Public Policies in Brazil Supporting GHG Emission Reduction and Adaptation to Climate Change

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Voluntary commitment to reduce GHG emissions by **36.1% to 38.9%** compared to the projected emissions until 2020 = **1.168 a 1.259 billion tons of CO_2eq**

COP15 COPENHAGEN
UN CLIMATE CHANGE CONFERENCE 2009
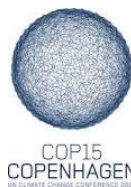
National Policy on Climate Change Law 12.187 (2009)

Brazilian Climate Change Forum (FBMC)

Ministries and Society

RedeClima
Mudanças Climáticas
Globais no Brasil

Sectorial Plans for Mitigation and Adaptation

Amazonian Deforestation	Cerrado Deforestation	**Agriculture**	Energetic Eficiency	Coal and Siderurgy	Other Sectorial Plans

TT Universities Research Instit.

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1. **Grassland restoration**
2. **Crop-Livestock-Forest Integration (iLPF)**
3. **No Till Systems(SPD)**
4. **Biological Nitrogen Fixation (FBN)**
5. **Forestry**
6. **Manure Management**

abc
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Working Group (2010 – 2011) for the elab. of the ABC Plan

Government

- Ministry of Agriculture (AGE, SDC, Embrapa)
- Ministry of Development
- Ministry of Finace
- Ministry of Science, Technology and Innovation
- Ministry of Environment

Civil / Scientific organizations, ONGs

- Brazilian Forum on Climate Change (FBMC)
- Confederation of Agriculture and Livestock of Brazil (CNA)
- National Confederation of Agricultural Workers (Contag),
- Organization of Brazilian Cooperatives (OCB),
- Central Única dos Trabalhadores (CUT
- Instutute for Socioeconomic Studies (Inesc)
- Conservation International; WWF

Productive sector

- Brazilian Federation of Zero Tillage and Irrigation (FEBRAPDP)
- Brazilian Association of Producers of Planted Forests (ABRAF)
- National Association of Producers and Importers of Inoculants (ANPII)
- Itaipu Binacional

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# Main Objective for the Agriculture Sector

Guarantee continuous improvement of sustainable agricultural systems and practices promoting low GHG emissions and **increasing C fixation in soils**

Some specific objectives

- Assist in the accomplishment of Brazil's NAMAs (COP 15)
- Assist in decreasing deforestation rates
- Promote production arrangements that contribute to reduce GHG emissions and increase farmers' income

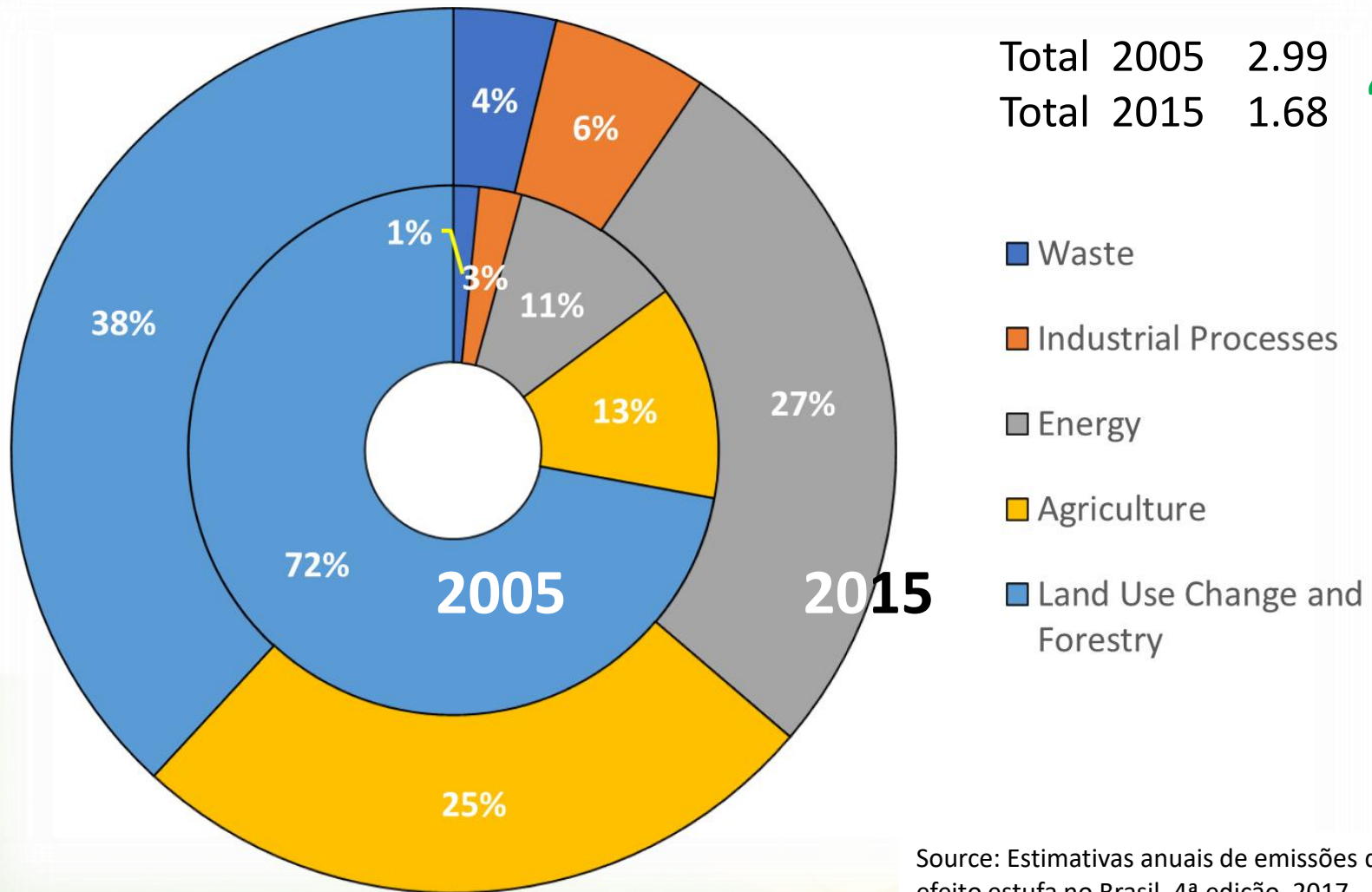# Brazilian Annual GHG Emissions (1990 – 2015)
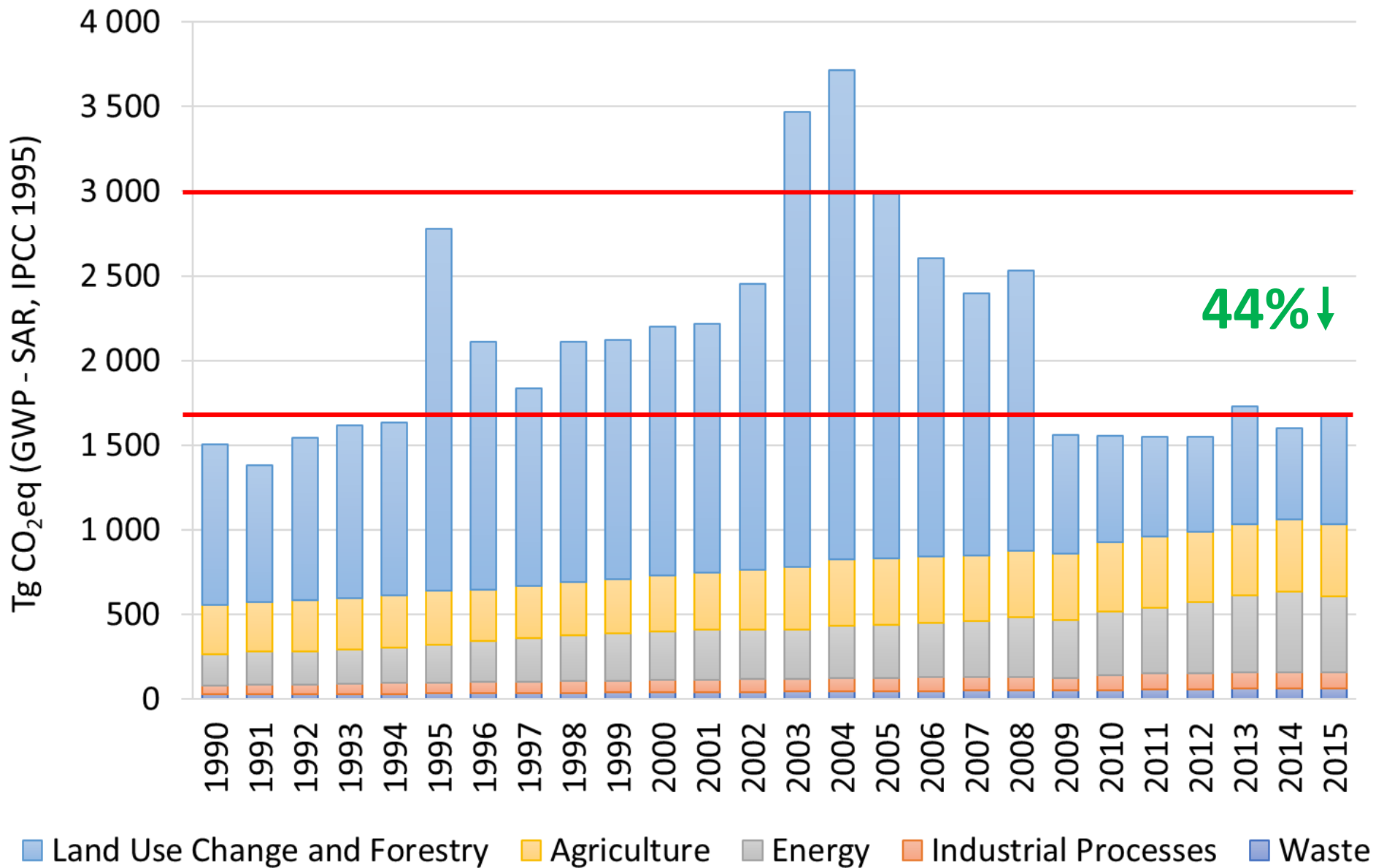
Source: Estimativas anuais de emissões de gases de efeito estufa no Brasil, 4ª edição, 2017

Brazilian GHG Emissions 2005 and 2015 (Gt CO$_2$eq)

Total 2005 2.99   **44%↓**
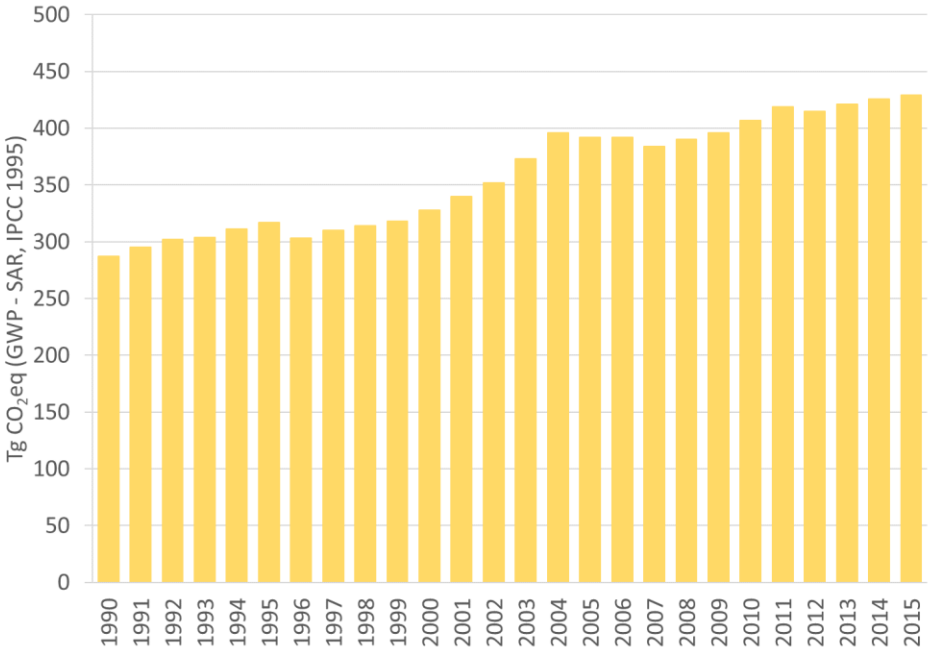Total 2015 1.68

Legend:
- ■ Waste
- ■ Industrial Processes
- ■ Energy
- ■ Agriculture
- ■ Land Use Change and Forestry

2005 (inner): 1%, 3%, 11%, 13%, 72%
2015 (outer): 4%, 6%, 27%, 13%, 38%, 25%

Emissions of the Agriculture Sector (Gt CO$_2$eq)

Bar chart: Tg CO$_2$eq (GWP - SAR, IPCC 1995) from 1990 to 2015

Contribution of subsectors to the emissions of the agricultural sector in 2015 (CO$_2$eq)

- 58%
- 35%
- 4%
- 2%
- 1%

Legend:
- Enteric fermentation
- Agricultural soils
- Animal waste manage[ment]
- Paddy rice
- Sugarcane burning an[d]
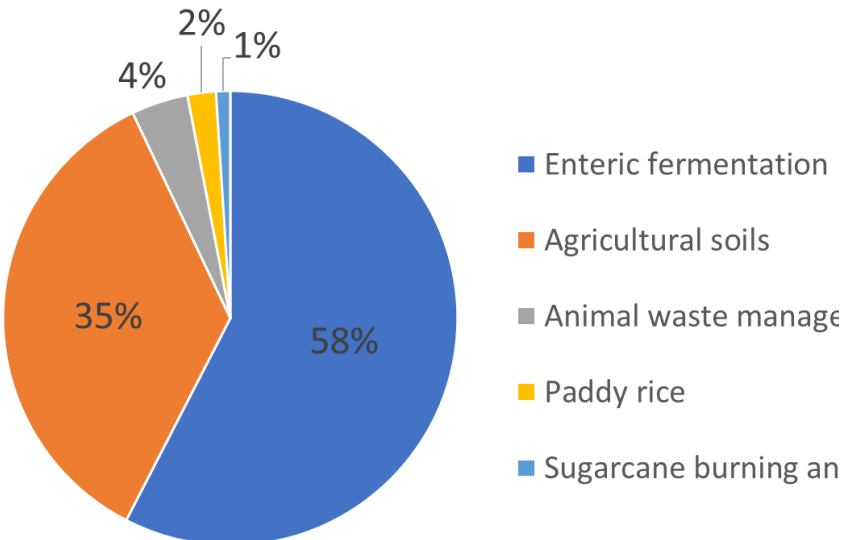
CH$_4$ and N$_2$O (CO$_2$eq) emissions in the Agriculture sector in 2015

- 63%
- 37%

Legend:
- CH4
- N2O
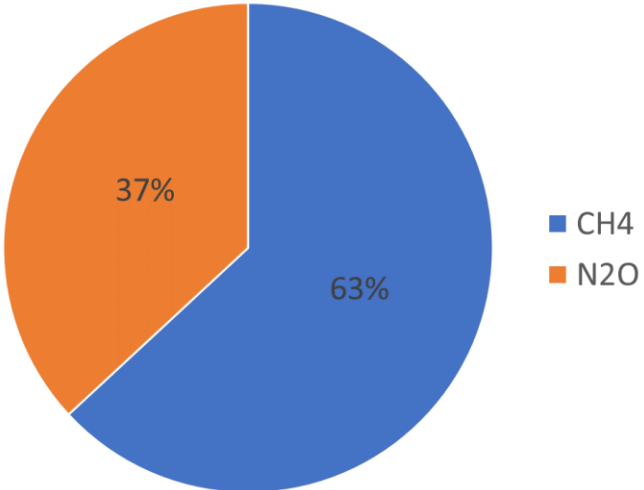
ABC Plan Targets

Technology / Process	Increase in area/use	Mitigation Potential (million Mg CO_2e)
1. Restoration of grazing lands[1]	**15 million ha**	83 a 104
2. Integrated crop-livestock-forestry systems (ICLF)[2]	**4 million ha**	18 a 22
3. No-till farming	**8 million ha**	16 a 20
4. Biological N_2 Fixation	**5.5 million ha**	10
5. Planted forests[3]	**3 million ha**	8 a 10
6. Treatment of Animal Waste	**4.4 million m³**	6.9
Total		**133.9 a 162.9**

[1] By proper management and fertilization

[2] Including Agroforestry Systems (AFSs)

[3] The potential mitigation of GHG emissions regarding the steel industry is not accounted here

Calculation of the ABC Plan Targets

1. Restoration of grazing lands[1]	3.79 Mg de CO_2eq ha^{-1} $year^{-1}$
2. Integrated crop-livestock-forestry systems (ICLF)[2]	3.79 Mg de CO_2eq ha^{-1} $year^{-1}$
3. No-till farming	1.83 Mg de CO_2eq ha^{-1} $year^{-1}$
4. Biological N_2 Fixation	1.83 Mg de CO_2eq ha^{-1} $year^{-1}$
5. Planted forests[3]	
6. Treatment of Animal Waste	1.56 Mg de CO_2eq m^{-3}

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7 Programmes of the ABC Plan

The seven programmes (Adaptation at center):
1. Restoration of grazing lands
2. ICLF+AFS
3. No-till farming
4. Biological N_2 Fixation
5. Planted forests
6. Treatment of Animal Waste
7. Adaptation
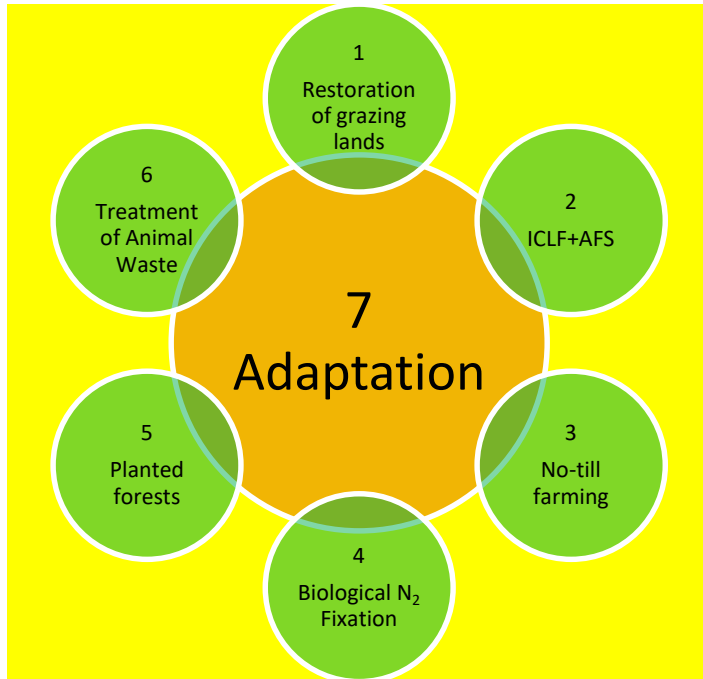
- Construction of State and Municipal Plans – Local committees - process ownership
- Information
- Training
- R, D & I
- Technology Transfer
- Technical Assistance
- Land titling and compliance with environmental requirements
- Monitoring, Reporting and Validation
- Synergy with other National Programs
- Credit and other financial tools

Estimated cost:
R$ 197 billion (70 bi US$)

Summary

- Programmes actions
  - R & D & I
  - Technology / Knowledge Transfer
  - Production
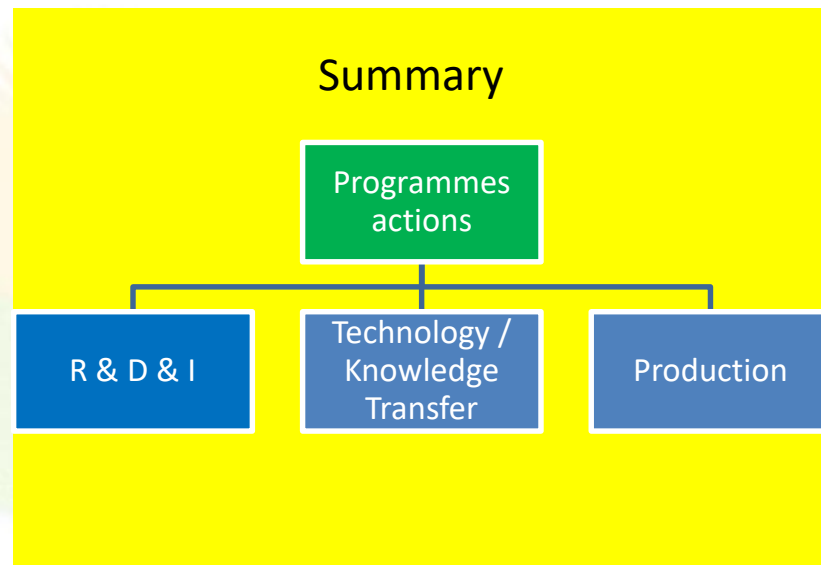
Construction of State and Municipal Plans

National Level - strategic, Interministerial Committee
National level – tactic, Executive Committee of ABC Plan
Coordination: Ministry of Agriculture, Ministry of Agrarian Development + Casa Civil, MF, MMA, Embrapa, FBMC

Monitoring

State and municipal level - operational, Local committees
Elaborated for local conditions

- strengthening technical assistance
- training and information
- technology transfer strategies
  (field days, lectures, seminars, workshops),
- implementation of Technological Reference Units (URTs)
- publicity campaigns
- contracting for Technical Assistance and Rural Extension (ATER)
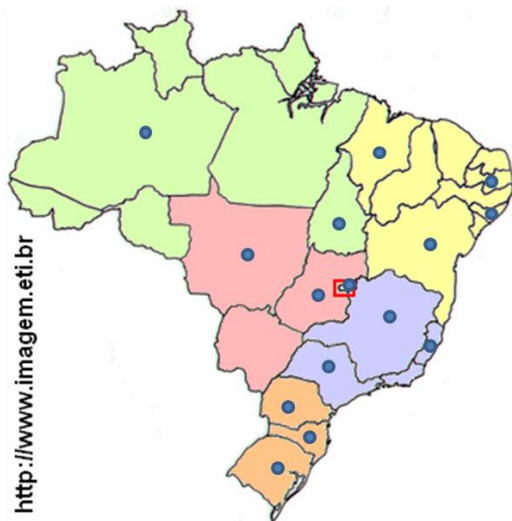
Until 2017
14 states+DF with Plan
⬤ under implementation
11 states with elaborated Plan
2 states miss Plan (in elaboration)

http://www.imagem.eti.br

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Credit and other financial tools

The ABC Plan is a set of actions that reduce or avoid emissions of GHG and contributes to the adaptation to climate change.

The ABC Programme is a set of actions and funding rules, which follow the guidelines and subprograms of the ABC Plan – which, for operational reasons, was merged with several other programmes that existed in the Ministry of Agriculture.
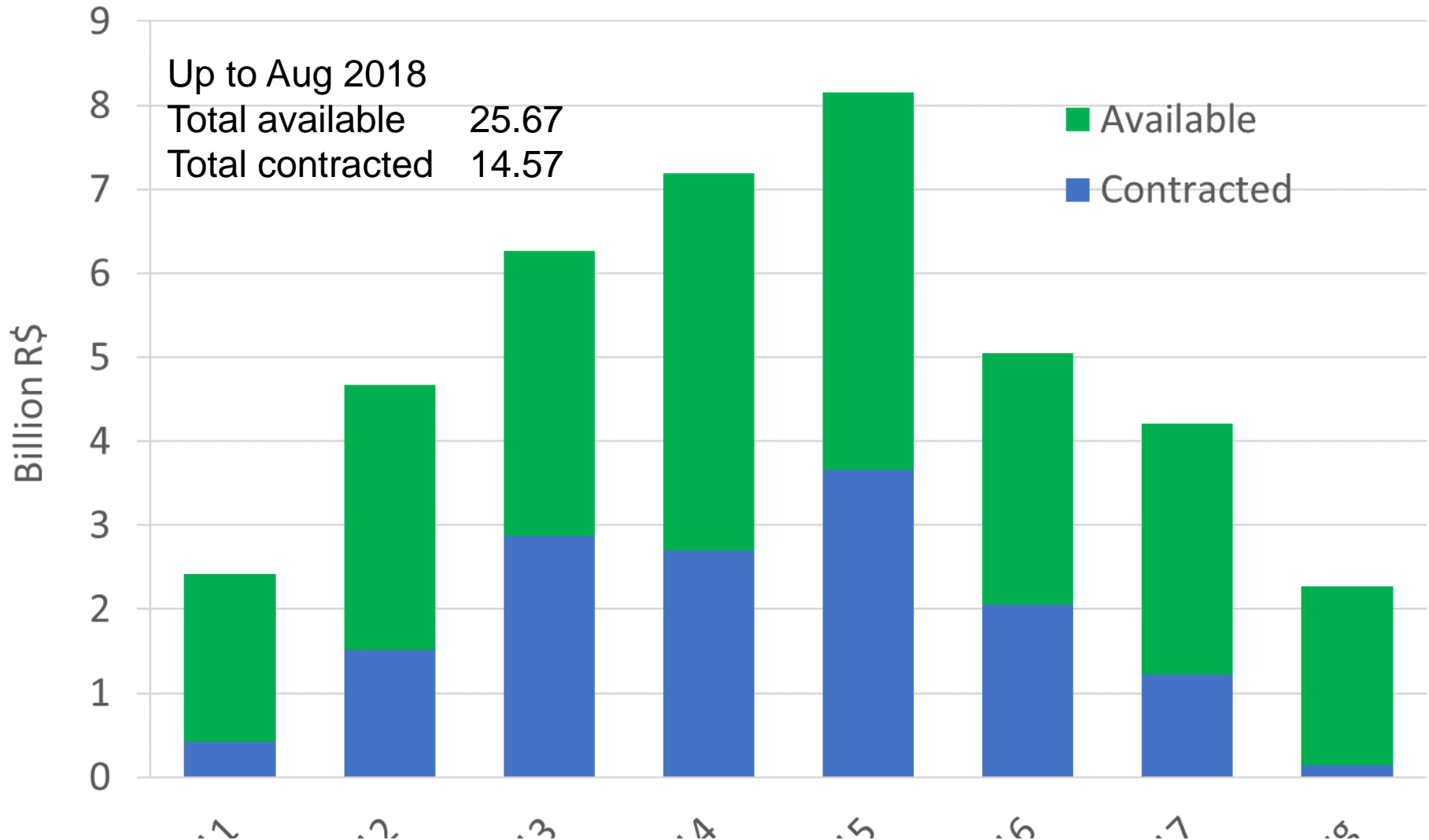
BNDES, Banco do Brasil

Credit line

Up to Aug 2018
Total available   25.67
Total contracted   14.57
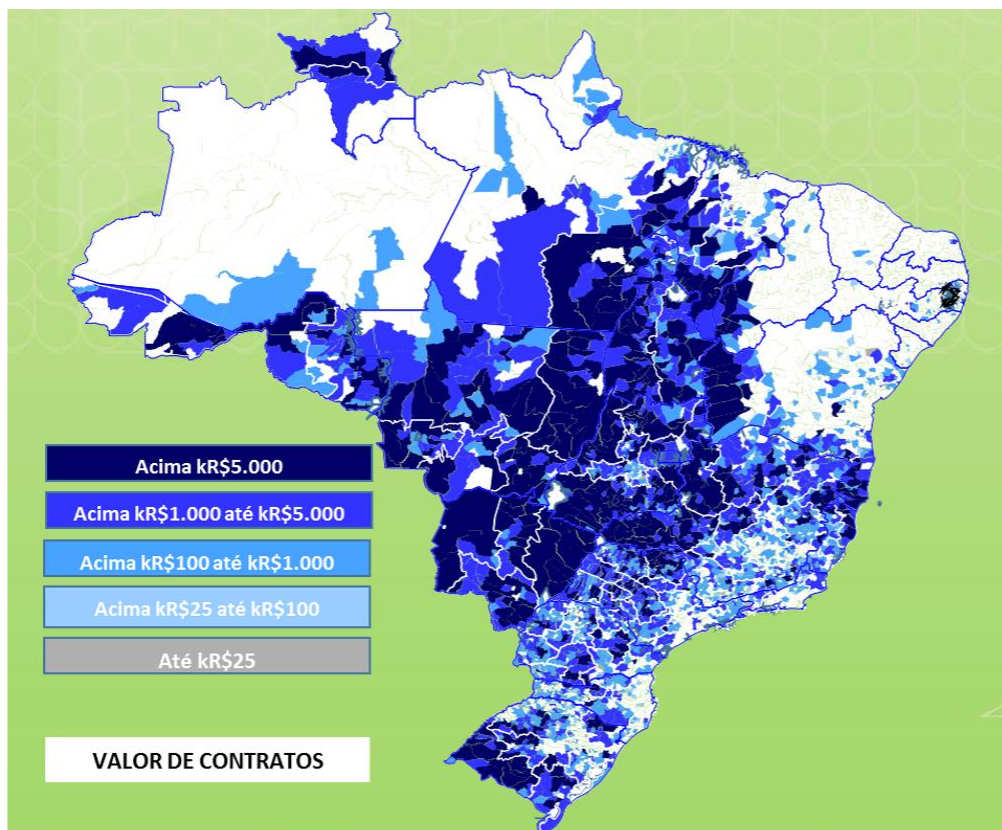
Billion R$

Legend: Available (green), Contracted (blue)

➢ Limit of 0.5 million dollars per farmer (~1.000.000,00 R$ as per 2010/11)
➢ Grace period of up to 8 years; maximum payback period of up to 15 years
➢ Interest rate of 5-8.5% per year

Spatial distribution of financing by the ABC Programme
(Jan 2013 – Jan 2017)

Legend:
- Acima kR$5.000
- Acima kR$1.000 até kR$5.000
- Acima kR$100 até kR$1.000
- Acima kR$25 até kR$100
- Até kR$25

VALOR DE CONTRATOS

RURAL SUSTENTÁVEL

The program aims to promote the implementation of a large-scale project to enhance the development of the Low-Carbon Agriculture (ABC) Programme and encourage the implementation of agriculture technologies within rural properties under the Project. (ICF, DEFRA, IDB, IABS)

Set Aside

R$ +70 million

in direct benefits to support rural producers in:

350 UDs
(Demonstratives Units)
that already have one of the four low carbon technologies supported by the Project

3.360 UMs
Multiplying Units)
With the potential and interest to adopt one of the four low carbon technologies supported by the Project

11 m
Rural Producers Trained during Field Days

1.120
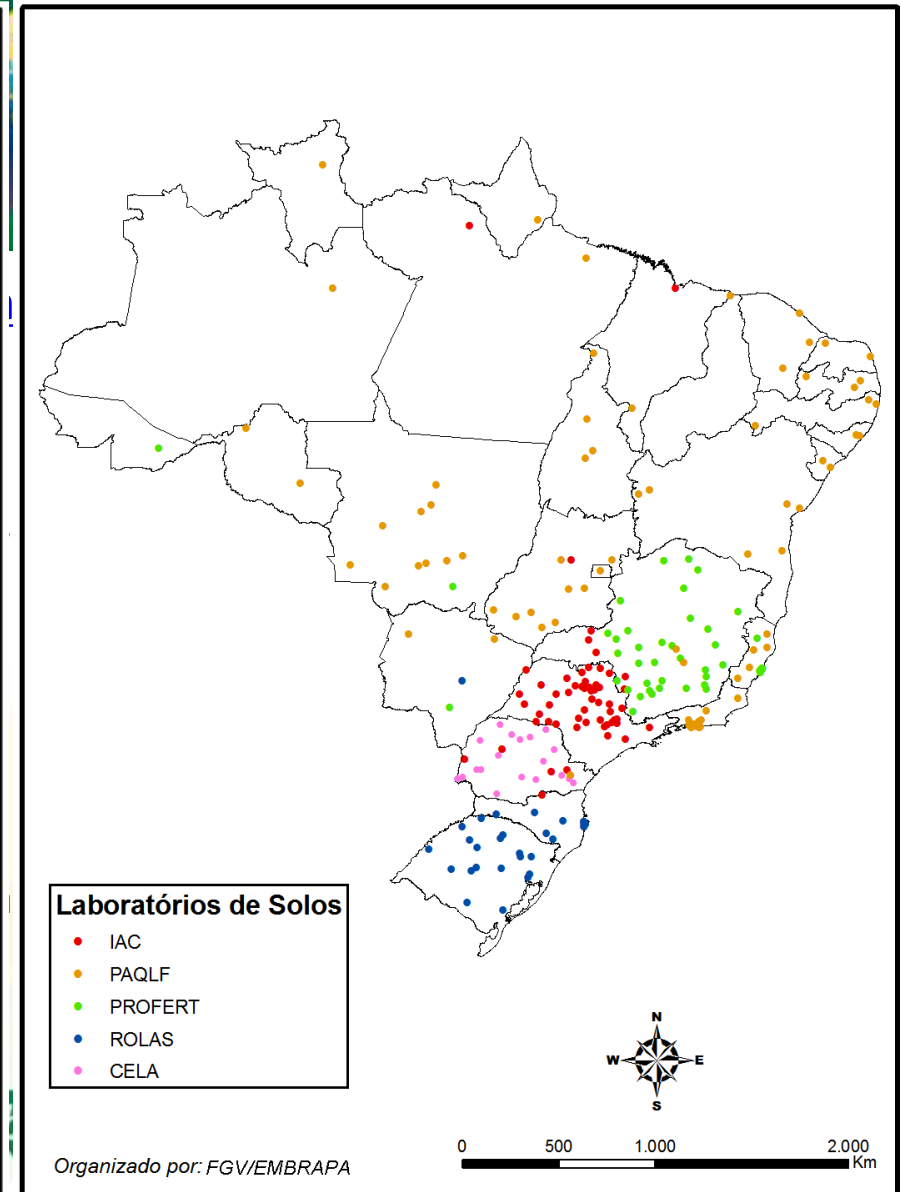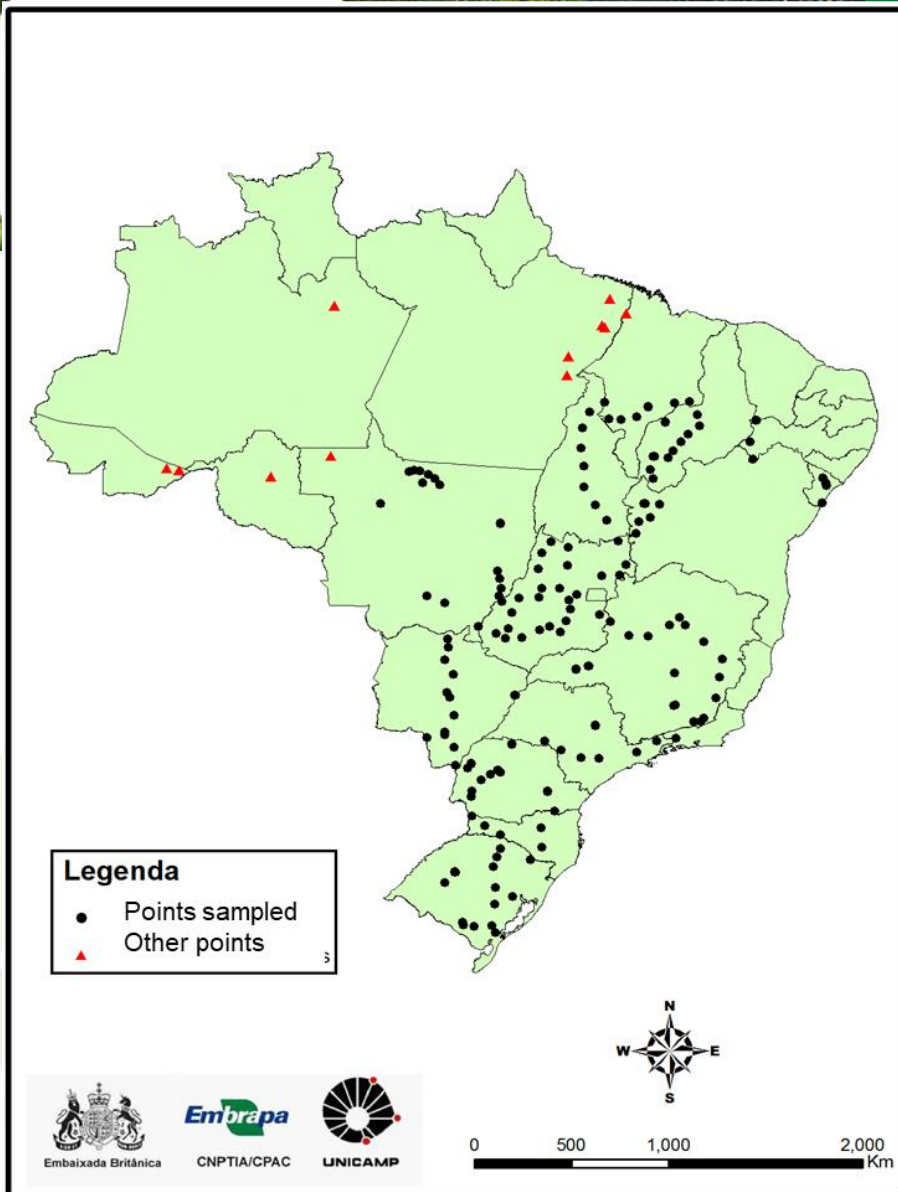Trained Technical Assistant Agents

3.710
Trained Rural producers' family members

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Monitoring, Reporting and Validation

ABC Plan – Sample points

Synergy with other National Policies

National Policy of Climate Change 2009

abc
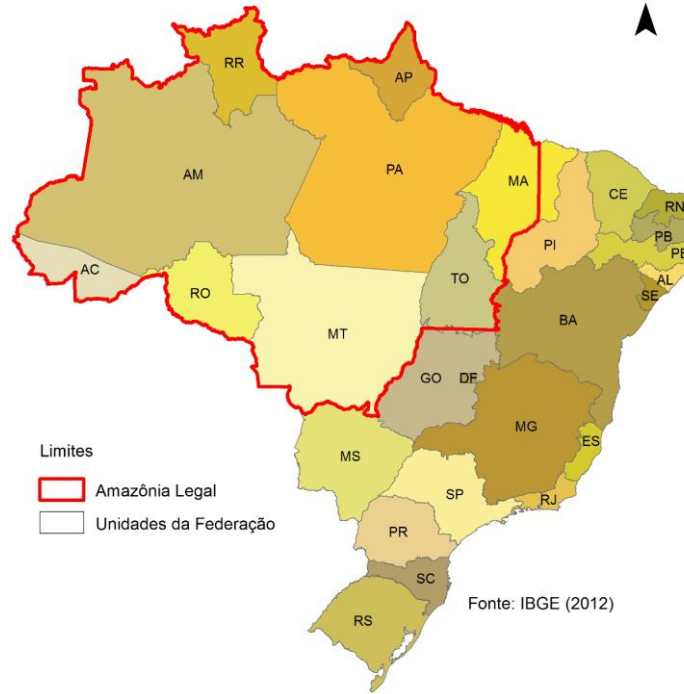AGRICULTURA DE BAIXA EMISSÃO DE CARBONO

National Water Security Plan 1997

National Irrigation Policy 2013

National Programme to Combat Desertification (PAN-Brasil)

Limites
- Amazônia Legal
- Unidades da Federação

Fonte: IBGE (2012)

Law for Protection of Native Vegetation
Forest Code 1965, 2012

Legal Reserve

Areas of Permanent Preservation

Areas of Restricted Use

National System of Conservation Units 2000

Environmental Regularization Programme 2014

Environmental Register (CAR)

National Policy for Integration of Farming Livestock and Forestry 2013

Agricultural Policy for Planted Forests 2014

Synergy with other National Programs

The Amazon Fund is a REDD+ mechanism created to raise donations for *non-reimbursable* investments in efforts to prevent, monitor and combat deforestation, as well as to promote the preservation and sustainable use in the Brazilian Amazon. (BNDES)

The Climate Fund Program aims to apply the portion of *reimbursable* funds from the National Fund on Climate Change, or Climate Fund. (BNDES)

ABC Plan Results 2010 - 2018

Technology / Process	Increase in area/use Million ha	Mitigation Million Mg CO_2e
1. Restoration of grazing lands	15 vs 10.45	39.61 (43%) *
2. Integrated crop-livestock-forestry systems (ICLF)	4 vs 5.83	22.11 (111%) ♦
3. No-till farming	8 vs 9.7♦	18.25 (101%) ♦
4. Biological N_2 fixation	5.5 vs 9.97	16.88 (169%) °
5. Planted forests	3 vs 1.10	0.59 + 15.57 (173%)
6. Treatment of animal waste	4.4 vs 1.7-4.51 million m³	2.67-7.08 (39-103%)
Total (1-5)	27.65	100.21-154.38 (68♦-105*°%)

* SEEG
♦ Plano ABC
° Plataforma ABC

NDC do Brasil

Commitments:

Reduce greenhouse gas emissions by

37% below 2005 levels in 2025
(NAMAs + 19% reduction)

43% below 2005 levels in 2030

i) increasing the share of sustainable **biofuels** in the Brazilian energy mix to approximately 18% by 2030

ii) **strengthening and enforcing the implementation of the Forest Code, zero illegal deforestation in Amazonia by 2030, restoring and reforesting 12 million hectares of forests by 2030, enhancing sustainable native forest management systems**

iii) achieving **45% of renewables** in the energy mix by 2030 (already 40%)

iv) **restoring an additional 15 million hectares of degraded pasturelands by 2030, enhancing 5 million hectares of integrated cropland-livestock-forestry systems (ICLFS) by 2030**

v) promote new standards of **clean technology**, further enhance **energy efficiency** measures and **low carbon infrastructure**

vi) further promote efficiency measures, improve **infrastructure for transport and public transportation** in urban areas

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National Adaptation Plan to Climate Change (2016)

Sectoral:
The ABC Plan and Adaptation

Adaptation measures proposed for drafting of the Adaptation Programme for Agriculture

Intensified acquisition and use of information

Land use, zoning of risks and identification of vulnerabilities, modelling, simulation and design of integrated scenarios

Research and thematic areas

  Water resources and use of water in agriculture

  Combat desertification

  Pest Risks Analysis (ARP)

  Genetic resources and improvement

  Adaptation of production systems for economic, social and environmental sustainability

  Financial instruments (insurance systems)

  Rural development (technology transfer and technical assistance)

  Restructuring of the Rural Technical Support (ATER) system and training of its technical staff

  Public policies and normative instruments

National Adaptation Plan to Climate Change (2016)

Sectoral:
The ABC Plan and Adaptation

Agricultural Risk and Vulnerability Monitoring and Simulation System
Agricultural Zoning System for Agroclimatic Risk (SISZARC)
Existing policies:
Agriculture Activity Guarantee Programme (PROAGRO and PROAGRO Mais)
Family Farming Insurance (SEAF within PROAGRO Mais and PRONAF-National Programme to Strengthen Family Farming)
The Insurance Premium Subsidy Program (PSR)
National Policy for Agroecology and Organic Production and its respective Plan (PLANAPO)
Law for Protection of Native Vegetation
Environmental Regularization Programme (PRA)
National Policy for Integration of Farming Livestock and Forestry (ILPF)
Agricultural Policy for Planted Forests
National Water Resources Policy (PNRH) and the National Water-Resources Management System (SINGREH)
National Irrigation Policy
National Irrigated Agriculture Information System and the National Programme to Combat Desertification (PAN-Brasil)

Climate Intelligence Center for Agriculture

Assessment of climate risk in the planning and development of Brazilian agricultural policies, communications and Early-Warning Network
Inter-institutional Working Group
(INMET, EMBRAPA, MAPA, MCTI, MDA, MI, MMA, IPEA, IBGE, INPE, and ANA)

Agricultural Risk and Vulnerability Monitoring and Simulation System

SOMABRASIL (Embrapa): Brazilian Agriculture Observation and Monitoring System

SCenAgri (Embrapa): Agricultural Scenarios Simulator

SISDAGRO (Inmet): Decision Support System for Agriculture in Meteorology

Agricultural Zoning System for Agroclimatic Risk (SISZARC)

Suggestion for aditional actions
# ABC Plan – Mitigation x Adaptation

Technological options

- **Water management – harvesting, storage, use (irrigation and** ʻwastewaterʼ), clear policies

- ʻ**Crops for an uncertain future' – gene banks, breeding** programs, bio and other technologies

- **Animal breeding and diversity (gene banks)**

- **Precision agriculture (soil, water, forest…)**

- Strengthen **research institutions and direct programs**

- Strengthen **institutional capacity – from government to** technical assistance – decision-makers

- Reshape food access and **consumption patterns (basic** nutritional needs, healthy and sustainable eating patterns worldwide)

- **Reduce loss and waste in food systems, targeting** infrastructure, farming practices, processing, distribution and household habits

- **Integrate food security and sustainable agriculture into global** and national policies

- Consider an **alternative future food system …**

Potential Impacts of the ABC Plan
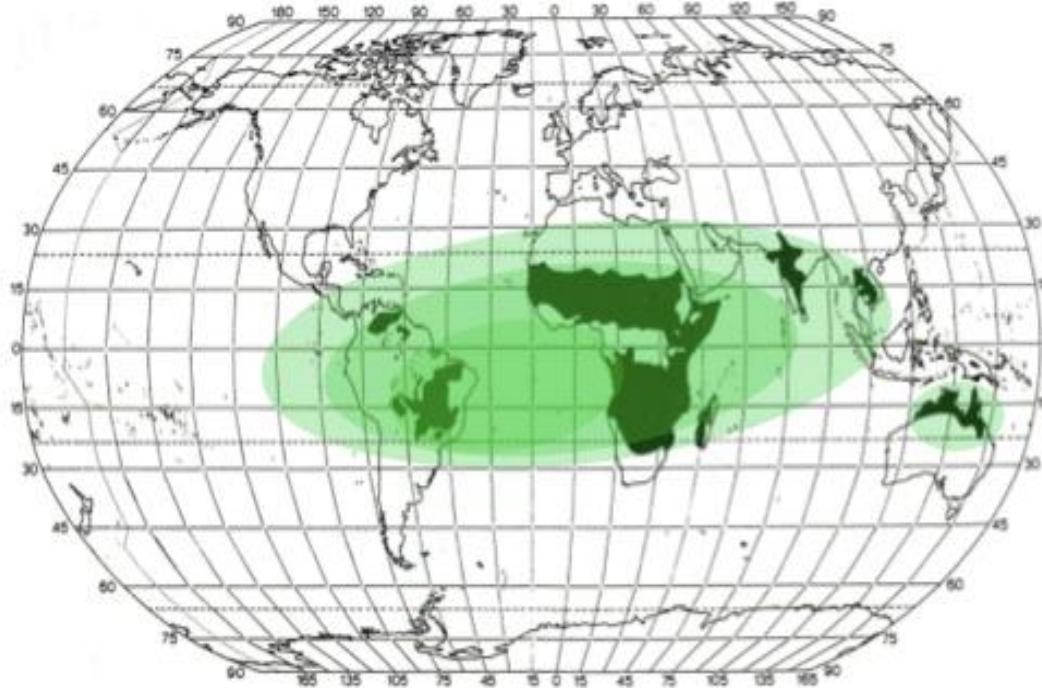
✓ Discuss the difficulties and advances under GRA and UNFCCC;
✓ Huge potential to adopt/research tropical agriculture technologies;
✓ Great opportunity to develop/increase S-S and N-S-S cooperations;
✓ But to reach these goals...
    ✓ Cooperation must be customized;
    ✓ Focus must be on site-specific problems (consider backward and forward linkages);
    ✓ Design problem-oriented training.

The End

Thank you!

Supplementary information

- Some of the Brazilian networks and initiatives active in the formation, observation, evaluation, improvement of the National Policy of Climate Change and within it the ABC Plan / Program

- Networks and initiatives that form bases of society debate

Brazilian Research Network on Global Climate Change

Supports the National Climate Change Policy

Sub-Network on Agriculture

• Development of models to define and quantify **future impacts of climate change** on agriculture and its associated scenarios;

• Influence of climate changes on **pests, diseases, mutualists and symbionts** of cultivated plants;

• Evaluation of the efficiency and **adaptation of production systems** to the new agricultural scenarios;

• Studies on **greenhouse gas emissions and soil carbon stock**.

- Coordination of 3rd Inventory of national GHG emissions in Agriculture sector
- MRV methodology for ABC Plan monitoring

National Soils Programme

Goal:
- Systematization of existing data
- Mapping 1.3 million km^2 of soils in the first ten years, and another 6.9 million km^2 by 2048, ranging from 1: 25,000 to 1: 100,000
- Improve in formation for land use management, adaptation and vulnerability assessment, prediction of catastrophic events, agricultural credit system

Cost / financing: R$ 4 billion in 30 years (national public and private)

Institutions: Embrapa, IBGE, SBCS, CPRM, UFRRJ, UFPI, UDESC, UFLA e Ministry of Agriculture, ...

Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa (SEEG)

System for Estimating Greenhouse Gas Emissions

Initiative to produce annual estimates of GHG emission in Brazil

Climate Observatory, an initiative comprising ~ 40 non-governmental and civil society organizations in Brazil

Coordination:
Imazon (Land Use Change)
Imaflora (Agriculture)
IEMA (Energy and Industrial Processes and Product Use)
ICLEI (Waste)

IPCC guidelines, Data: National Inventories, government reports, institutes, research centers, industry and other non-governmental organizations

Source: Azevedo et al. 2018. Data Descriptor: SEEG initiative estimates of Brazilian greenhouse gas emissions from 1970 to 2015. Nature SCIENTIFIC DATA | 5:180045 | DOI: 10.1038/sdata.2018.45   https://www.nature.com/articles/sdata201845

MAPBIOMAS — Brazilian Annual Land Use and Land Cover Mapping Project

An initiative of the Greenhouse Gas Emissions Estimation System (SEEG) of Climate Observatory that involves a collaborative network of biomes, land use, remote sensing, GIS and computer science experts that rely on Google Earth Engine platform and its cloud processing and automated classifiers capabilities to generate Brazil's annual land use and land cover time series.

Biomes Coordination:

- Amazon – Institute of Man and Environment of the Amazon (IMAZON)
- Caatinga – State University of Feira de Santana (UEFS) and Plantas do Nordeste Association (APNE)
- Cerrado – Amazon Environmental Research Institute (IPAM)
- Atlantic Forest – Foundation SOS Atlantic Forest Foundation and ArcPlan
- Pampa – Federal University of Rio Grande do Sul (UFRGS)
- Pantanal – Institute SOS Pantanal Institute and ArcPlan
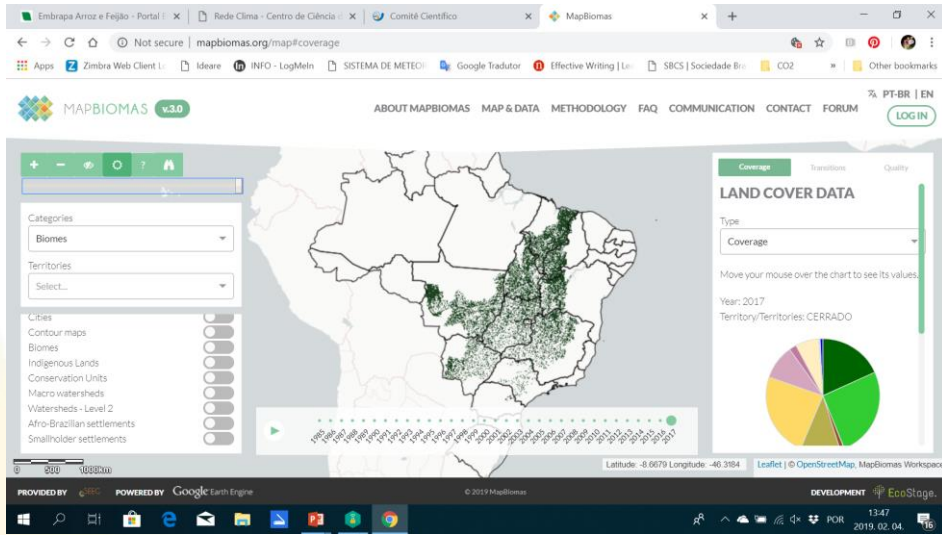
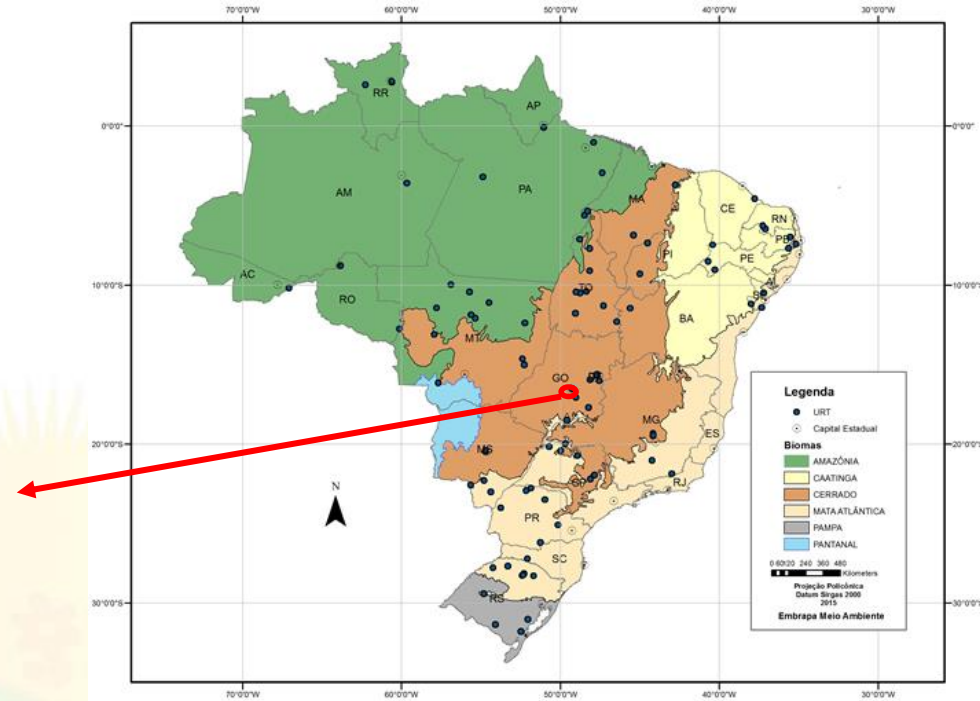Google Earth engine / EcoStage / Terras App

Associação Rede ILPF   ICLF Network Association

Activities:
- Technology transfer
- Training of technical assistance staff
- Communication
- (Research)

Workshop Embrapa & Agriculture and Agri-Food Canada

Developing pratical land-based GHG mitigation strategies, including both carbon sequestration and reduction of N_2O emissions

Federação Brasileira de Plantio Direto e Irrigação
Brazilian No-Till Farmers' Federation

Congregate and represent the associations that stimulated and promoted adoption of the No-Till System.

Activities:
- Technology transfer
- Training of technical assistance staff
- Communication
- Field days
- (Research)

2018: 32 million hectares under No-Till System in Brazil