III – Low Carbon Scenario for LULUCF

Brazil GHG Emissions Profile

Low Carbon Scenario

3.

4.

1. Drastically reduce Deforestation

1. Act on Primary Causes: reduce need for new land

   Free-up land for crop expansion by increasing low productivity of livestock

2. Complementary Forest Protection :

   Protect against illegal cuts

2. Large Sequestration Opportunities

1. Forest Recovery *up to full Legal Reserves compliance*

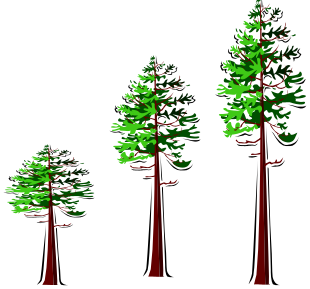
2. Plantations *for Renewable Charcoal for Steel Industry*

Capture of up to 1/3 of current emissions from deforestation

Trade-off between Legal Compliance and Risk of Carbon Leakage

More sequestration but less land remains available for crop expansion and therefore risk of more pressure to deforest elsewhere

Large Sequestration Potential



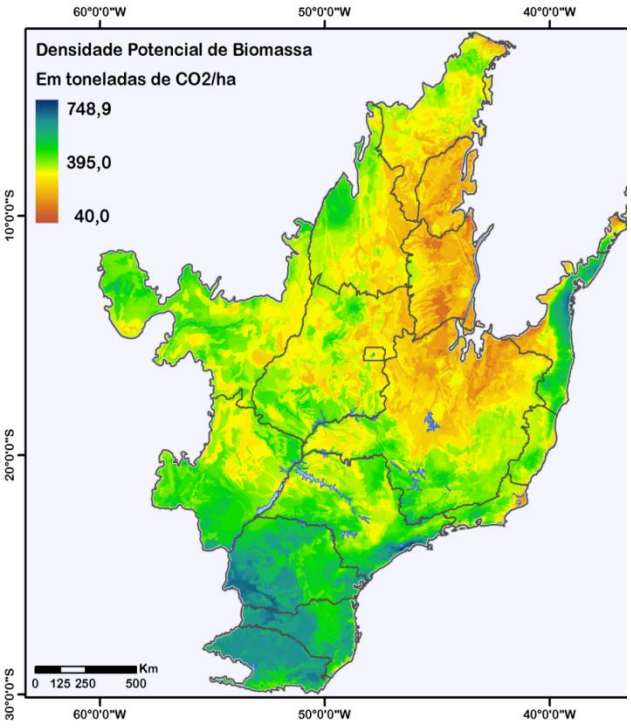
Rain Forest and Cerrado

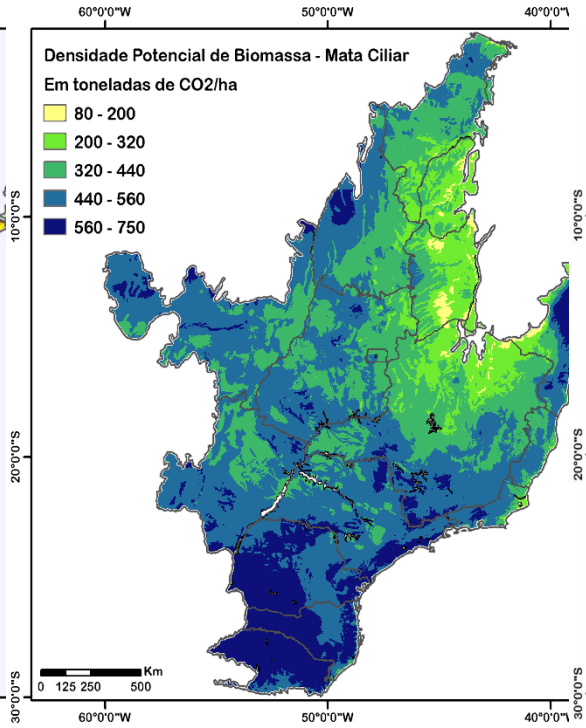
Legal Reserves

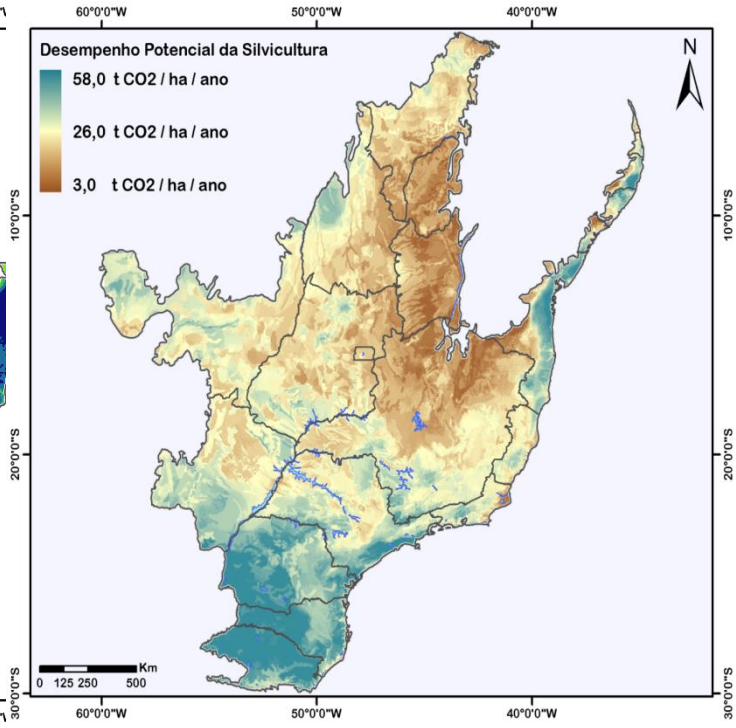
APP
(Riparian forests)

Eucalyptus plantations

Carbon sequestration rates
(tCO2/ha/year)







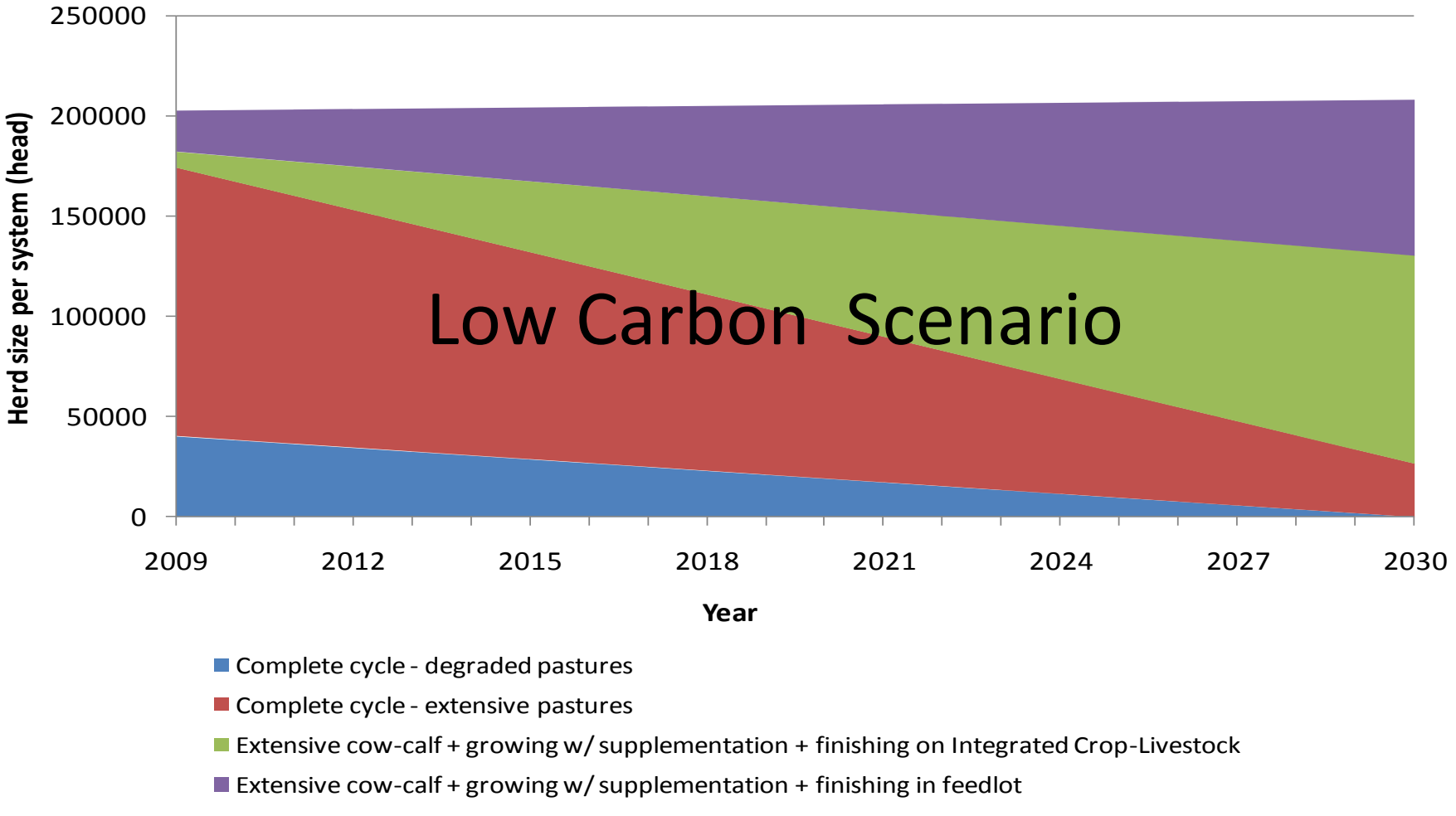
“Reduce Need for New Land” : A Challenge

Low Carbon Scenario:

certain mitigation options requires additional land

Shock 1: Absorption of excess land demand in reference scenario → *requires to free 16.8 million Ha additional land*
Shock 2: Elimination of non-renewable charcoal by 2017 and increase participation of renewable plantations for charcoal to reach 46% for steel production → *requires 2.7 million Ha additional land*
Shock 3: Expansion of Sugar Cane for Brazil to supply 15% of the ethanol required for a Mix of 20% of ethanol in world gasoline → *requires 6.4 million Ha additional land*
Shock 4: Recovering of the environmental liabilities of legal forests, → *requires to free 44.3 million Ha additional land*
Combined effects : + 70 million Ha to be absorbed

Increase Productivity of Livestock to free-up land for expansion of other activities to avoid deforestation

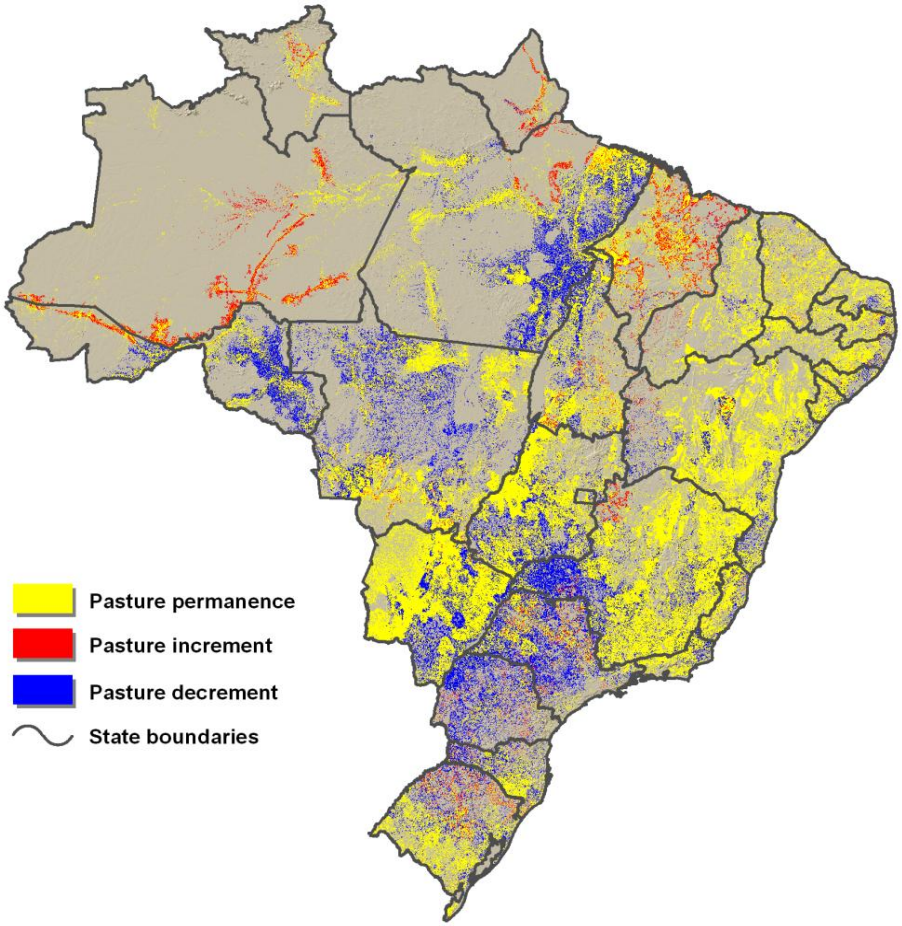



SISTEMA AGROSSILVIPASTORIL
Ótima opção para parte da fazenda
1º Ano
Eucalipto + Arroz


Segundo Ano
Eucalipto + Soja

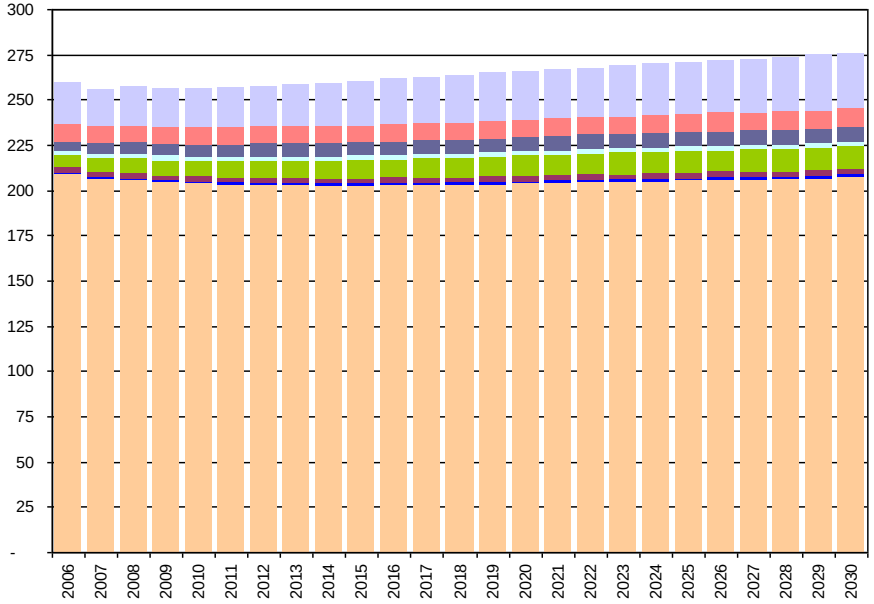

Terceiro ao Décimo Ano
Eucalipto – Pastagem - Animal


Terceiro Ano
Pastagem
1 a 2,0 ua/ha/ano

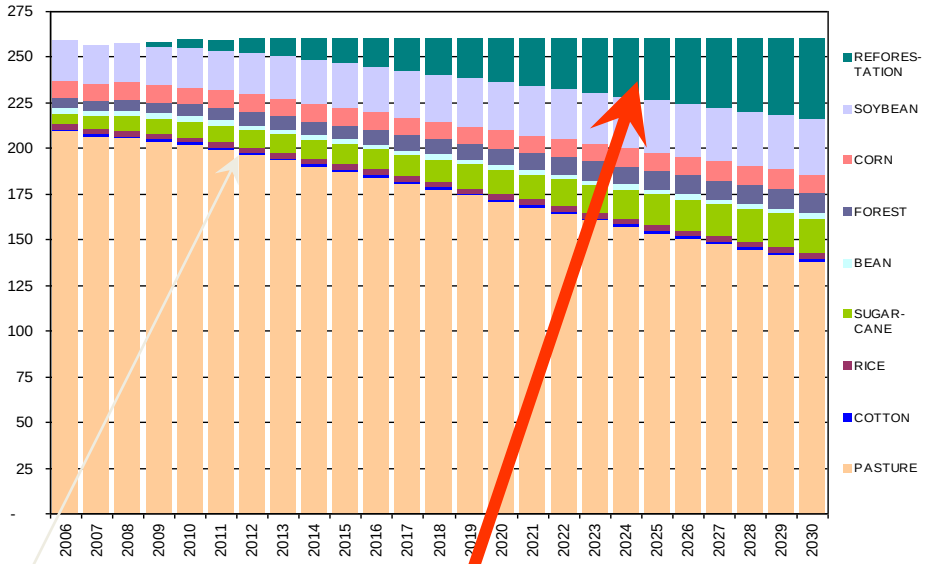

Pasture permanence
Pasture increment
Pasture decrement
State boundaries

Reference and Low carbon Scenarios
Summarized Results – BRAZIL (Million of Hectares)

Land use Reference Scenario



Low Carbon Scenario



Pasture s are freed-up to accommodate expansion of other land needs

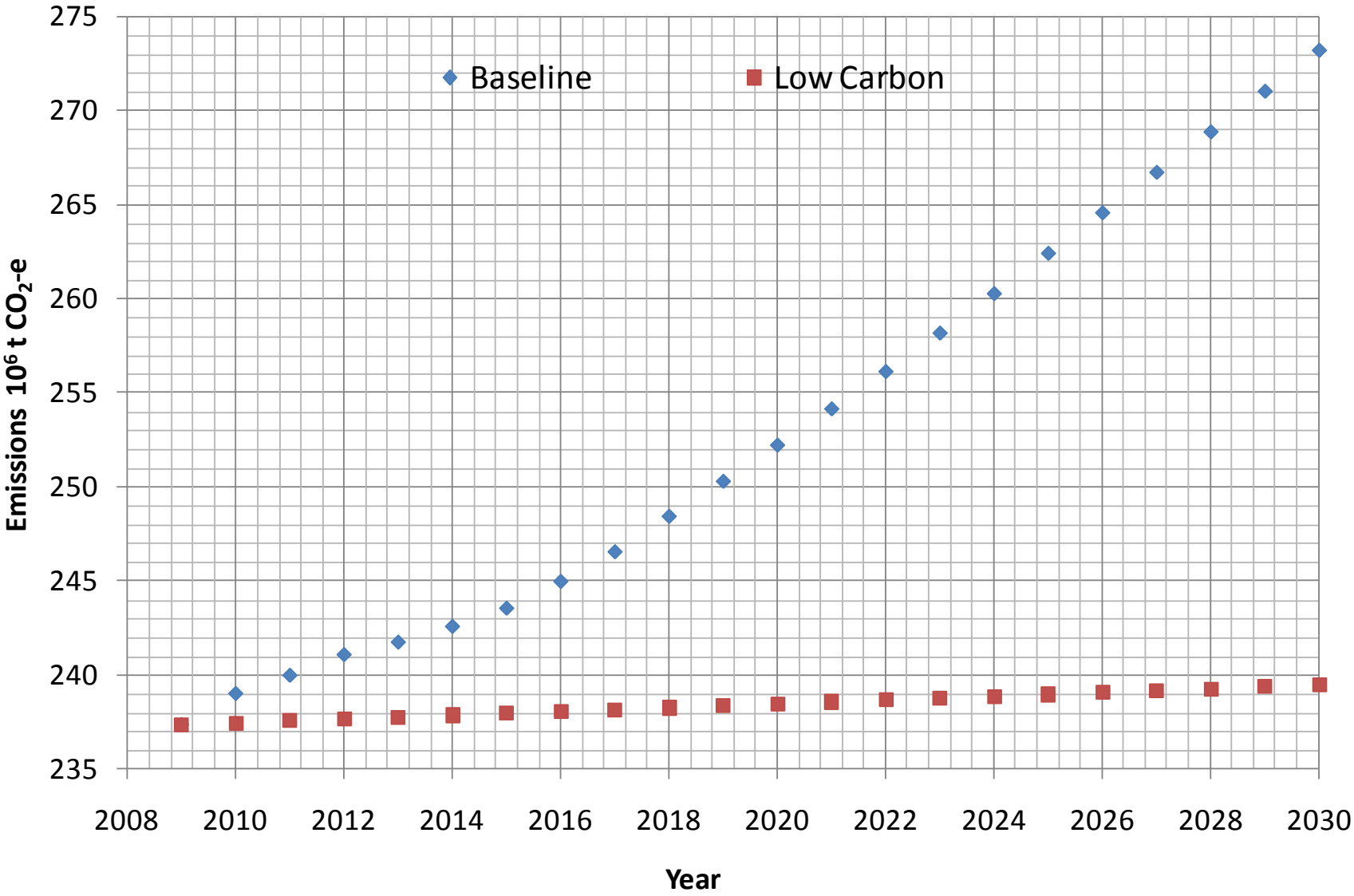
Trade-off:
more reforestation, more bio-energy triggers more efforts to free-up pasture

Alternatives for mitigation of GHG emissions

- Improvement of forage quality
- Genetic improvement of the cattle herd
- Expansion of the feedlot sector
- Recovery of degraded pastures
- Adoption of integrated systems (Crop-Livestock, Crop-Livestock-Trees)

- Increased stocking rates
- Decreased demand for grazing lands
- Improvement of performance indices
- Decreased age at slaughter
- Decrease in cow herd size needed to supply calves
- Decrease in greenhouse gas emissions

Projected growth of Livestock GHG emissions



Greenhouse Gases (GHGs) Emissions from Agricultural Systems

I. Soil Emissions

CO_2 – Changes in soil C stock.

N_2O – Fertilizer, crop residues and soil C losses (N_2O from soil N mineralization)

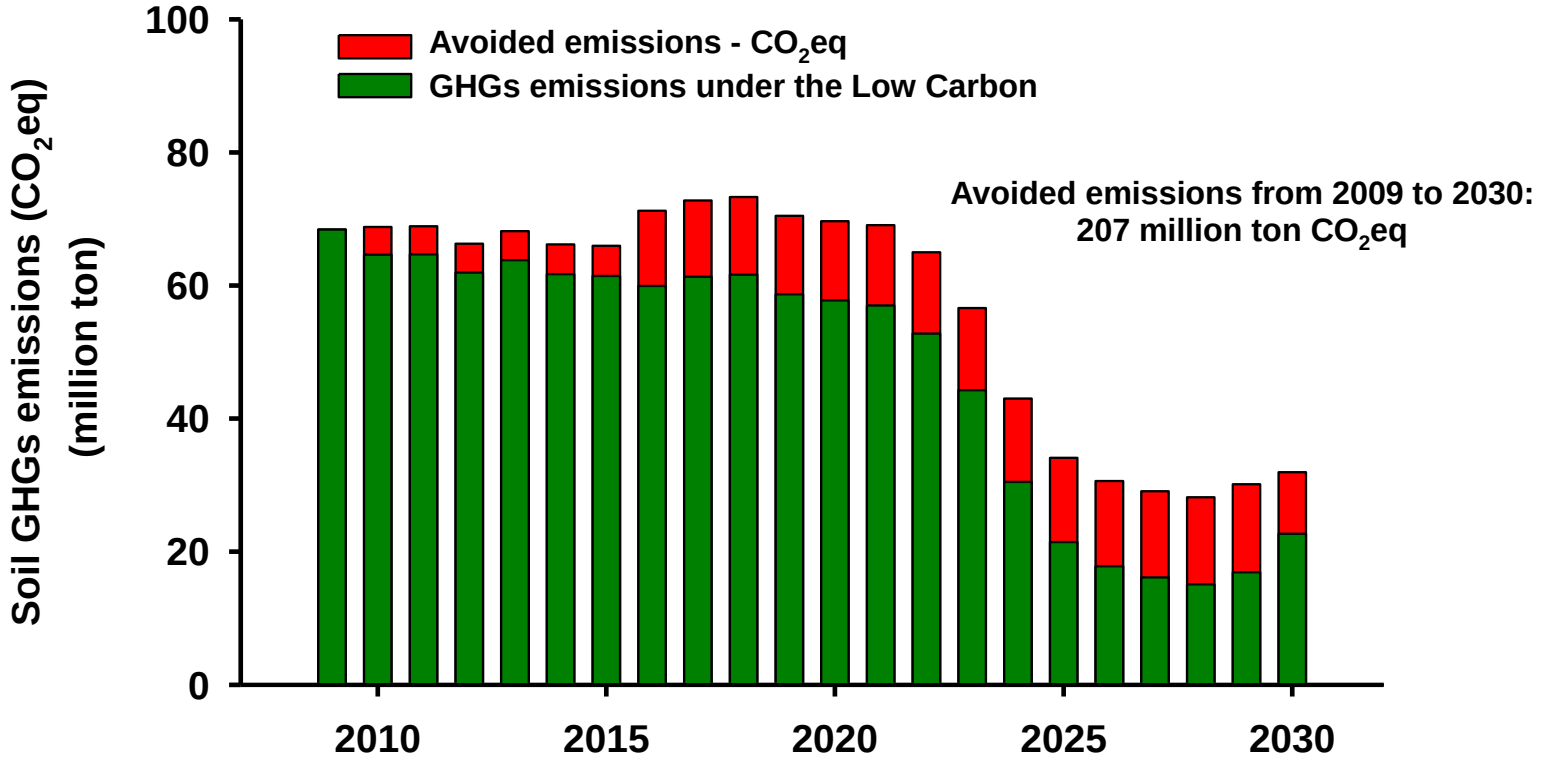
CH_4 – Biomass burning and waterlogged rice

II. Emissions from fossil fuels

CO_2eq – Based on the GHGs generated from diesel oil combustion to produce the energy required for field operations (fertilization, disc plough, seeding…).

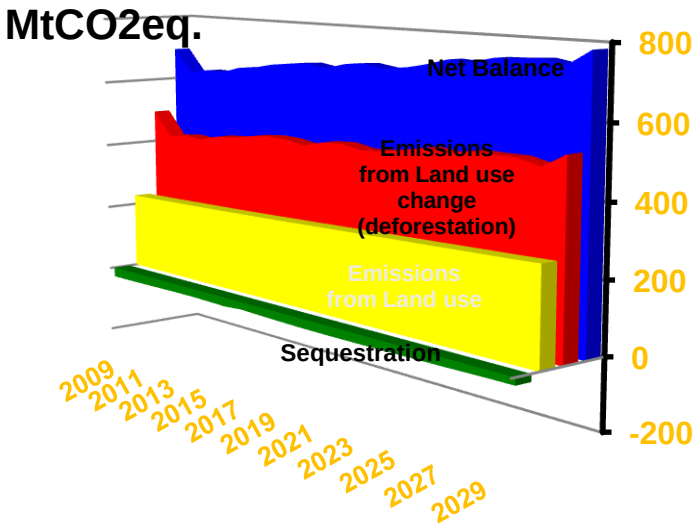
Zero Tillage

Projected growth of Agriculture GHG Emissions

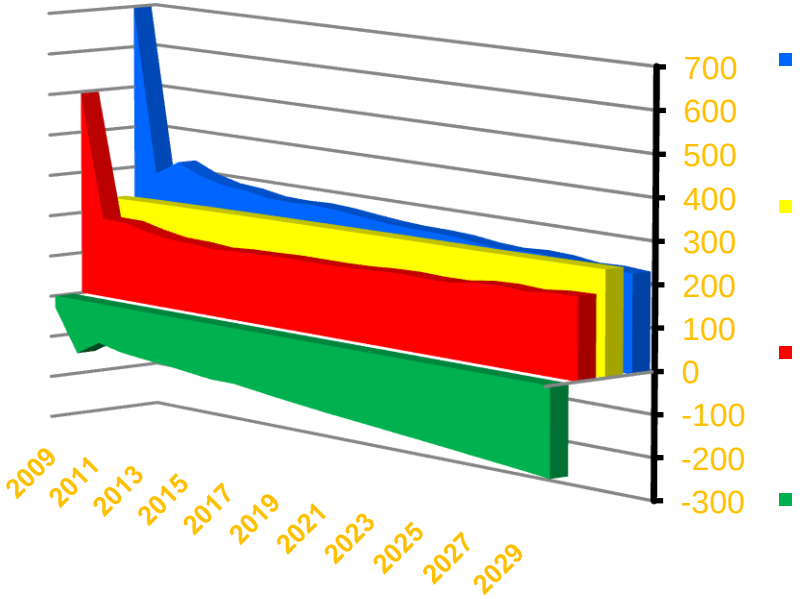


GHG emissions balance

Reference



Low Carbon



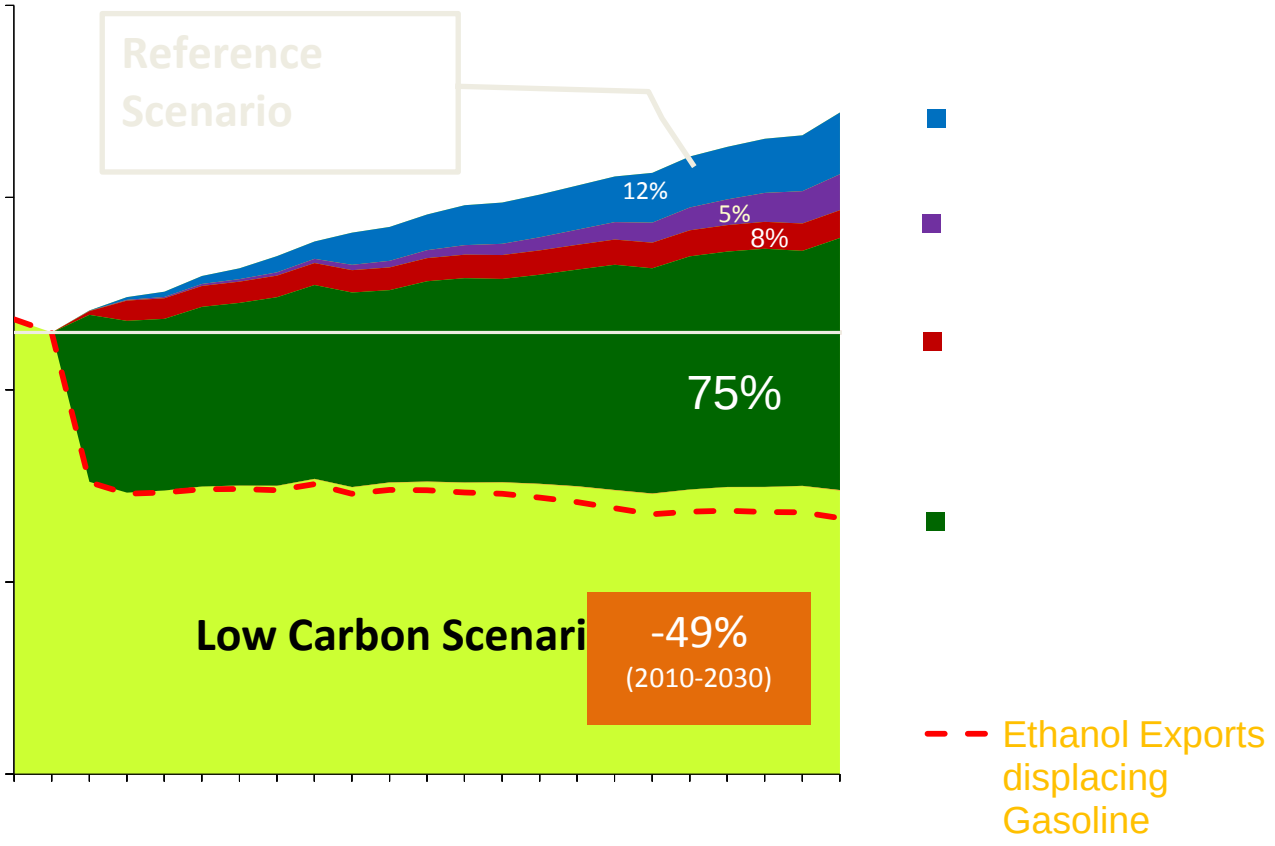
Reduction of Deforestation:

(-68%) compared to the Reference Scenario2010-2030

(-83%) in the Amazon Region compared to the historical average 1996-2005

Low Carbon Scenario

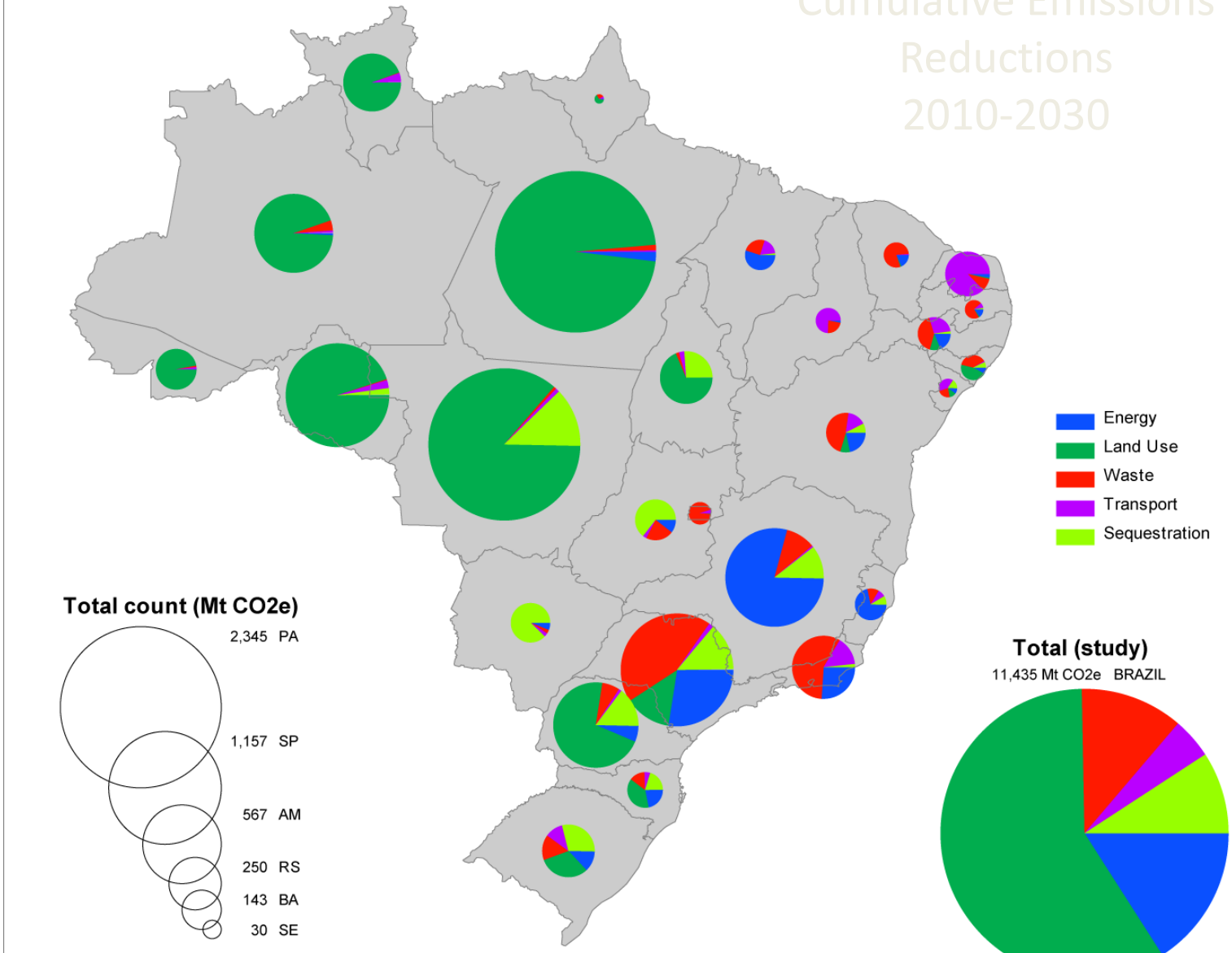
Projections 2008-2030



Accommodation of marginal expansion of crops

→ *sharp drop, but effort to be renewed every year*

Cumulative Emissions Reductions 2010-2030



Source: EMBRAPA, CETESB, UFMG, UFRJ, LOGIT, ICONE.

Made by JTH with Philcarto *10/12/2009* http://philgeo.club.fr

PAUSE:
Q&A AND DEBATE

3) What Constrains are there (Institutions, Capacity, Finance) ?

4) Are there Trade-offs ?

IV – Economic Analysis -

To inform the Decision Process

Inform the Decision Making Process

Key questions	Example: Cogeneration from Sugarcane
Is there a low carbon option ?	Extracting condensing turbine, 90 bars
What is the mitigation potential ?	158 MtCO2e (7.5MtCO2/year)
Does it make sense economically from a planning perspective ?	YES: Marginal Abat. Cost = - $ 105 /tCO2 *(8% social discount rate)*
Would it happen spontaneously ?	NO: Sector Expected IRR is 18% > 8% Incentive required = + $ 8 /tCO2
Break-Even Carbon Price = +$8/tCO2	
How much financing needed ?	Additional investment = + $ 35 billion *(+$1.6 bi /year)*

Social Costs and Private Cost of Mitigation Options for

More Productive Livestock Systems:

→ are more capital intensive

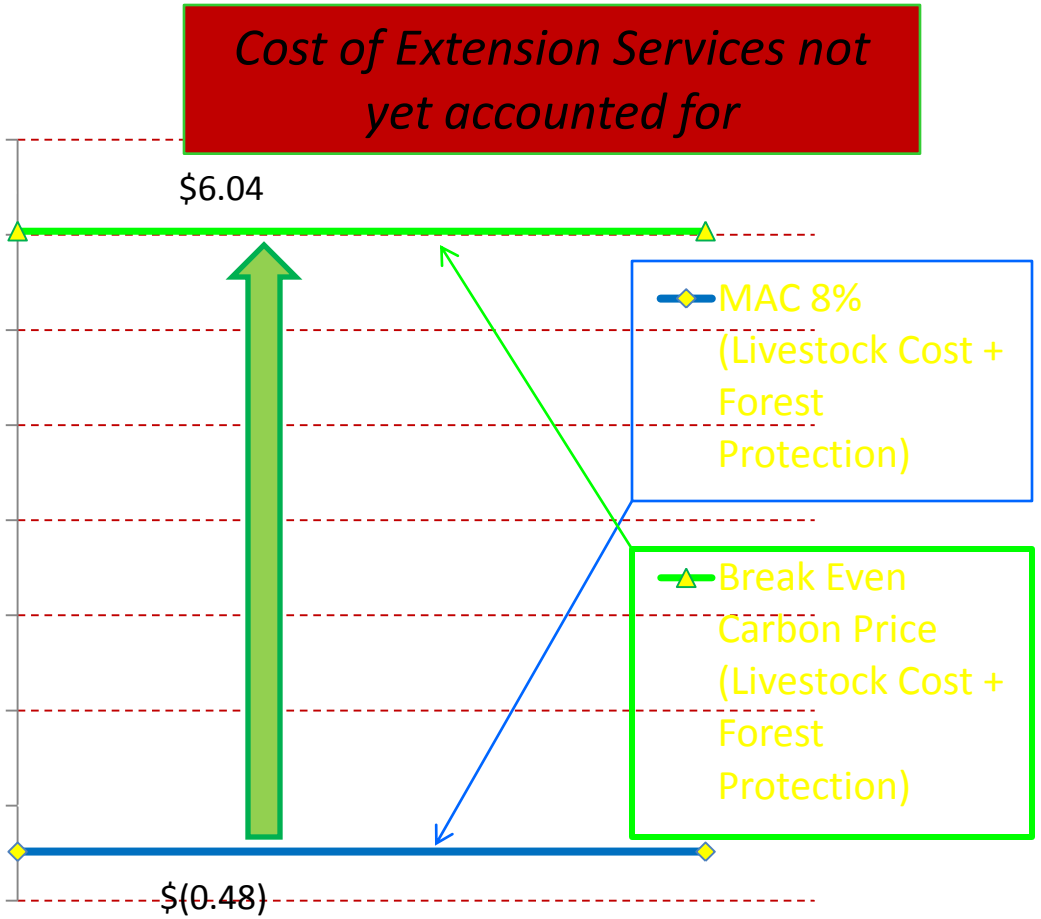
→ require financing

→ induce additional financial costs

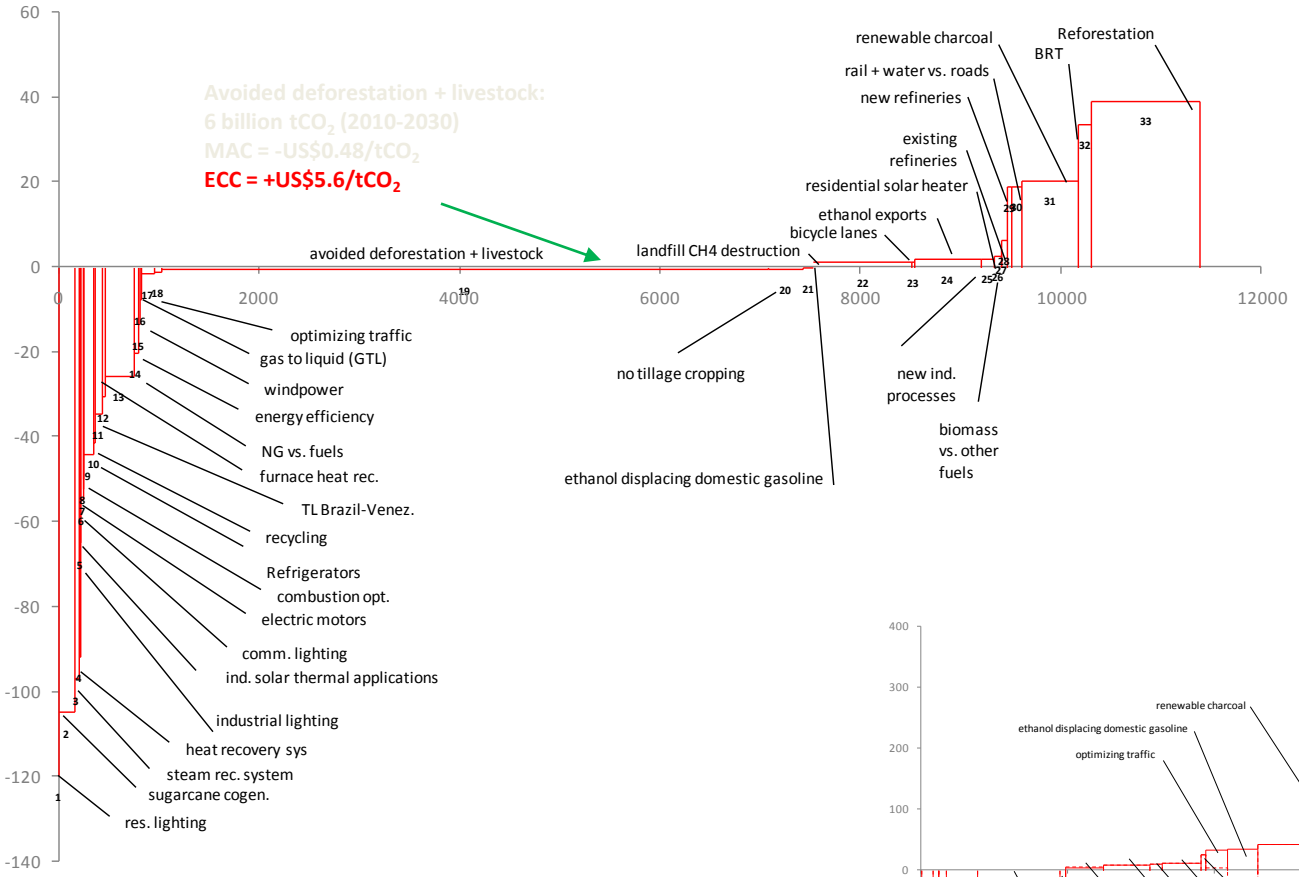
→ request higher IRR than 8% social discount rate

→ require incentive

(Break-even Carbon Price)



Marginal Abatement Cost / Break-Even Carbon Price Curves

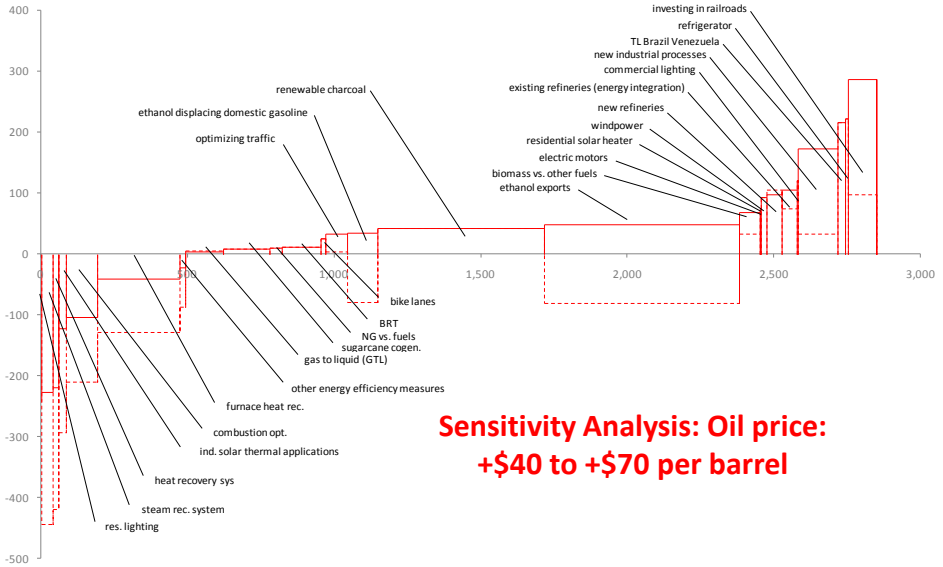


Selection criteria:

- MAC < U$50/tCO2e, *(social discount rate 8%)*

  or

- Other benefits would trigger implementation *(transport, sanitation)*



Sensitivity Analysis: Oil price: +$40 to +$70 per barrel

Additional Financing is needed

- For Incentive
  (to finance Break-Even Carbon Price)
- For Investment

Average Investment needed:
U$ 22 billion additional per year
(U$5bi/y for LULUCF)

(National Investment = U$ 250 bi/year, FDI = U$ 30 bi/year)

Not exorbitant, however new instruments are required

PAUSE:
Q&A AND DEBATE

5) What Opportunities are there for the WBG to engage ?