Programa FAPESP de Pesquisa sobre Mudanças Climáticas Globais

IOP Institute of Physics

RSC Advancing the Chemical Sciences

Opportunities for climate change mitigation in the Brazilian agricultural sector

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PRESENTATION PLAN

Programa FAPESP de Pesquisa sobre Mudanças Climáticas Globais

Initial Considerations

Mitigation opportunities in the Brazilian agricultural sector

- Meat production
- Biofuel production

Final considerations: carbon footprint

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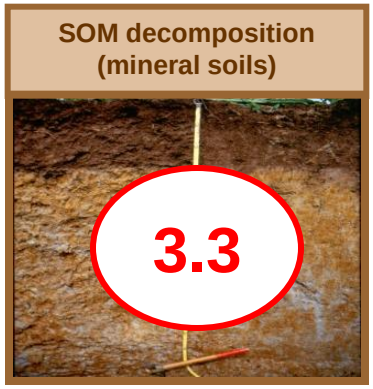
Emission Sources

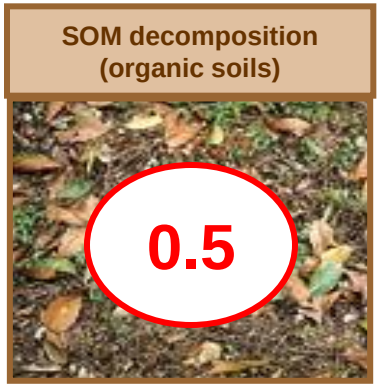
Fossil fuel burning	Land use change and agriculture			Fossil fuel burning
	Global	GHG	Brazil	
78	22	CO_2	75	25
	55	CH_4	91	
	80	N_2O	94	

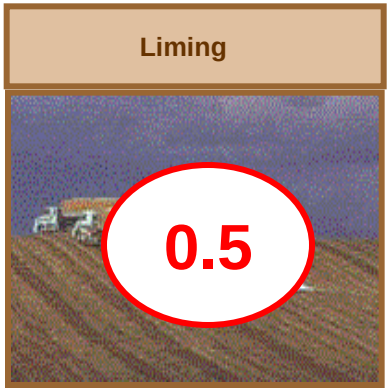
GHG in Brazil

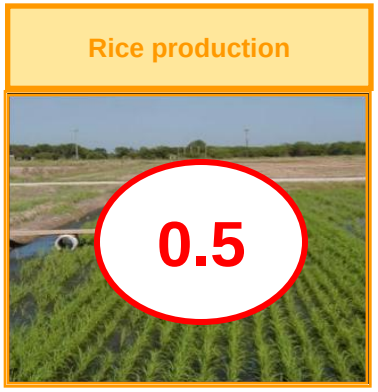
	Global Ranking
Only fossil fuel burning	17°
Fossil fuel burning + Land use change and agriculture	4°

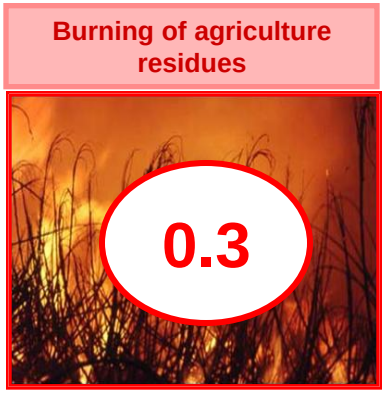
Relative Distribution (%) of CO_2-eq emissions

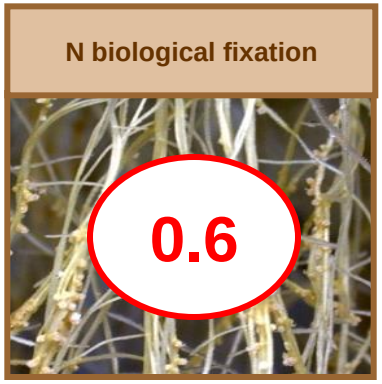


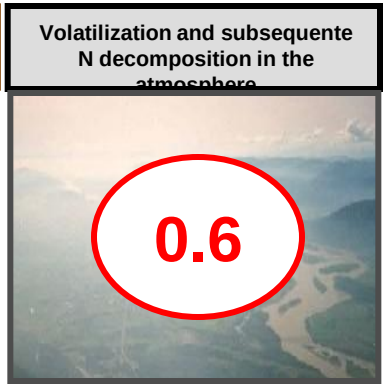












Relative Distribution (%) of CO_2-eq emissions

Deforestation

Enteric fermentation

Management of animal manure

Extensive animal production

Manure

SOM decomposition (mineral soils)

SOM decomposition (organic soils)

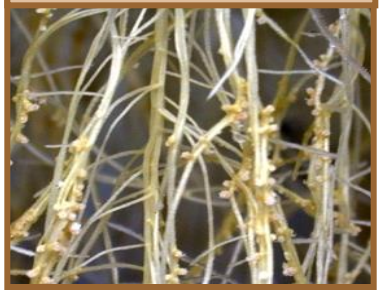
Liming

Rice production

Burning of agriculture residues

Sintetic Fertilizers

N biological fixation



Residues from harvesting

Volatilization and subsequente N decomposition in the atmosphere

Lixiviation and N runoff

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Expansion estimates in area (10^6ha) for the next 10 years

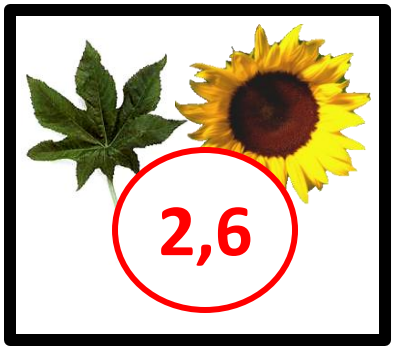
Soybean

Mayze

Others

Sugarcane

Oil crops



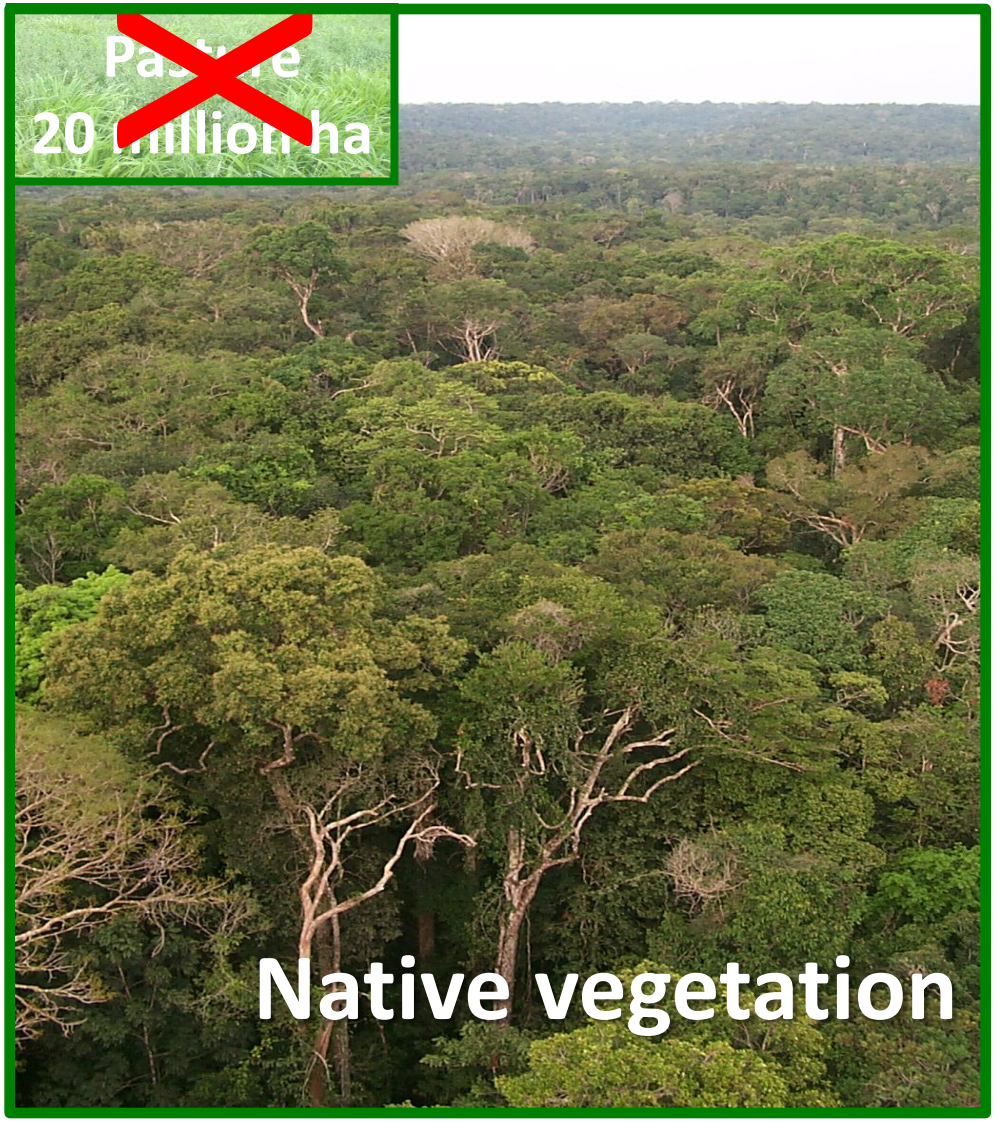
Reforestation

How to associate agribusiness expansion and sustainability?

MAPA, 2007

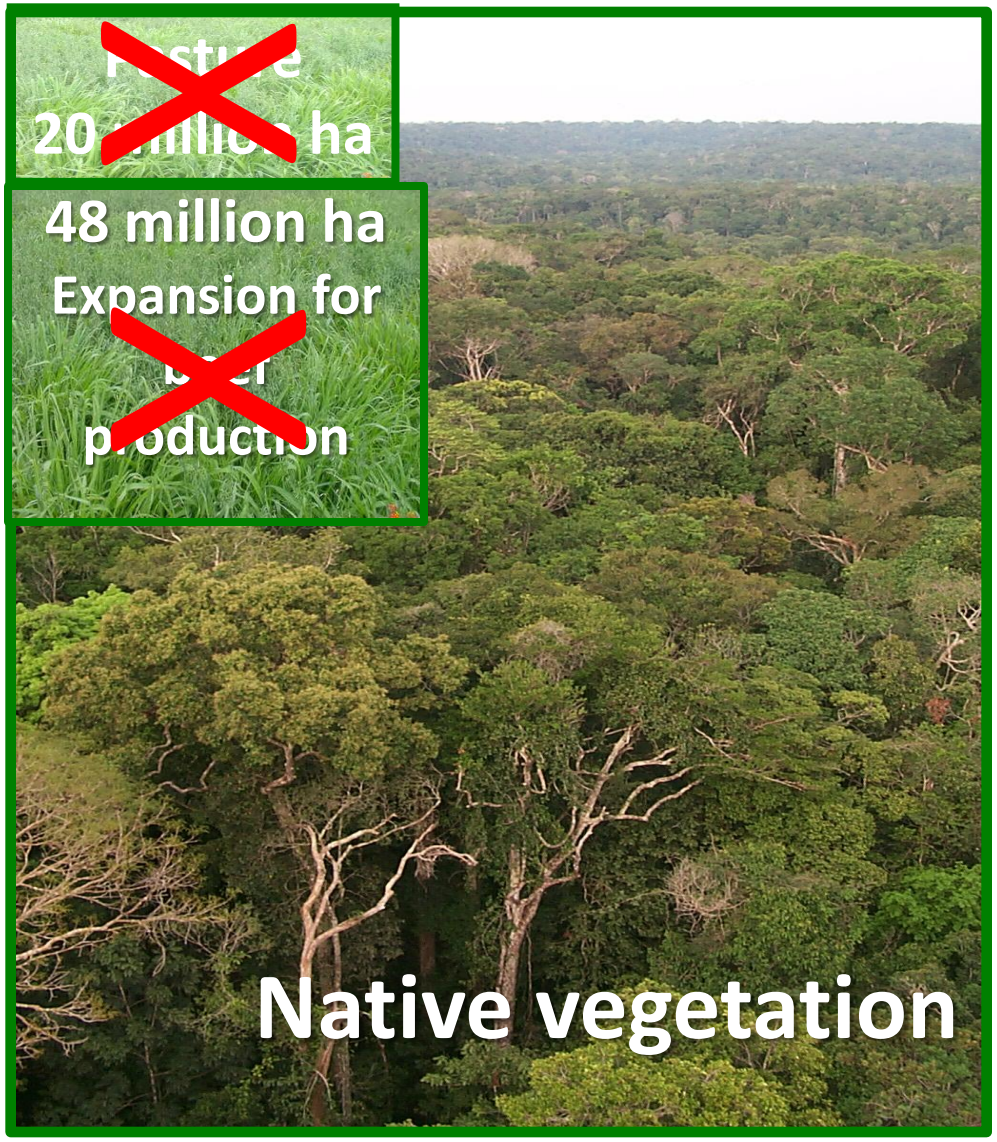
www.sbs.org.br

Agricultural expansion 2007 - 2018



MAPA, 2007

Pasture Expansion



MAPA, 2007

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CO_2eq

PHOTOSYNTHESIS

PRODUCTION

MANAGEMENT

Emissions during planting and management

PROCESSING

Emission in the industry

Clean Technologies

Emissions during transportation

CO_2eq

PHOTOSYNTHESIS

PRODUCTION MANAGEMENT

Emissions during planting and management

PROCESSING

Emission in the industry

Emissions during transportation

PHOTOSYNTESYS

PRODUCTION MANAGEMENT

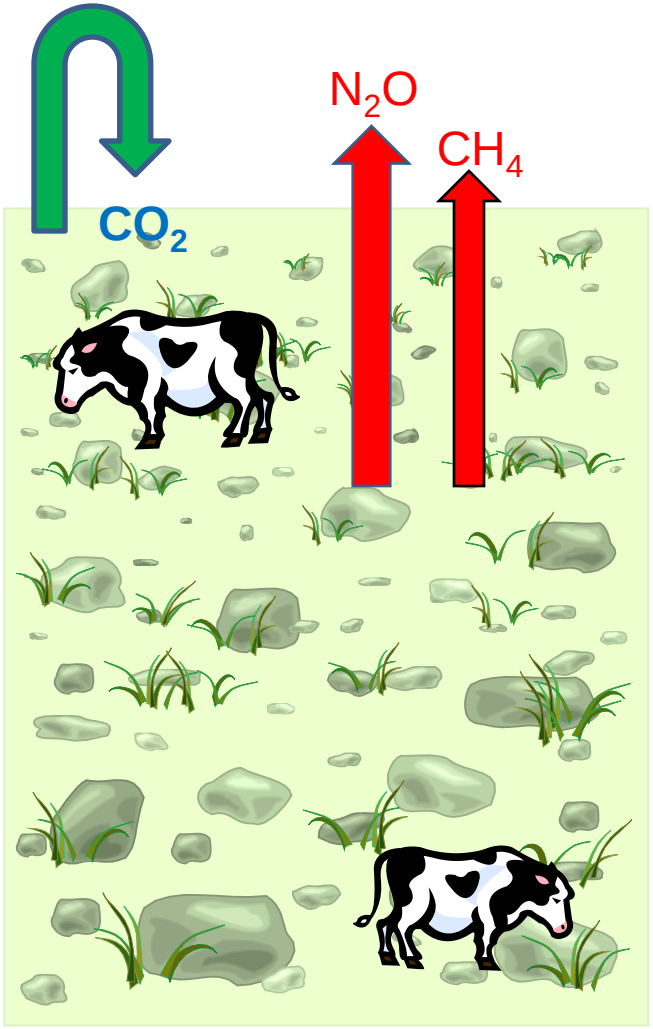
Emissions during planting and management

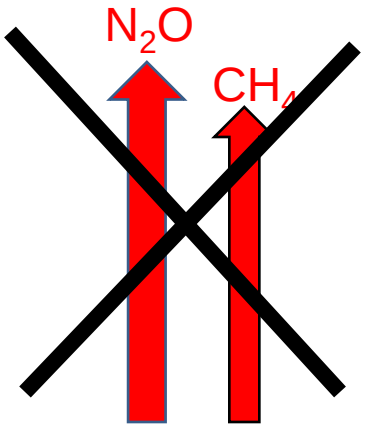
Genetic improvement

Rehabilitation of degraded pastures

Crop-livestock integration

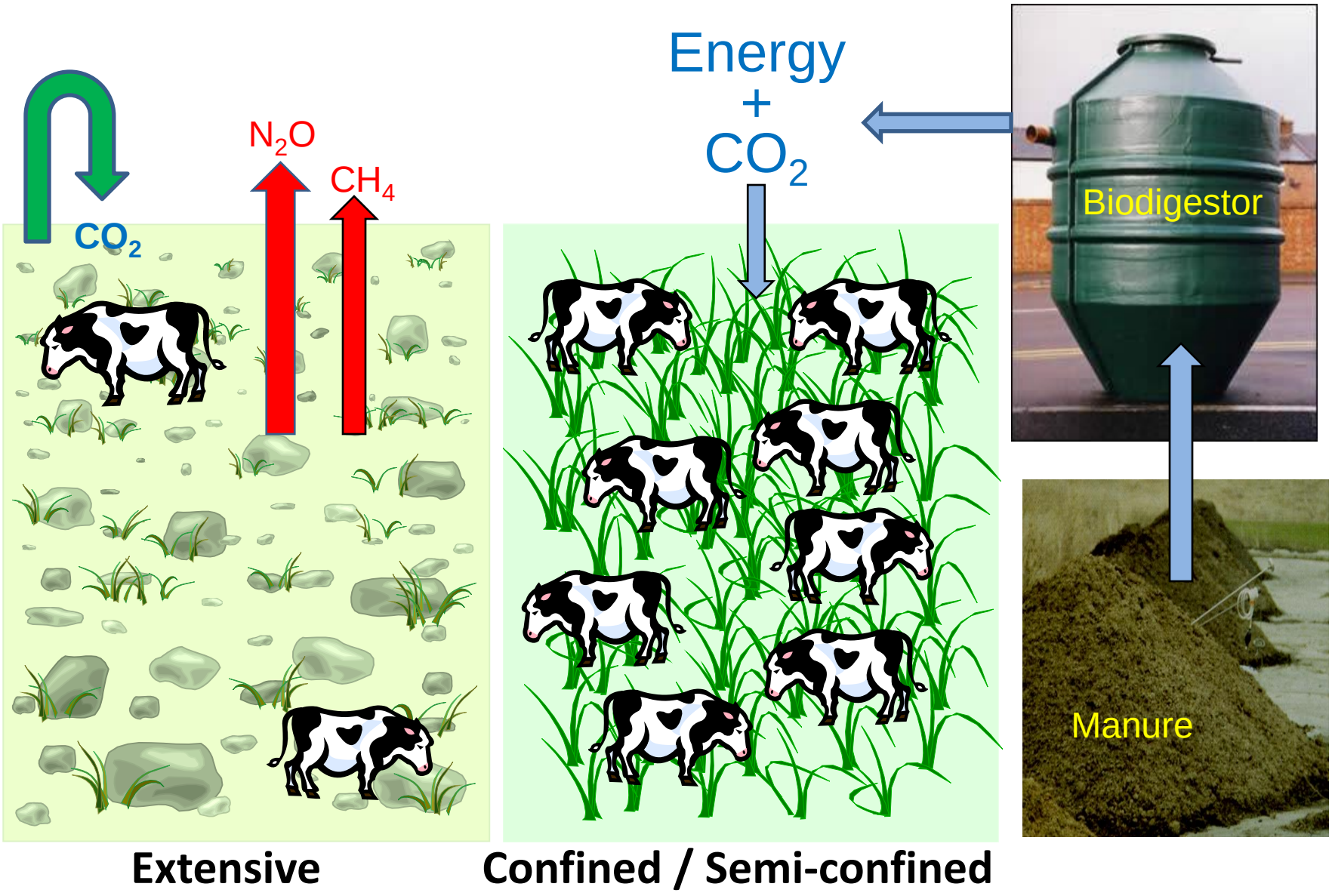
Confinement





Extensive

Confined / Semi-confined


Energy
+
CO_2
N_2O
CH_4
CO_2
Biodigestor
Manure
Extensive
Confined / Semi-confined

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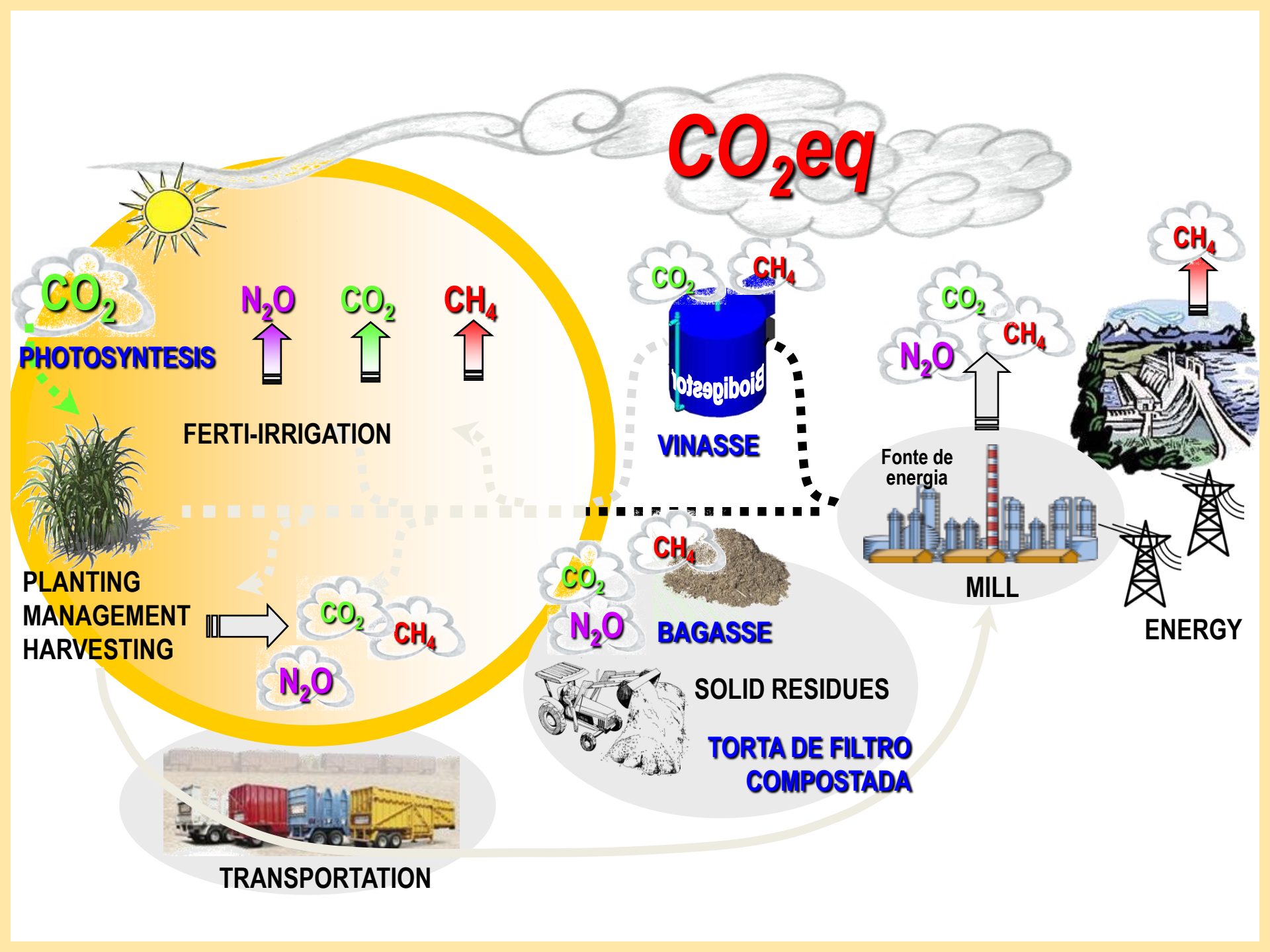
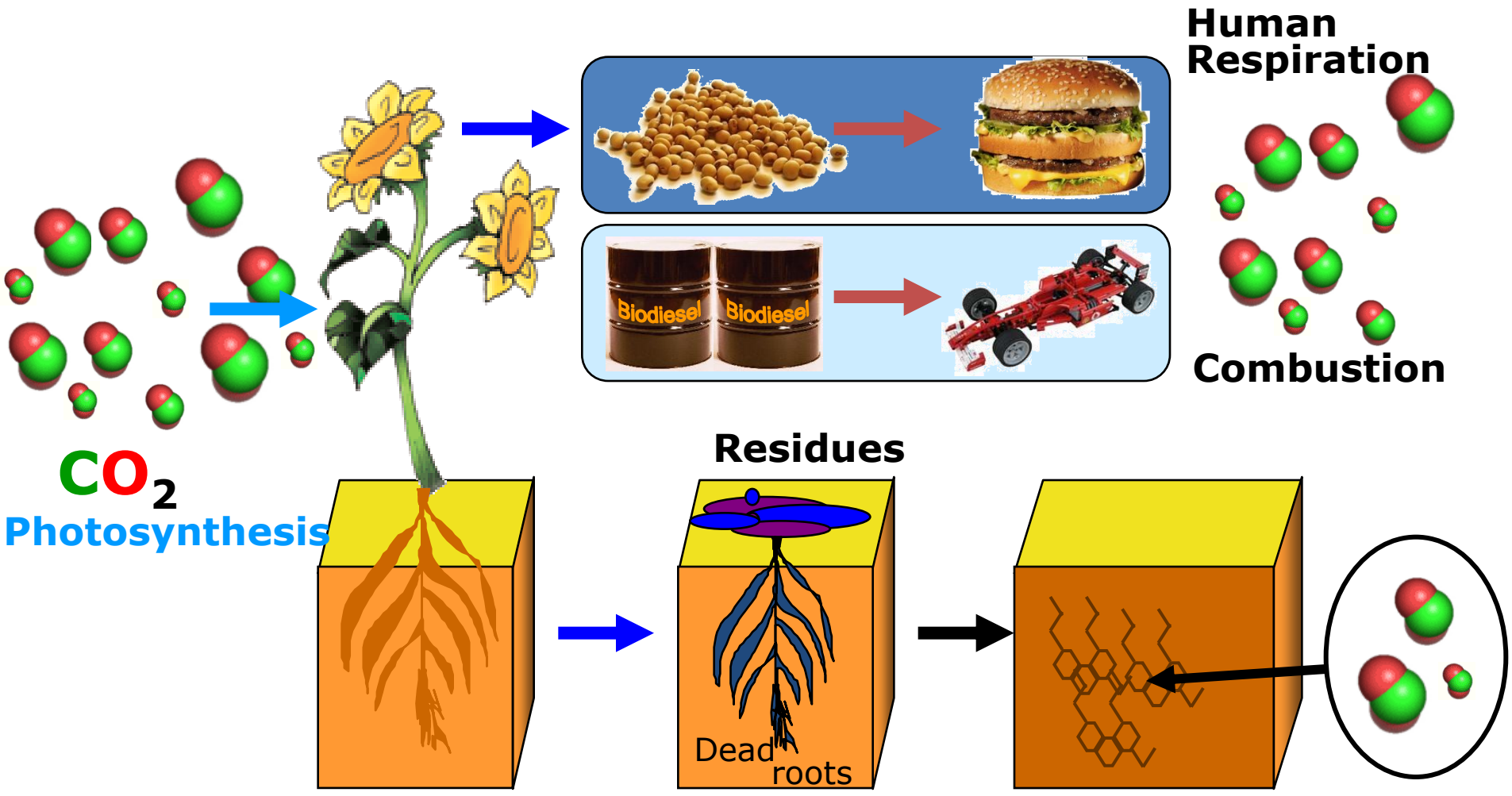

CO_2eq
CO_2
PHOTOSYNTESIS
N_2O
CO_2
CH_4
FERTI-IRRIGATION
PLANTING
MANAGEMENT
HARVESTING
CO_2
CH_4
N_2O
CO_2
CH_4
VINASSE
CH_4
CO_2
N_2O
BAGASSE
SOLID RESIDUES
TORTA DE FILTRO
COMPOSTADA
CO_2
CH_4
N_2O
Fonte de
energia
MILL
CH_4
ENERGY
TRANSPORTATION

PLANTING
- Conventional
- Minimum cultivation

MANAGEMENT
- Fertilizer
- Liming
- Plant protection
- Residue

HARVESTING
- Burning (manual cut)
- No-burning (machinery)

Biodiesel Production and the Carbon Cycle



Increase in SOM = increase in soil C stocks

AGRIBUSINESS

GREENHOUSE GASES

C R O P S






Biomass

ENERGY

Biodiesel
Etanol

Biocombustível TEP

OFFSET

Crop residues

Decomposition

FIXATION

Significant role

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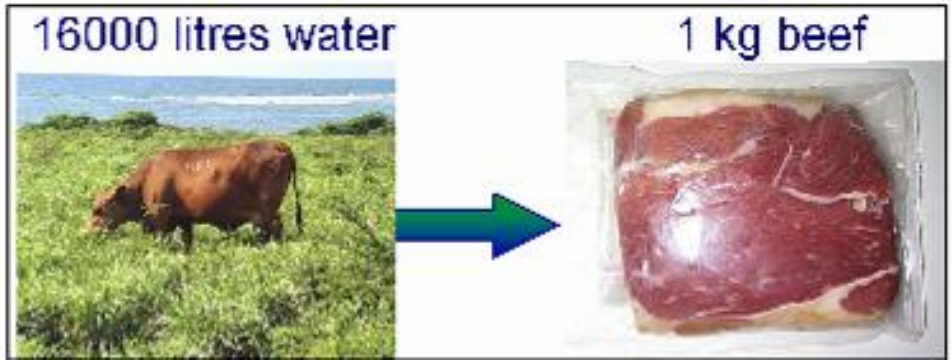
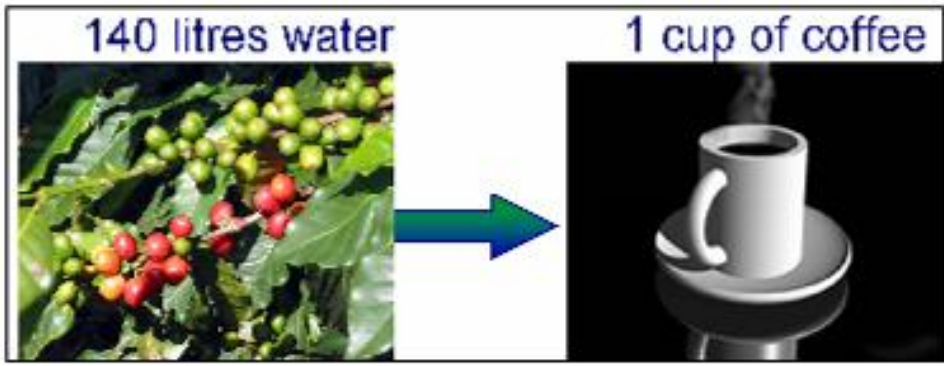
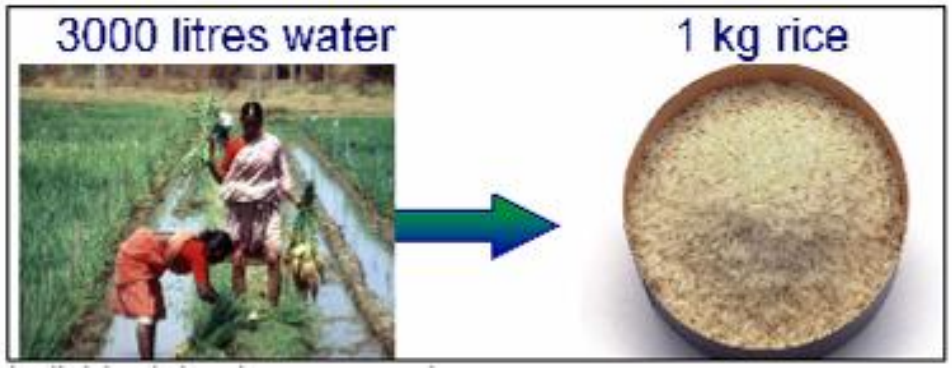
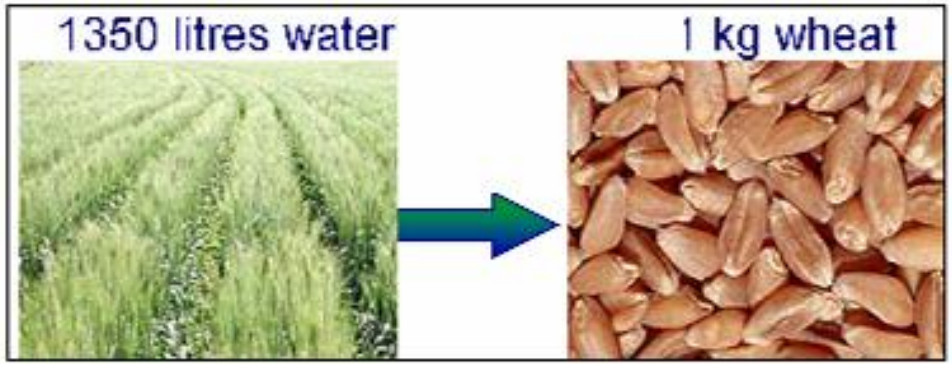
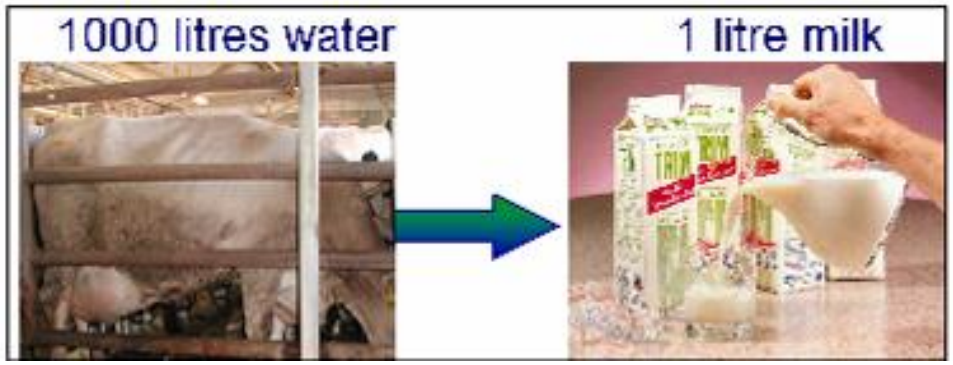
WATER FOOTPRINT











http://www.waterfootprint.org/Index.htm

CARBON FOOTPRINT

?? kg de CO_2

1 kg de trigo

?? kg de CO_2

1 xícara de café

?? kg de CO_2

1 kg de arroz

?? kg de CO_2

1 kg de miho

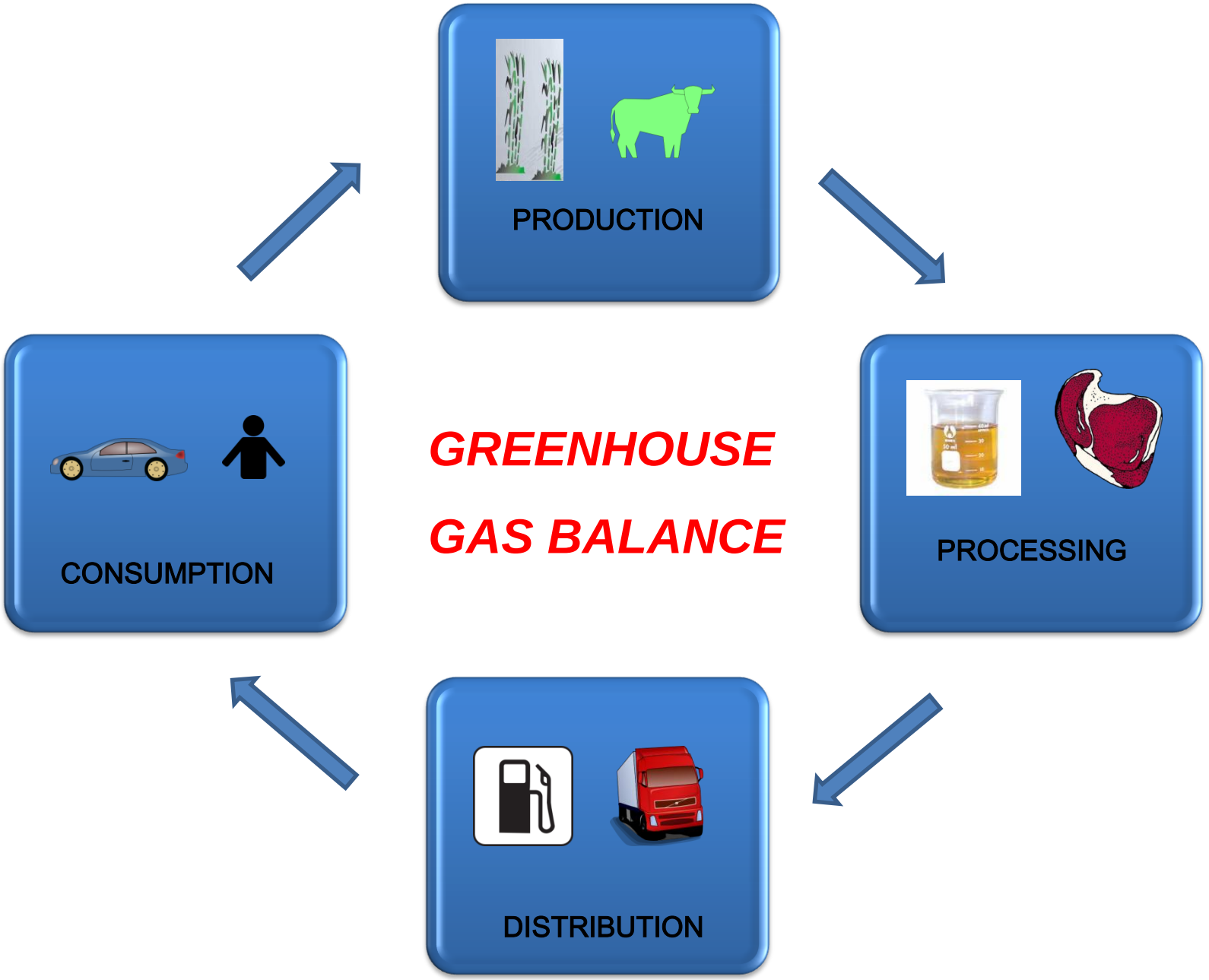
?? kg de CO_2

1 kg de carne

?? kg de CO_2

1 L de leite

Greenhouse Gas Emissions Inventory


PRODUCTION
PROCESSING
DISTRIBUTION
CONSUMPTION
GREENHOUSE
GAS BALANCE

CARBON FOOTPRINT

Carbon Facts

Fuel Consumed	
Delivery Trucks	.02 Gal
Cooking Oats	.004 Gal
Paper	.016 Gal
Paper Consumed	
Cardboard Box	.05 lb.
Shipping Container	.17 lb.

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