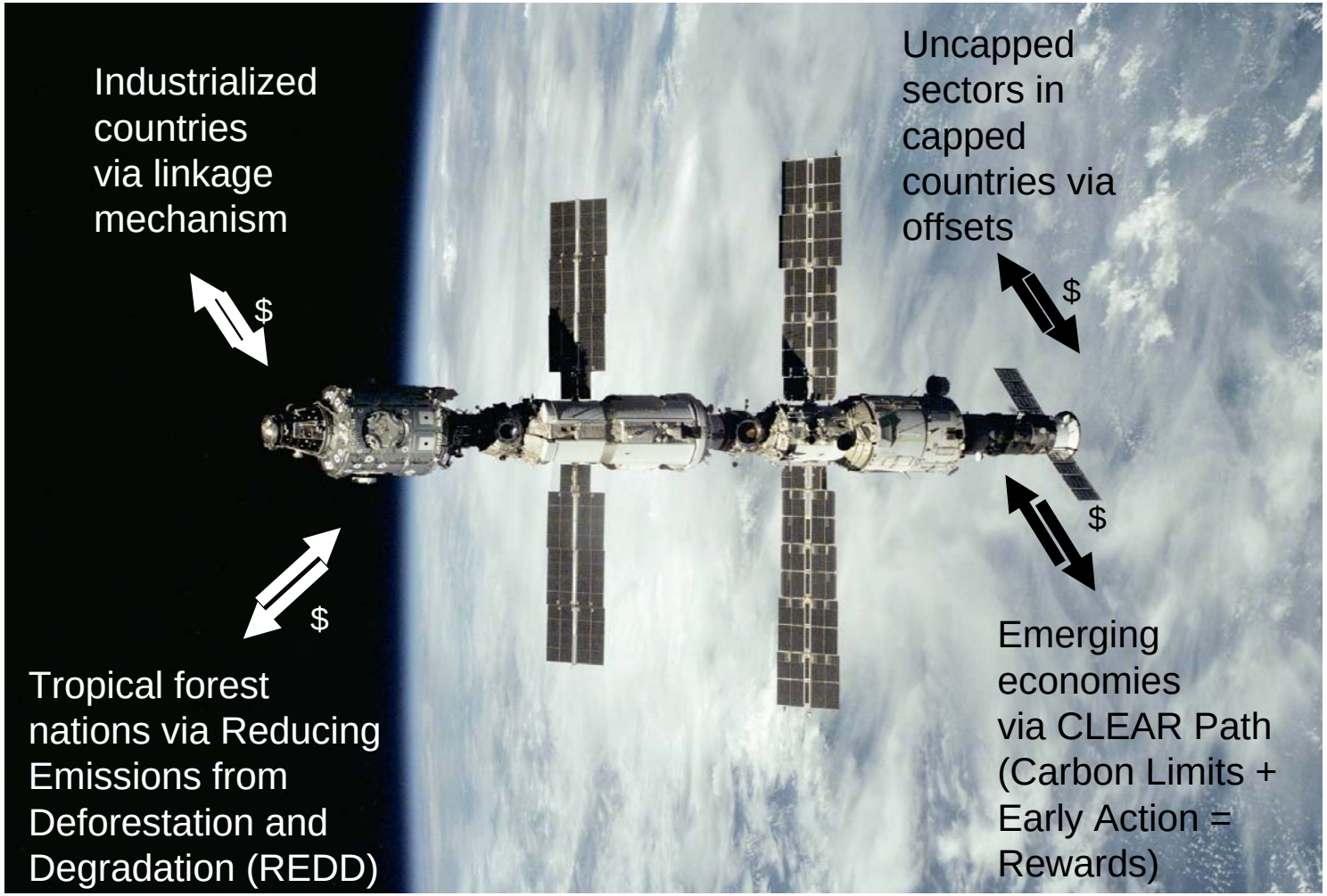
Source: Based on presentation by Pedro Barata, Government of Portugal, Washington D.C., May 13, 2009.

The U.S. Position on REDD

- U.S. submission on “key elements” to be included in a Copenhagen agreement” includes REDD+
- Ultimate goal is comprehensive accounting of sources/sinks
  - Reflects “what the atmosphere sees”
  - Minimizes leakage, omissions, double-counting
  - Recognizes challenge of full terrestrial GHG accounting and suggests “staged” approach
- Staged process for financing also could be applied
  - Self-financed actions
  - Actions eligible for capacity building, technical assistance, financial support
  - Actions eligible for market-based approaches
- Economic, social and environmental impacts must be addressed
  - Local/Indigenous communities
  - Biodiversity
  - Other ecosystem services
- Desire to address “key drivers” of deforestation in each country

Source: Based on presentation by Kim Todd, US EPA, Washington D.C., May 13, 2009.

“Docking Stations” into Global Carbon Markets



Source: Based on presentation by Annie Petsonk, Environmental Defense Fund, Washington D.C., May 13, 2009

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REDD and H.R. 2454 (“Waxman-Markey”)

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International Offsets Allowed in H.R. 2454

- Three different types allowed
  - "Sectoral" offsets
  - Offsets issued by an "international body" (e.g., CDM)
  - Reduced Emissions from Deforestation and Degradation (REDD)
- REDD-based Offsets
  - One component of the 1-1.5 $GtCO_2$ allowed annually from "international" sources
  - Current version allows both "national" and "sub-national" programs to yield REDD-based offsets
  - Source of "supplemental" emissions reductions that EPA is supposed to generate by using 5% allocation of CO_2 allowances

H.R. 2454 – "Offsets from Reduced Deforestation"

- REDD-based offsets are one of three types of "international offset credits" in the WM Draft
- W-M requires key prerequisites to REDD-based offsets:
  - International / bilateral agreement
  - The EPA Administration must identify eligible countries that can demonstrate technical capacity to monitor and measure carbon fluxes and institutional capacity (i.e., strong forest governance).
  - Only GHG emissions reductions from reduced deforestation that are measured against a national or sub-national deforestation baseline are eligible to receive international offset credits.
- *National and Sub-National Deforestation Baselines*
  - NDB must take into consideration at least 5 years of historical deforestation rates and must establish a trajectory that would result in zero gross deforestation within 20 years of the establishment of the baseline.
  - SNDB must be consistent with "any existing nationally appropriate mitigation commitments
  - No offsets to be issued for sub-national REDD programs / projects after 1/1/2017.

H.R. 2454 – "Supplemental Emissions Reductions from Reduced Deforestation"

- "Set-aside" equal to 5% of the U.S. CO_2 cap in 2012-25, 3% in 2026-30, and 2% in 2031-50
- Allowances to be transferred to countries that have entered into a bilateral agreement with the U.S. or a multilateral agreement
- Allowances to be used to provide incentives to reduce deforestation and can be used to fund a wide range of activities including, but not limited to, national and sub-national deforestation reduction activities
- The objective of this program is to achieve "supplemental" emission reductions" of at least 720 $MtCO_2$ by 2020, which is equal to 10% of U.S. emissions in 2005, and 6 $GtCO_2$ by the end of 2025.

Will REDD-Based Offsets Come into the Market in the Near-term (2012-2015)?

- EPA's draft economic analysis of "Waxman-Markey" suggests at least 1 $GtCO_2$ of REDD-based offsets will be generated and used annually by compliance parties. Most of these are expected by EPA to be "banked" for later use.
- Several issues suggest EPA's estimate may not be not realistic:
  - REDD projects are located in somewhat "risky" countries
  - Countries with high rates of tropical deforestation lack necessary technical expertise, key institutional capacity & governance
  - H.R. 24564 requires REDD-based offsets to be supplemental to a "deforestation emissions baseline" that requires zero "net deforestation" in 20 years and phases out "sub-national" offsets starting in 2017.
  - REDD-based offset projects that might be implemented on for the benefit of "compliance parties" will necessarily compete in part with EPA's required "Supplemental Emissions Reduction" program

EPRI's Xingu Avoided Deforestation Project

Creating Greenhouse Gas Emission Offsets from Avoided Deforestation in the Amazon's Xingu River Basin

Tropical forest deforestation is one of the leading sources of global greenhouse gas emissions. Avoided deforestation projects offer opportunities to generate carbon offset credits as a global climate change mitigation strategy.

- Advance our understanding of avoided deforestation based carbon "credits" in evolving global GHG cap and trade markets
- Unlock large-scale, low-cost GHG emissions offsets
- Gain early experience with carbon offset projects in advance of GHG emissions regulations
- Help to preserve and protect tropical rainforests and their biological resources, and provide sustainable development opportunities for indigenous peoples

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Xingu Project Summary

- Goal: To facilitate recognition and use of GHG emissions offsets derived from avoided tropical forest deforestation.
- Why is this important? Deforestation is one of the largest sources of global CO_2 emissions (~20% of annual emissions (IPCC 2007)).
- Partners: Collaboration with Environmental Defense Fund (EDF) and a coalition of Brazilian NGOs involved with key indigenous leaders for many years.
- Phases: 1st phase of 3-phase project that starts with "capacity building" among tribal leaders leading to development of a pilot REDD project.
- EPRI Leverage: Builds upon previous work done by EPRI and its members on protection of forest lands (e.g., Noel Kempf project)
- Funding Goal: $400,000. $250,000 raised to date.
  Cost to participate is $50,000, and this project is "TC" eligible.

Key Insights

- LULUCF accounts for ~20% of global GHG emissions annually
  - Difficult to stabilize atmospheric GHGs without reducing global deforestation
  - Brazil & Indonesia are world's 3rd & 4th largest GHG emitters w/LULUCF
  - An "afforestation only" policy will lead to emissions leakage and increased GHG emissions land-use sector
  - REDD theoretically can provide ~3GtCO_2 per year of offsets at \$15/tCO_2
  - REDD comprises more than 70% of abatement potential over the next 25 years to achieve 550 ppm stabilization
- Key technical challenges may make it difficult to achieve large-scale REDD in the near term:
  - Lack of developing country institutional capacity / governance
  - Baselines
  - Measurement, monitoring and verification
  - Leakage
- International negotiations are very complex and different parties have different agendas for REDD (e.g., US, EU, rainforest nations, etc….)
  - National v. sub-national approaches
  - Appropriate approach for dealing with REDD (e.g., ODA funding, project-based finance, credit / trade by national governments?)

Thank You

Adam Diamant

Electric Power Research Institute

Senior Project Manager

Global Climate Research Program

3420 Hillview Avenue

Palo Alto, CA 94304 USA

Tel: 510-260-9105

Email: adiamant@epri.com

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