Climate Change Mitigation and REDD+: Emission Reductions and Investment Opportunities
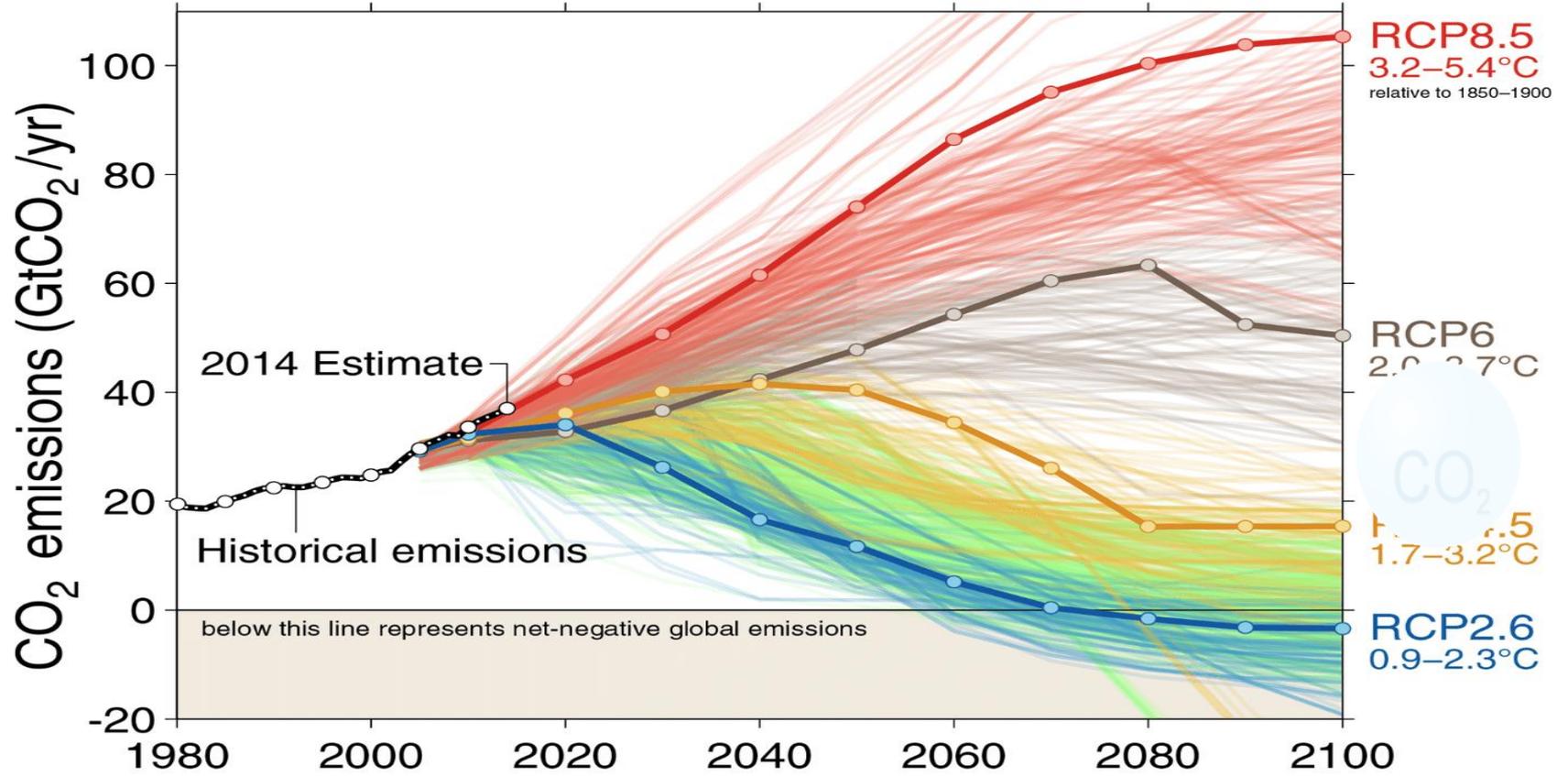
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Rising CO2 and Temperature

CO$_2$ emissions (GtCO$_2$/yr)

2014 Estimate

Historical emissions

below this line represents net-negative global emissions

RCP8.5
3.2–5.4°C
relative to 1850–1900

RCP6
2.0–3.7°C

1.7–3.2°C

RCP2.6
0.9–2.3°C
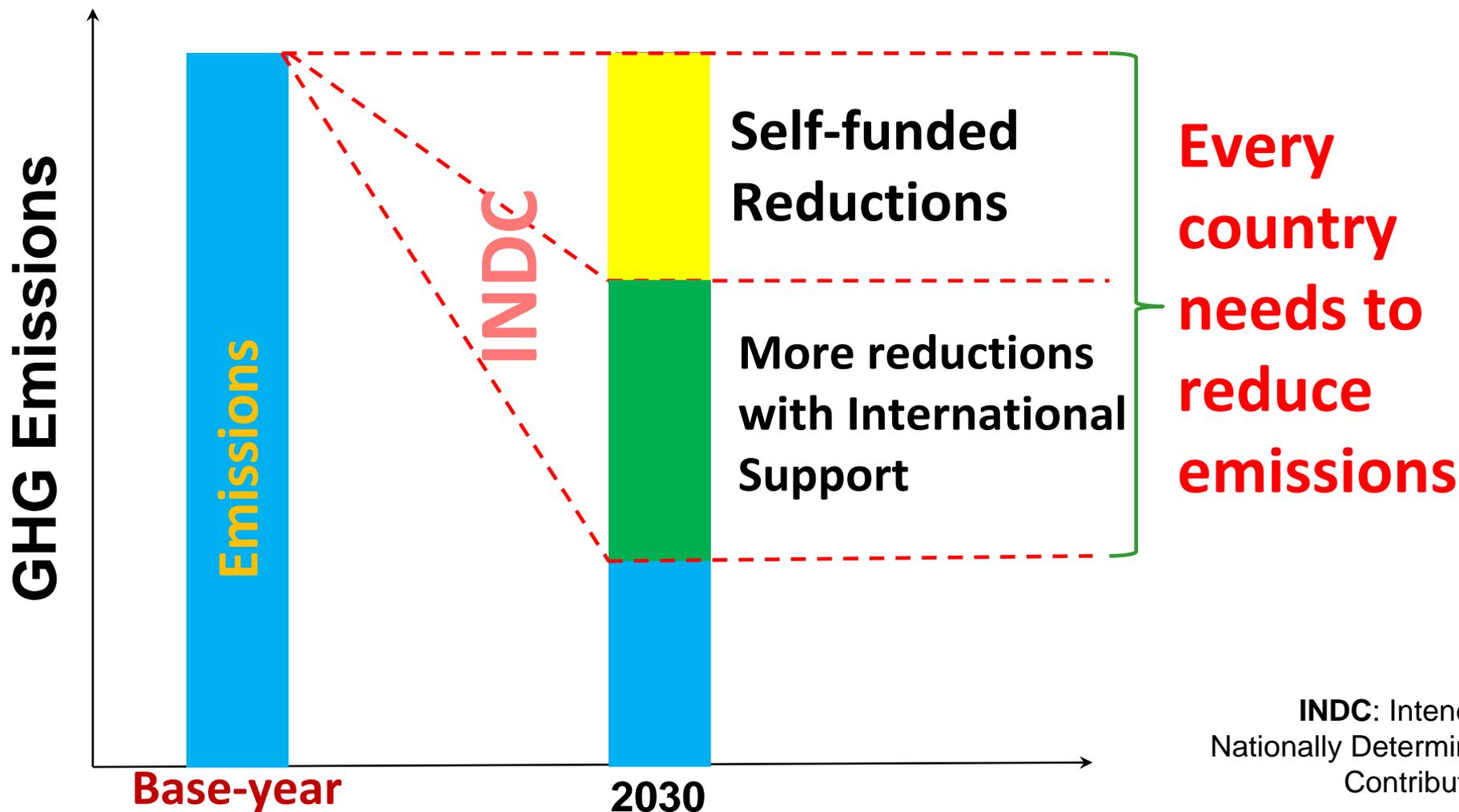
www.saawinternational.org

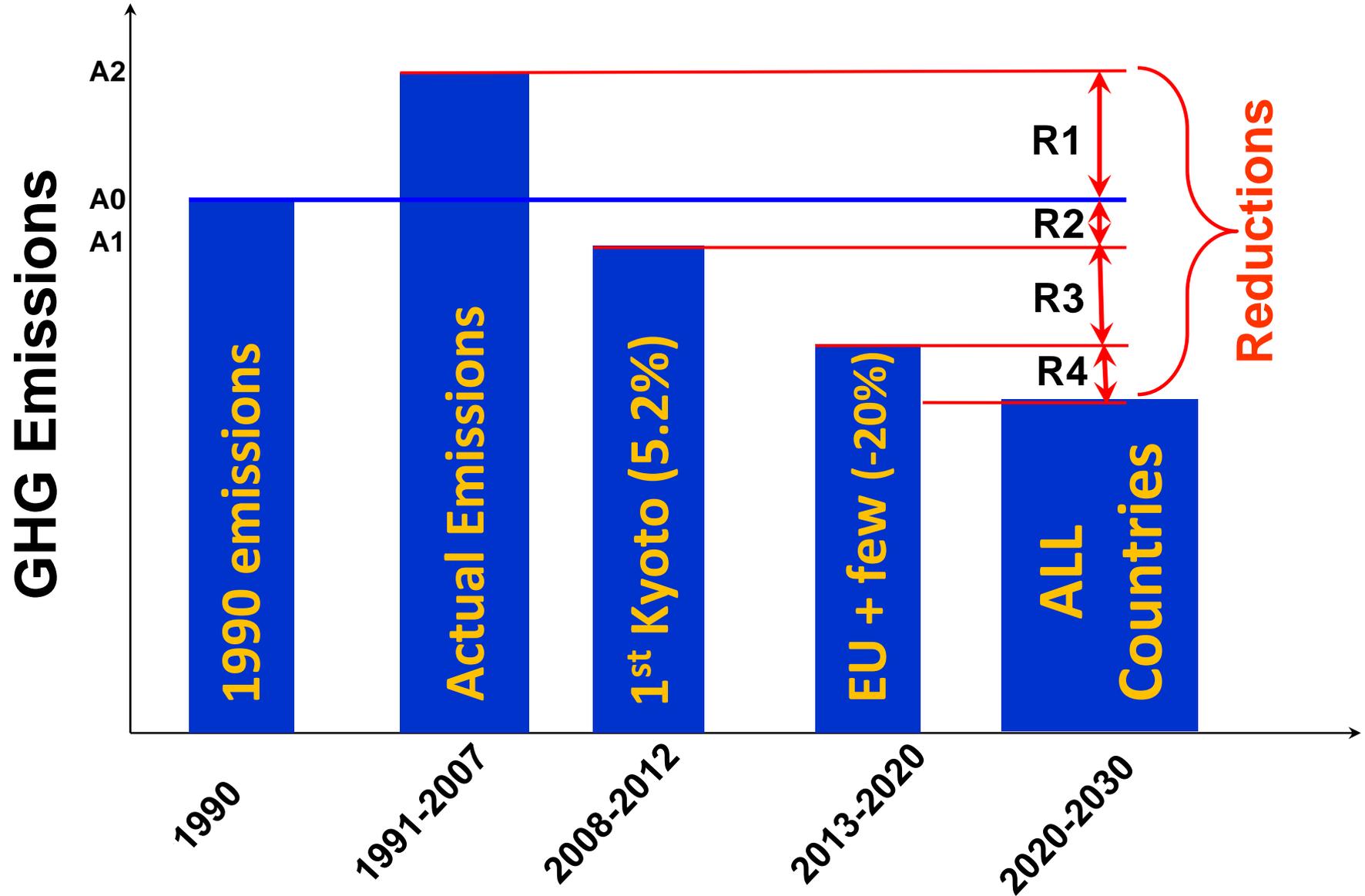www.emaze.com

Paris Agreement and Mitigation

Paris Agreement (2015): Long-term commitment below 2°C
Goals: Climate Change Mitigation and Sustainable Development
Parties: Submission of INDC, how much to reduce

GHG Emissions

Emissions

INDC

Self-funded Reductions

More reductions with International Support

Every country needs to reduce emissions

Base-year

2030

INDC: Intended Nationally Determined Contribution

Climate Change Mitigation Options

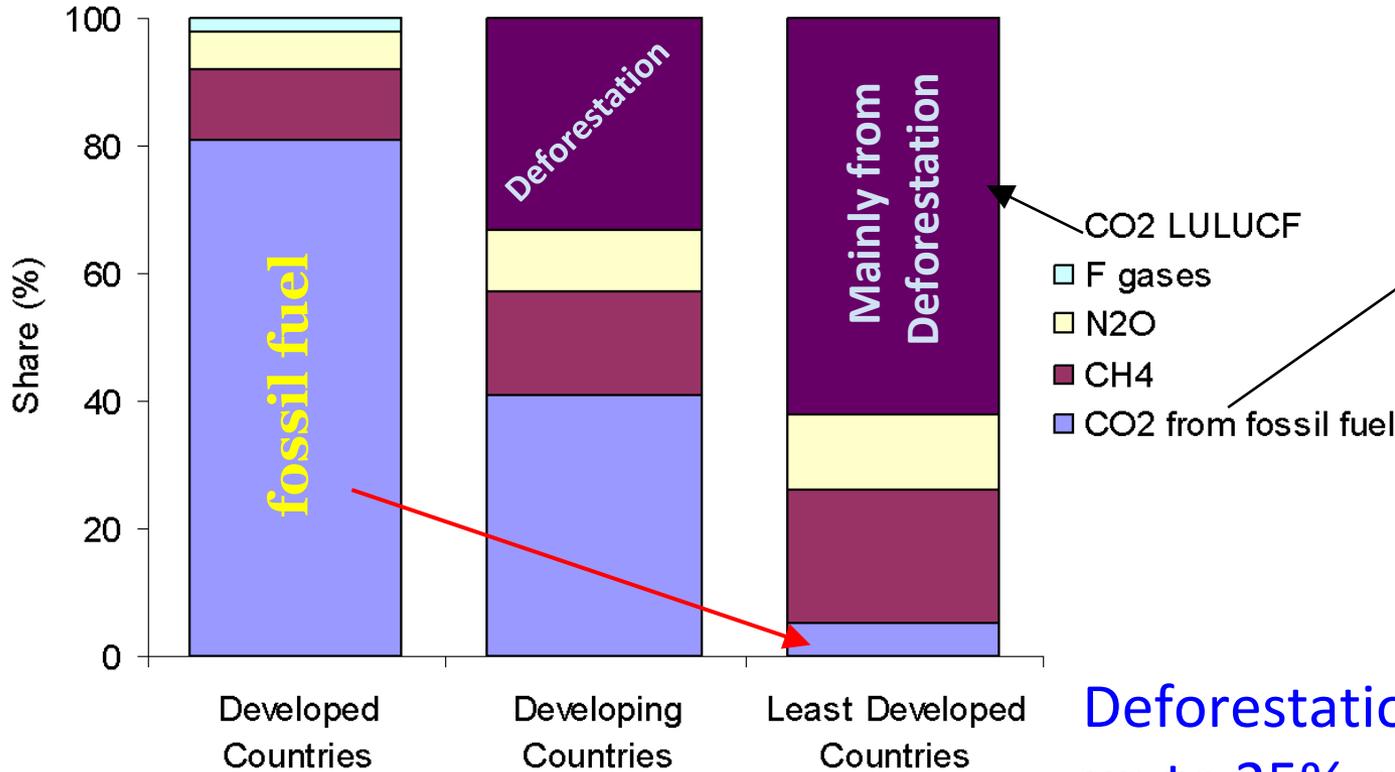| Mitigation Options:		
Domestic measures	Energy related CO2	
	CO2 from non-energy sources	
	Methane	
	N2O	
	Other GHGs	
Sinks including forests		
Kyoto Mechanisms		
REDD+ Mechanism		
Bilateral Partnership (?)		

Do it yourselves or use domestic or regional trading schemes

1. Emission Trading

2. Joint Implementation

3. Clean Development Mechanism (CDM)

Ongoing Negotiations

Why Forestry and Climate Change Mitigation?

Share (%) — chart with three bars: Developed Countries, Developing Countries, Least Developed Countries.

Labels: fossil fuel, Deforestation, Mainly from Deforestation

Legend:
CO2 LULUCF
☐ F gases
☐ N2O
☐ CH4
☐ CO2 from fossil fuel

Emission Reductions

Energy conservation ← → Sink Enhancement

Energy Efficiency | Stop Def. and Deg.
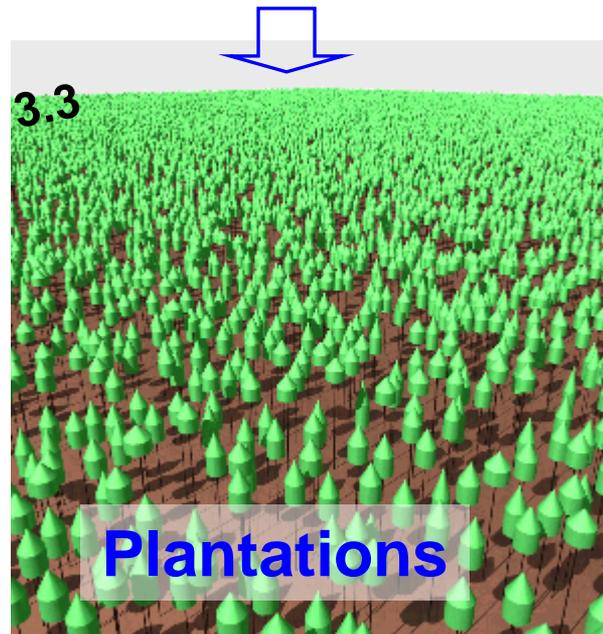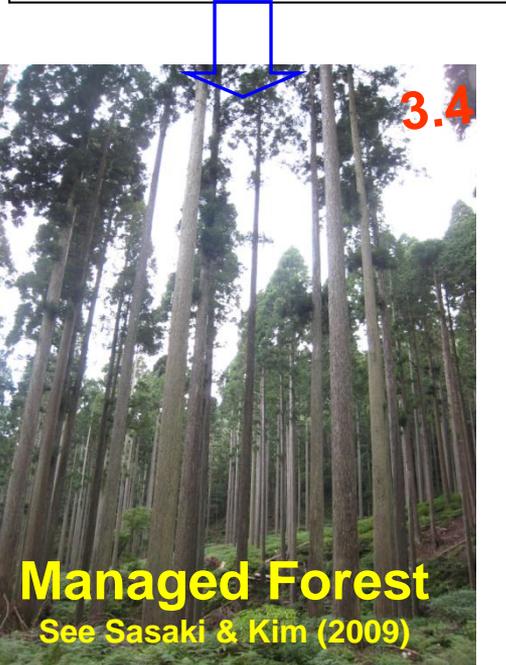
High Cost | Low Cost (?)

Deforestation accounts for up to 25% of carbon emissions. Yet, > 2 billion people depend on forests for subsistence
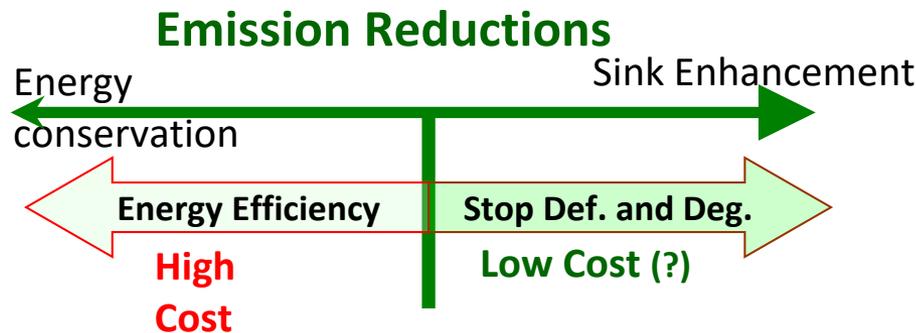
*LULUCF is Land use, land-use change and forestry*

Forestry and Kyoto Protocol
Kyoto Target: -5.2%

Forest Management

Afforestation Reforestation

Avoided Deforestation

3.4

3.3

Managed Forest
See Sasaki & Kim (2009)

Plantations

Avoided Deforestation (similar to REDD) was excluded in the Kyoto agreement in 2001:
Misinterpretation: 1 tC02 reduced = 1 tC02 emitted
Forest can be logged or cleared
Oil Prices
EU + Brazil: Opposed
USA, Japan, Austr.: Okay

REDD+ and Eligibility

- Reducing Emissions from Deforestation and Forest Degradation (REDD)
- Sustainable Forest Management
- Conservation of Forests
- Enhancement of carbon sinks

REDD

+ (plus)

REDD+

CO_2
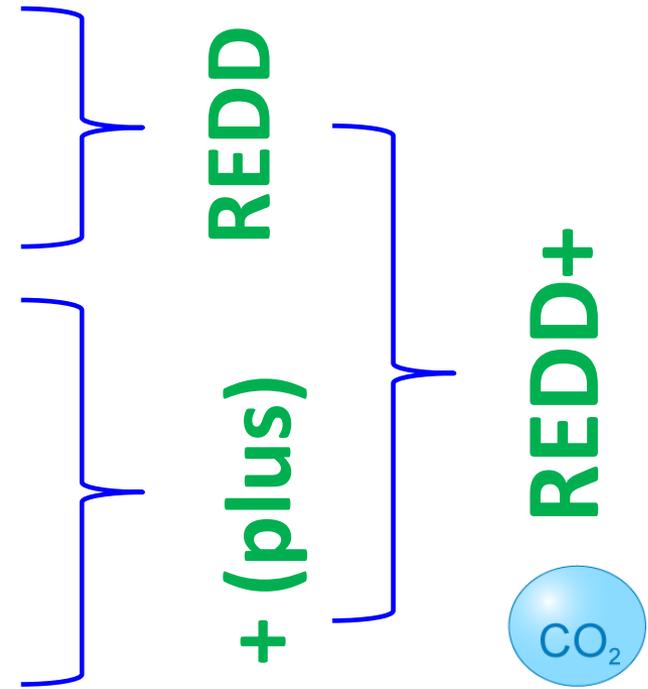
REDD+ is a financial scheme designed to provide incentives for reducing emissions under one or all activities (elements) above. Up to US$300 billion are needed to reduce 50% of deforestation

Process of Tropical Deforestation and Forest Degradation

CO_2
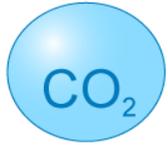
Deforestation and Forest Degradation affect 89% of all threatened birds, 83% of threatened mammals, and **91%** of threatened plants (IUCN)

?

CH_4
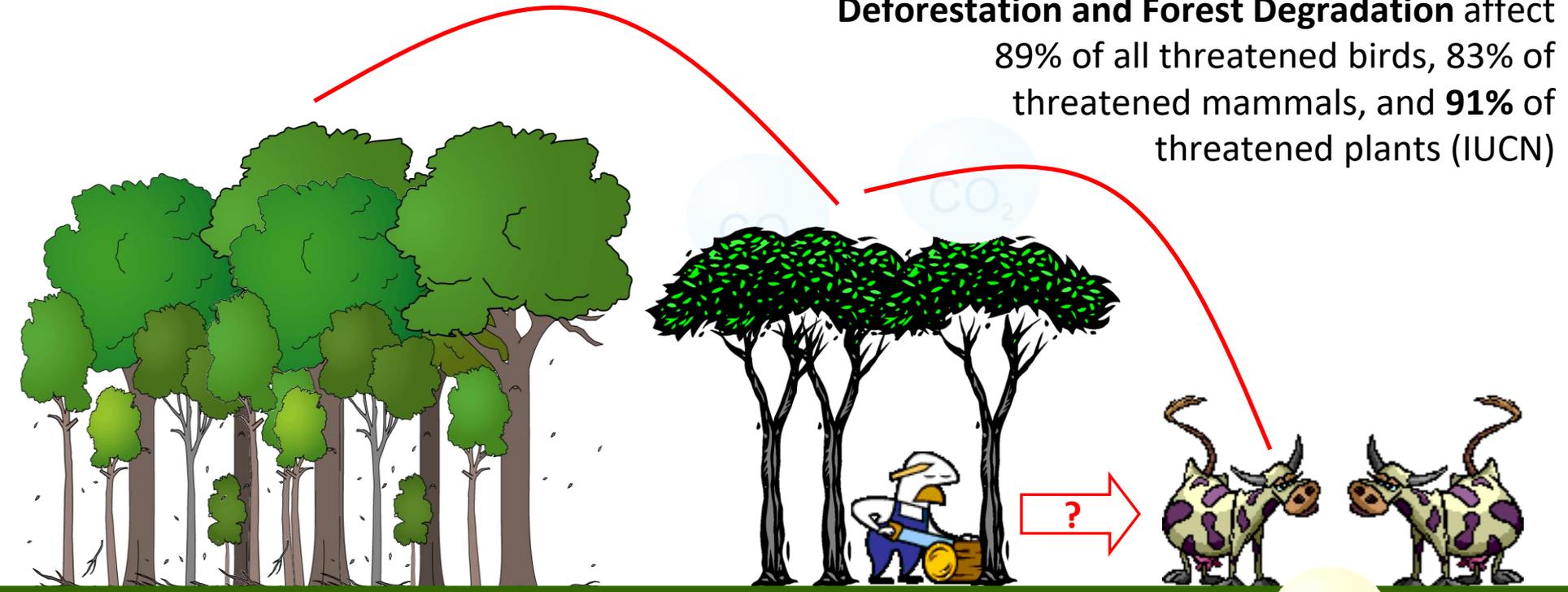
Emissions

Carbon Sinks

Degradation
Similar amount

Deforestation
1.5-2.2 PgC yr⁻¹

REDD+ Developments

- 2001: Avoiding deforestation was excluded

- 2004: Kim Phat (Sasaki) et al. (2004) published a paper on financing tropical forestry for climate change mitigation (DOI: 10.1016/j.foreco.2003.12.019), picked up by some UNs

- 2005: Reducing Emissions from Deforestation was put back on the UNFCCC's meeting agenda

- 2007: REDD with light "+" in Bali Action Plan; voluntary activities are encouraged

- 2009: Copenhagen Accord fully recognized REDD+ with financial pledges (fast-start fund)

- 2010-12: REDD+, MRV System, Safeguards, Financing

- REDD+ Financing: $3.5 billion/yr (2010-2012) to $35 billion for 2013-2020.

The Four REDD+ "Design" Elements

National Strategy &/or Action Plan

National Forest Monitoring System

Safeguards Information System

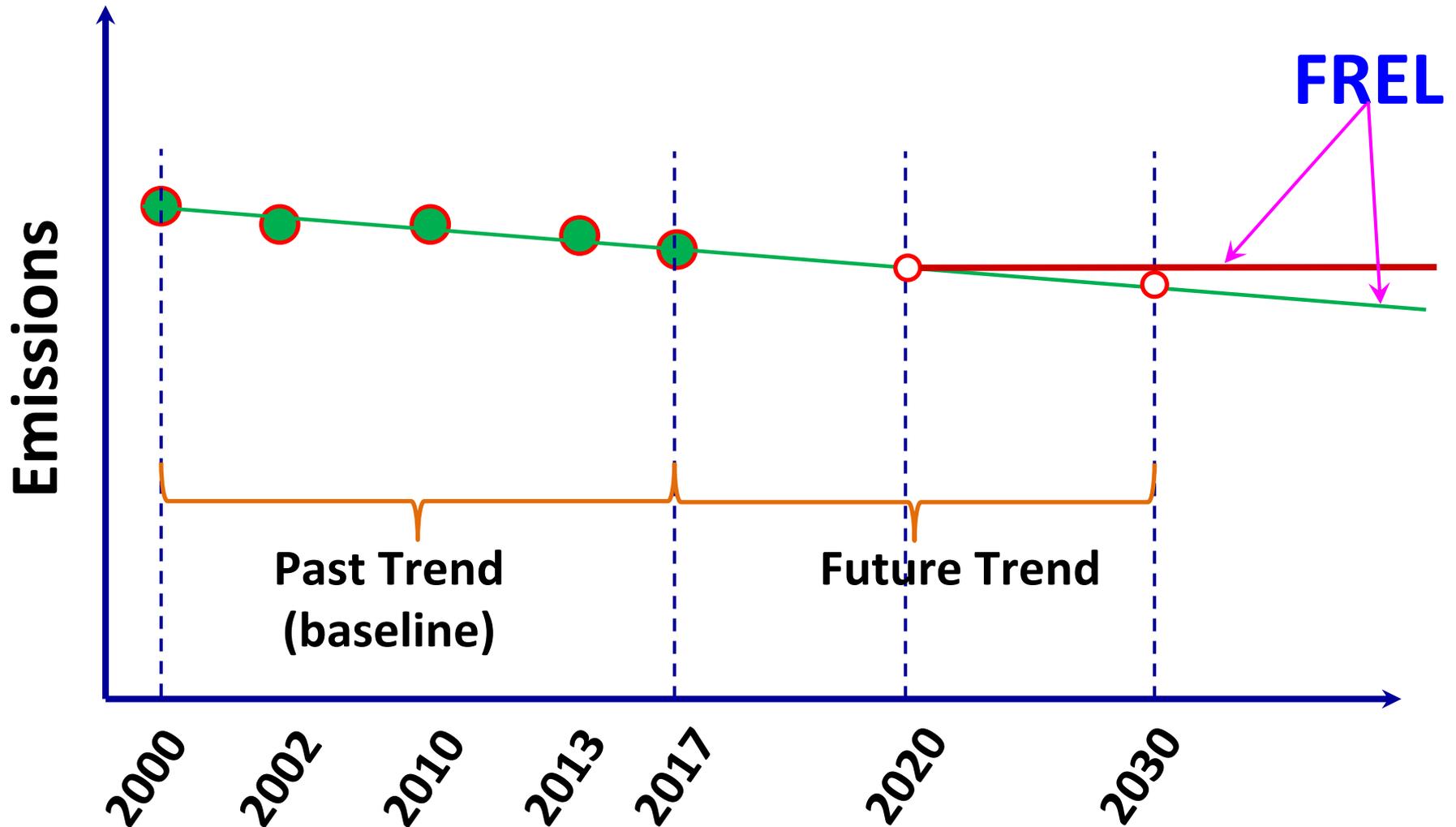**Forest Reference Level (FREL)**

SCALE

REDD+ should be implemented at the national scale

Countries can start by implementing at the subnational scale → with a view to transitioning to national scale
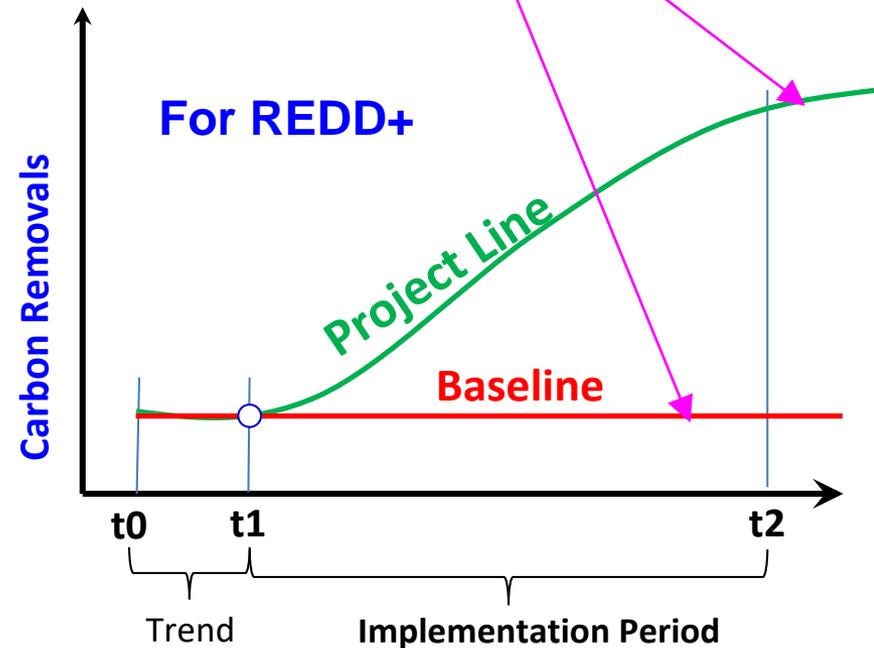
FREL and Emission Reductions

FREL is benchmark for assessing country's performance in implementing REDD+ activities
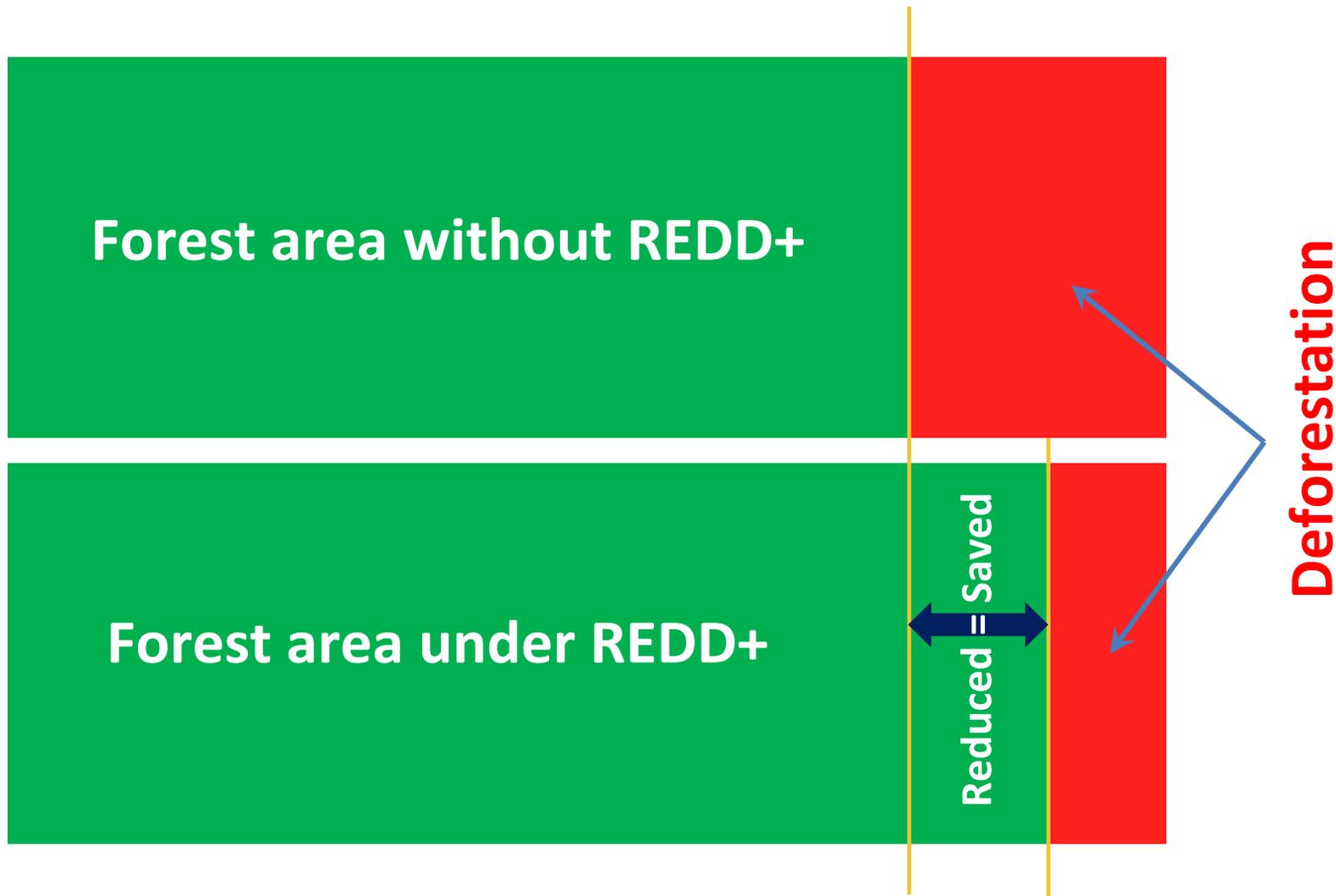
REDD+ is beyond FREL: Reductions

For REDD

Carbon Emissions

FREL

Project Line

t0   t1   t2

Historical Trend

Paris Agreement
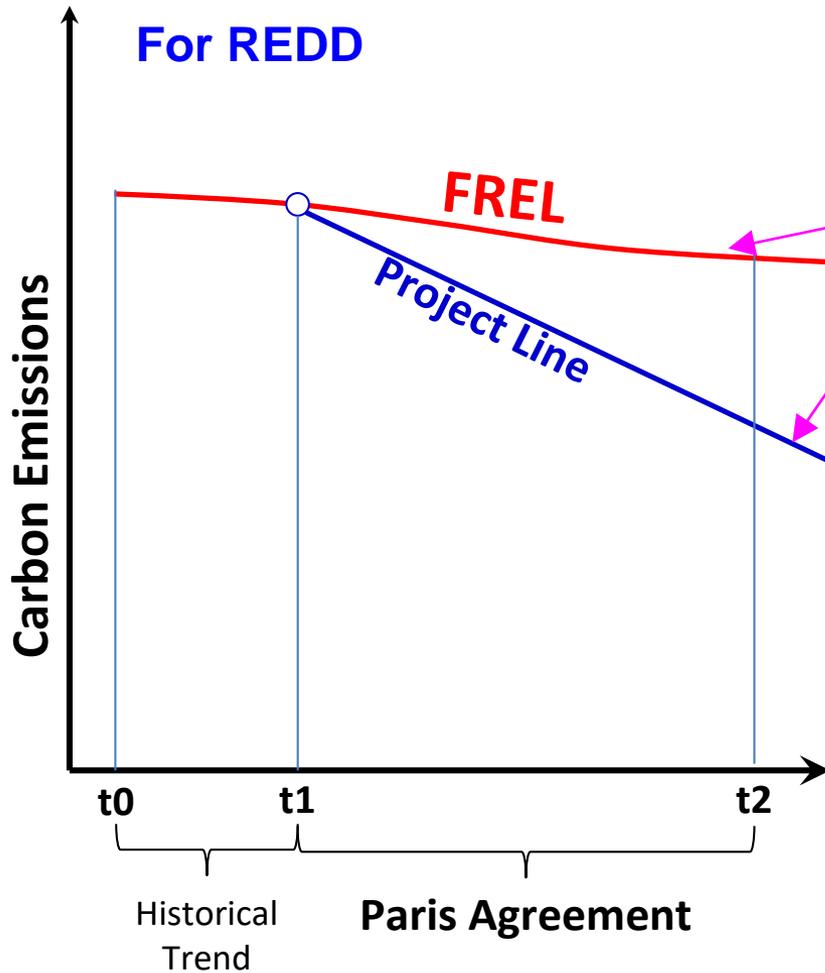
To obtain carbon-based financial support, these curves need to be developed

For REDD+

Carbon Removals

Project Line

Baseline

t0   t1   t2

Trend

Implementation Period

What is Reduced Deforestation?

Forest area without REDD+

Forest area under REDD+

Reduced = Saved

Deforestation

FREL, Reductions and Removals in Cambodia

- Case Study -

Cambodia

↑

Provinces: 24 provinces
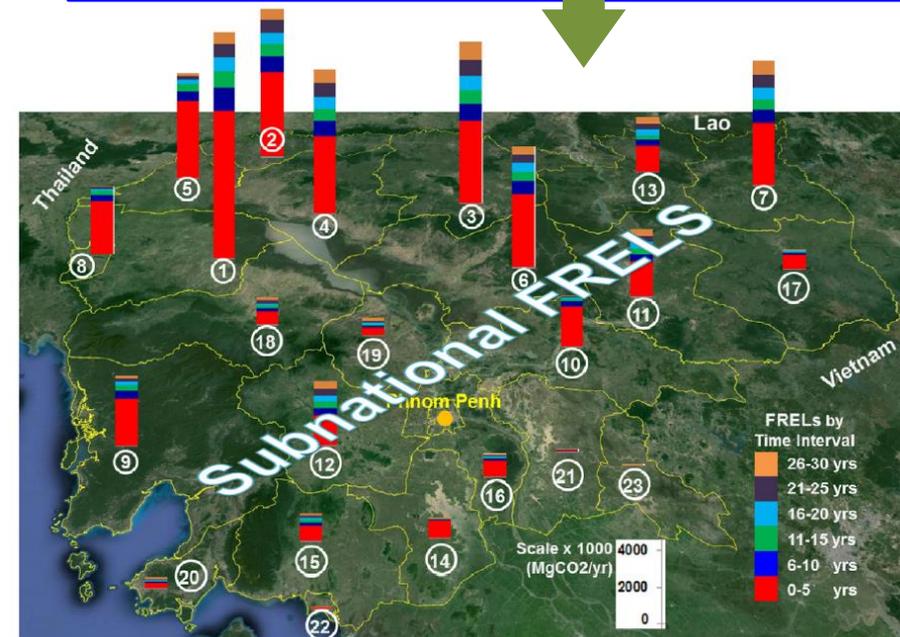
↑

Districts: 185 districts

↑

Communes:
1618 communes

↑

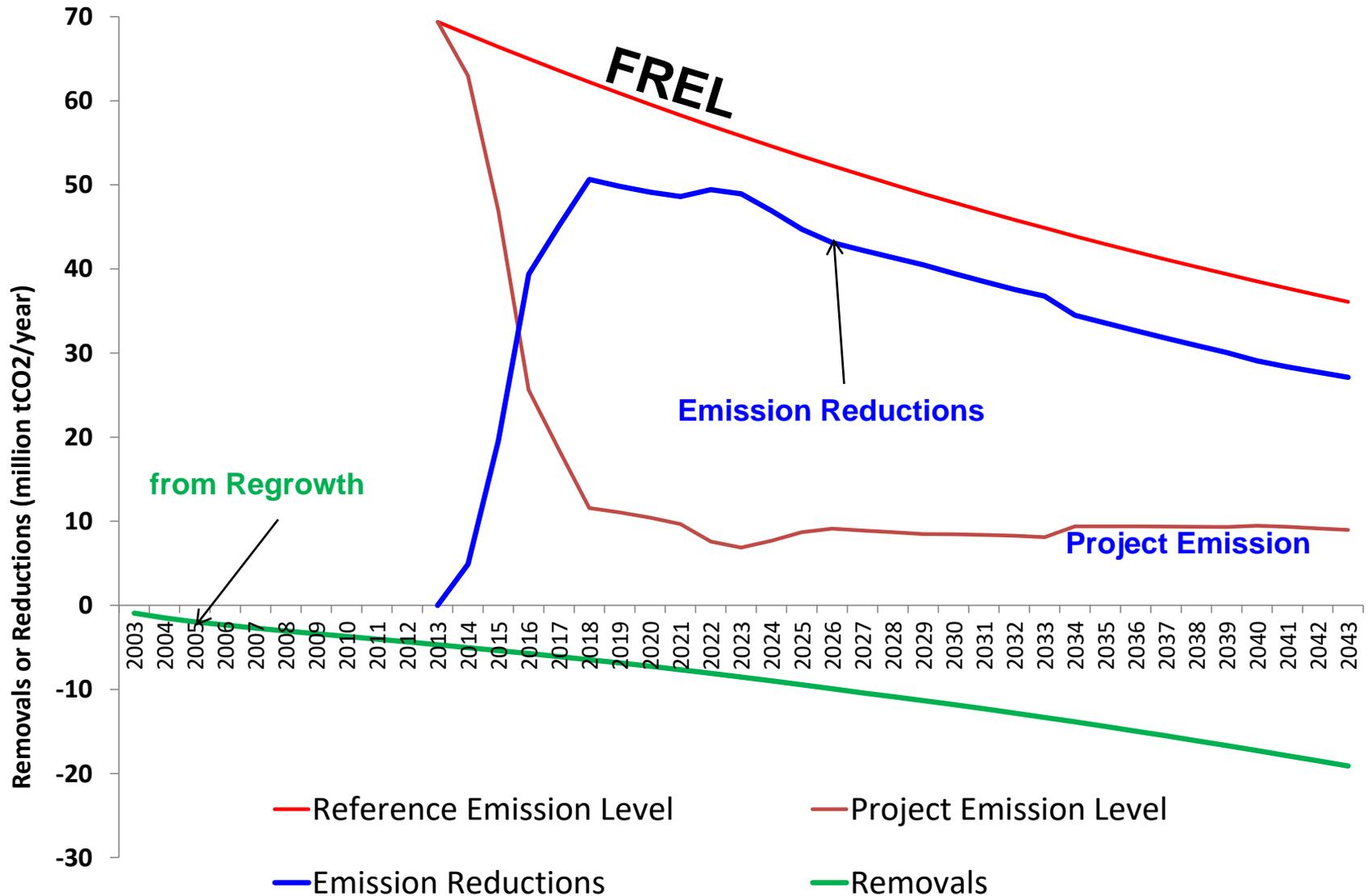**Forest Types**: Evergreen, Semi-evergreen, Deciduous, Bamboo, other forest, wood-shrub dry, wood-shrub evergreen

↑

Carbon Pools: Aboveground, belowground, Deadwood, Litters, Soil (soil not implemented)

Sasaki et al. (2016) DOI: 10.1016/j.gecco.2016.05.004

Flow of Analysis

Change in Forest Area
Forest Carbon Stocks
Carbon Stock Changes
Carbon Emission
Carbon Emission Baseline
Carbon Emission Reduction
Carbon Removals
Others

Subnational FRELs

FRELs by Time Interval
26-30 yrs
21-25 yrs
16-20 yrs
11-15 yrs
6-10 yrs
0-5 yrs

Scale x 1000 (MgCO2/yr)
4000
2000
0

FREL, Reductions and Removals in Cambodia

FREL

Emission Reductions

from Regrowth

Project Emission

Removals or Reductions (million tCO2/year)

— Reference Emission Level — Project Emission Level

— Emission Reductions — Removals
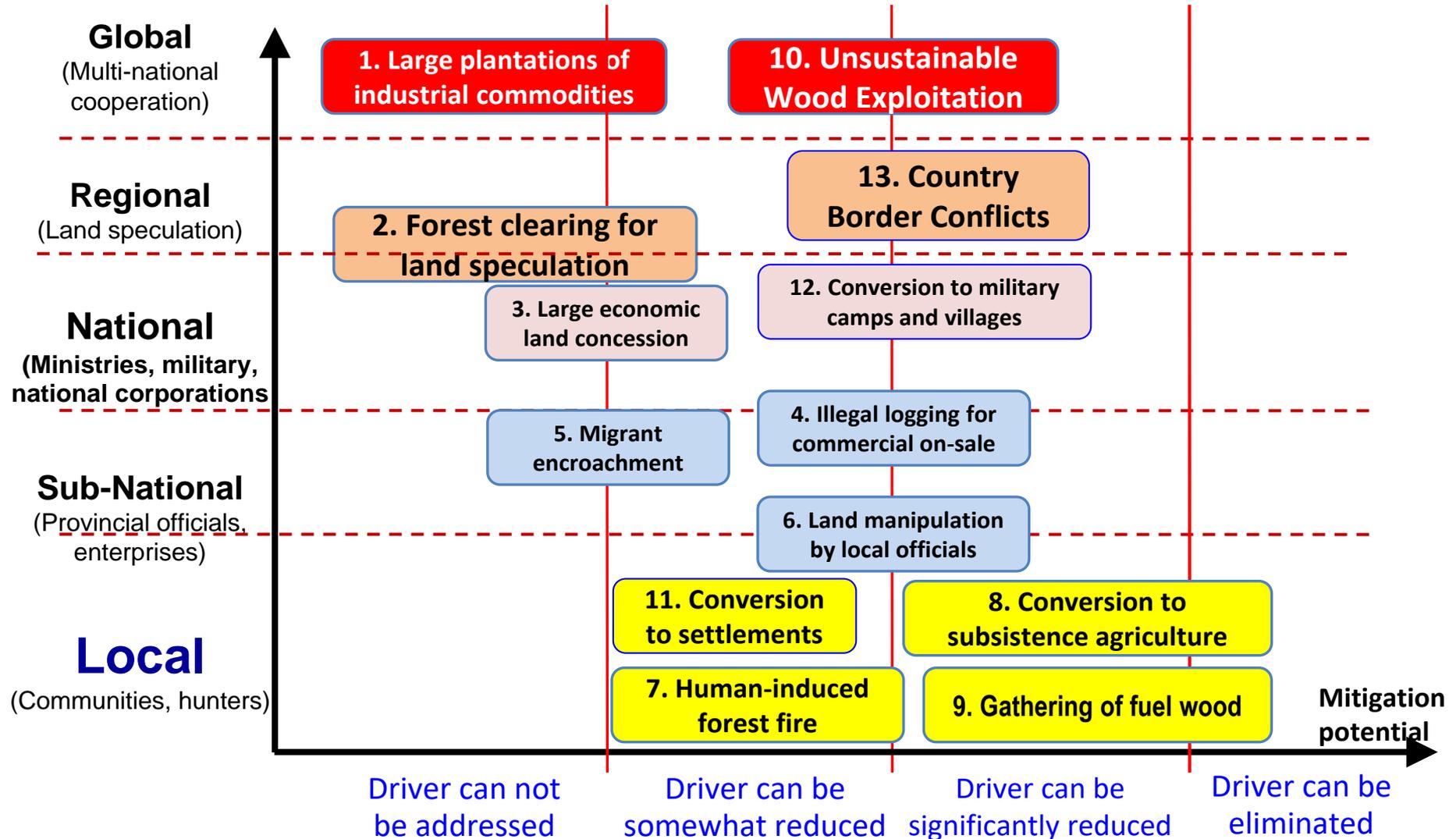
Sasaki et al. (2016)

REDD+ Project has many investment opportunities if well designed

- **Understand the drivers of deforestation and forest degradation**

- **Identify appropriate measures or activities to reduce the drivers**

- **Each activity can bring many investment opportunities**
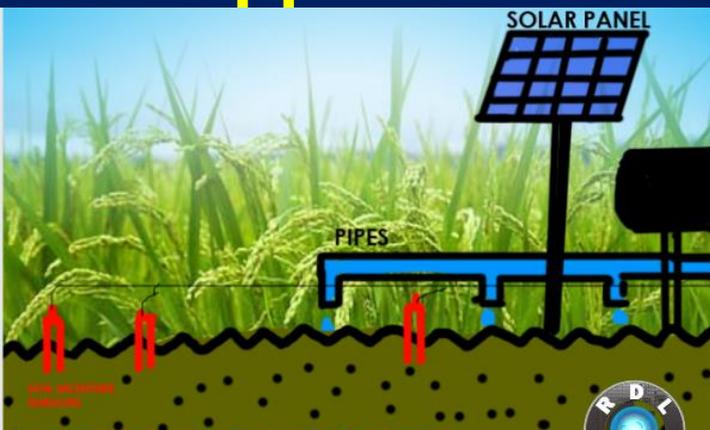
Understanding the Drivers of D& D

Adopted from Poffenberger et al. 2010 and Ty et al., 2011

# Activities for Reducing Drivers = Investment Opportunities

Activities

1. Reinforcing land-tenure
2. Land-use plans
3. Forest Protection
4. Assisted Natural Regeneration
5. Fuel-efficient Stoves
6. Mosquito Nets
7. Agricultural Intensification
8. Water Resource Development Projects
9. NTFP Development
10. Fire Prevention

Investment Opportunities

1. Monitoring tools and training
2. Mapping, Remote Sensing, Drone
3. Patrolling equipment
4. Forest plantation for paper and/or renewable energy
5. Production of Stoves
6. Production of Mosquito Nets
7. Irrigation technologies, solar for Water pumping, Smart Agriculture
8. Water purification
9. NTFP enterprise, ecotourism
10. Monitoring tools

Financing required to reduce deforestation by 50% by 2020 is approximately $75 billion to $300 billion. How to achieve?

Sources of revenues from forestry projects
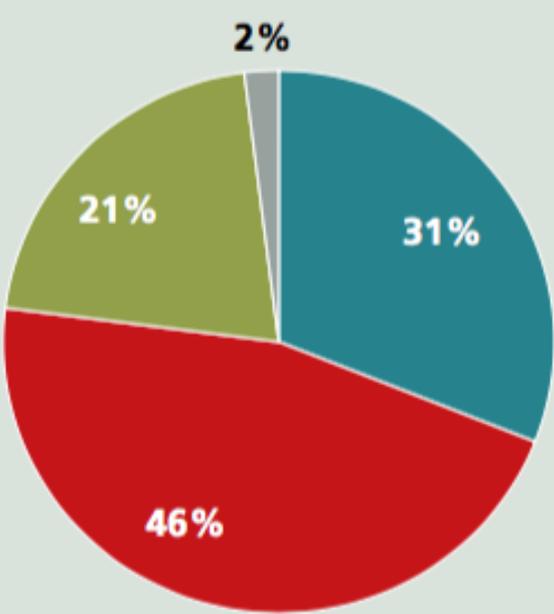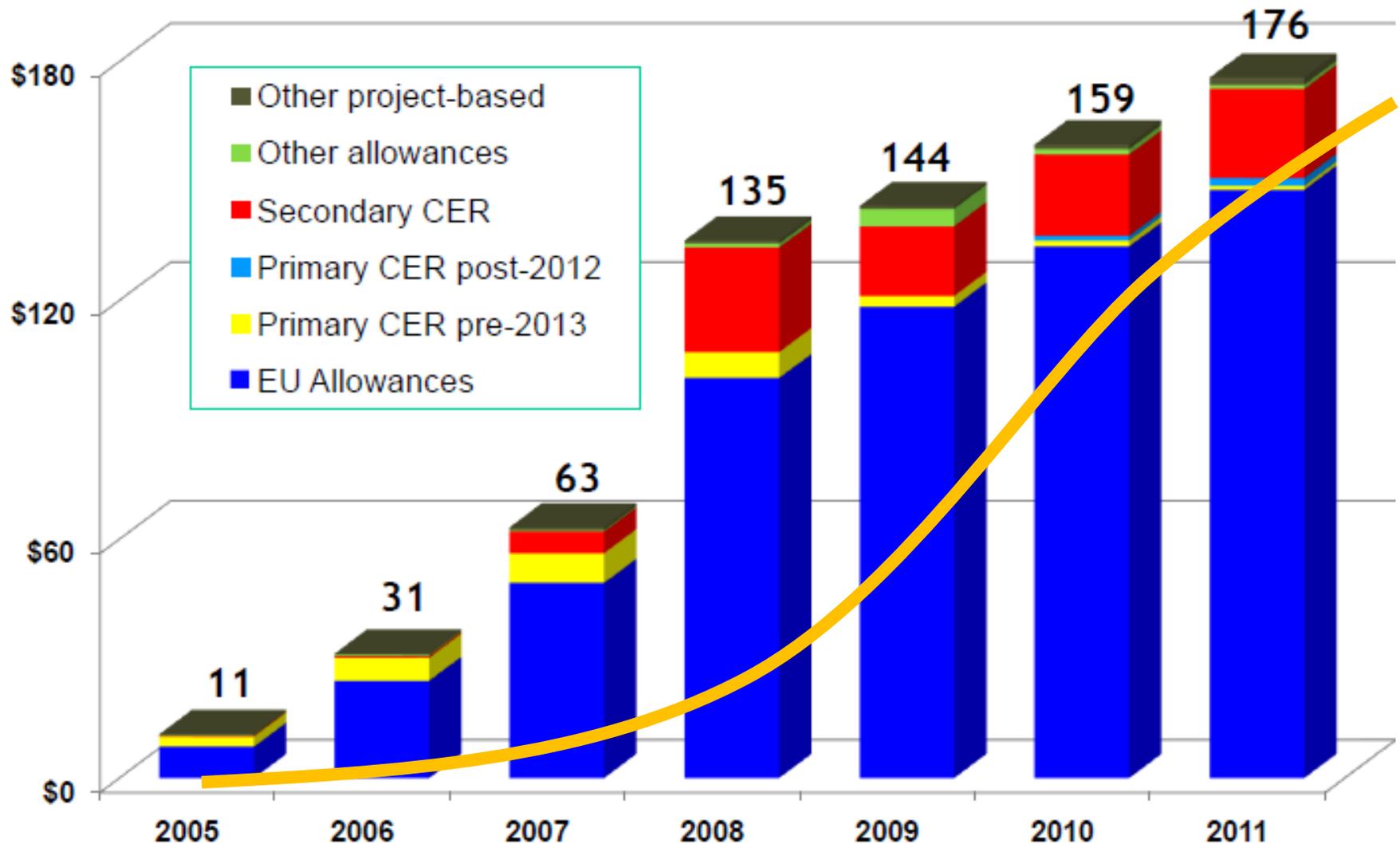

carbon credits
manioc
charcoal
other income

35 M euro forestry project in the Democratic Rep. of Congo
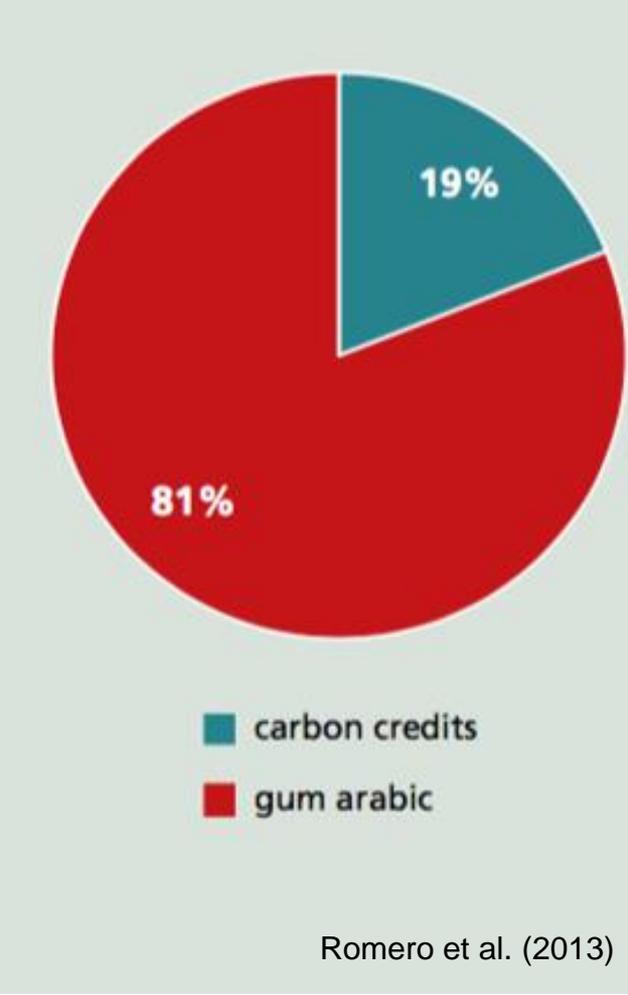
carbon credits
gum arabic

Romero et al. (2013)

8 M euro forestry in Senegal

Various opportunities provider great success independent from carbon market

Prospects for REDD+: Carbon Markets

Primary CDM: Not fixed CDM credits, depending on performance by specific project
Secondary CDM: guaranteed credits but non-specific projects

Forestry Credits vs Others
(Voluntary Markets in 2016)

RENEWABLES	18.3 $MtCO_2e$	$1.4	$25M
FORESTRY AND LAND USE	13.1 $MtCO_2e$	$5.1	$67M
METHANE	5.6 $MtCO_2e$	$1.8	$10M
EFFICIENCY AND FUEL SWITCHING	4.5 $MtCO_2e$	$2.9	$13M
HOUSEHOLD DEVICE	3.4 $MtCO_2e$	$5.2	$18M
TRANSPORTATION	1.9 $MtCO_2e$	$0.3	$1M
GASES	1.4 $MtCO_2e$	$5.7	$8M
OTHER	0.5 $MtCO_2e$	$4.0	$2M

Forestry-based credits is only US$67 M or 0.02-0.08% what are needed to reduce 50% deforestation. Shall we have a AIT REDD+ Venture here!?

Bring-home Messages

- REDD+ is a performance-based financial incentives for reducing carbon emissions from forestry

- Forest Reference Emission Level (FREL) needs to be established and emissions need to be reduced

- Identifying appropriate drivers are prerequisites

- Investment opportunities arise from activities for reducing the drivers

- Creating opportunities for local people could ensure permanent reductions of forestry emissions

- Opportunities are with us but we need a right team