



BRAZIL
Sugarcane Bioenergy Solution

APLA
BRASIL



Arranjo Produtivo Local do Álcool
Ethanol Cluster
Arreglo Productivo Local del Alcohol



**PARQUE
TECNOLÓGICO
PIRACICABA**

ENGENHEIRO EMÍLIO BRUNO GERMEK



BRAZIL
Sugarcane Bioenergy Solution

APLA
BRASIL



Arranjo Produtivo Local do Alcool
Ethanol Cluster
Arreglo Productivo Local del Alcohol

**PARQUE
TECNOLÓGICO
PIRACICABA**
ENGENHEIRO EMÍLIO BRUNO GERMEK

Add value to the agricultural production

Flavio Castellari – Executive Director



Diversification

To Eat



To Drive



To Fly



To Plug



For Business

Photosynthesis

Sun

Water

Earth

Sugarcane

Sugar

Ethanol

Bioelectricity

Raw Material

CO₂

Food

Fuels with low CO₂ emissions

Electricity with low CO₂ emissions

Bioplastics, Biochemical and yeast

Reduction of GHG emission

Reduces Emission



To challenge



And to DRINK



Brasil Sugarcane Market

Sugarcane - 665 million of tons

Sugar - **33.837** million of tons

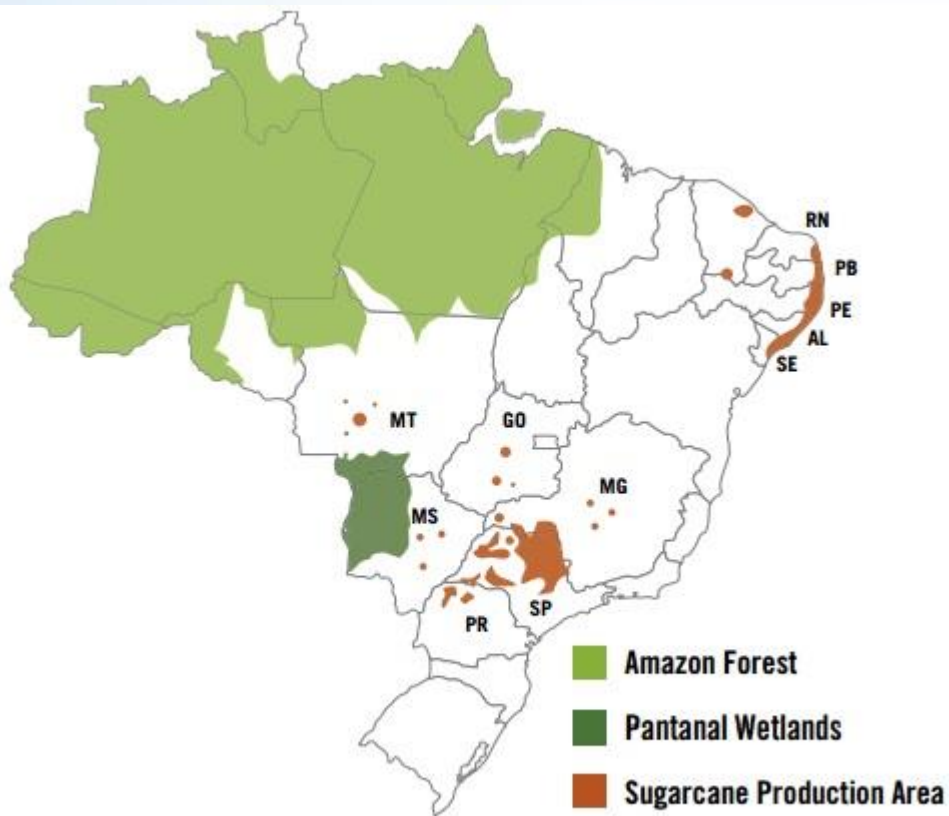
Ethanol - 30 billion liters

Bioenergy – 20,2 TW/h to the grid

Source: UNICA 15/16 – ANEEL



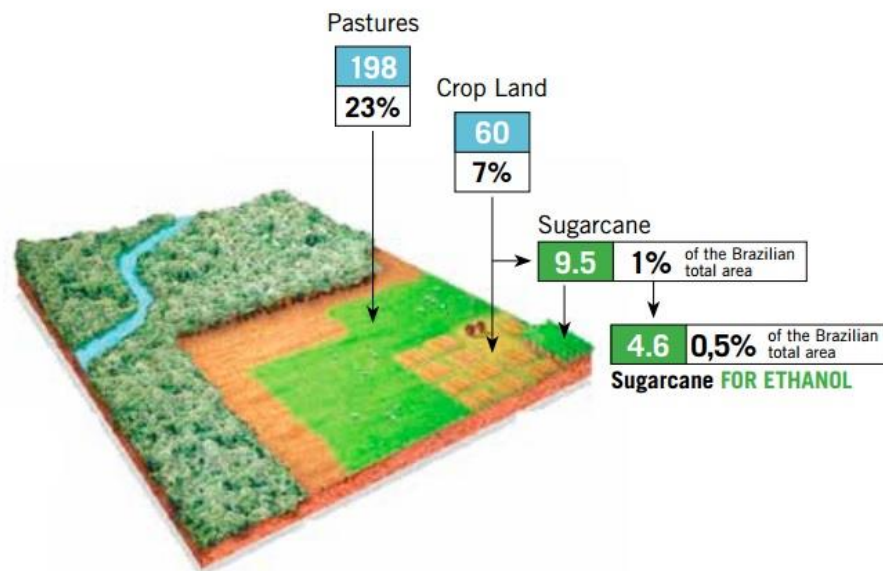
Brasil Sugarcane Map



Source: NIPE – Unicamp, IBGE and CTC

In Million Hectares

Total Area	Native Vegetation	Crop and Pasture Land	Other Uses*
851	554	258	39
100%	65%	30%	5%



Source: UNICA



1/3 Sugarcane Juice

$608 \times 10^3 \text{kcal}$

1/3 Bagasse 276 kg 50%
of moisture

$598 \times 10^3 \text{kcal}$

1/3 Straw 165kg
15% of moisture

$512 \times 10^3 \text{kcal}$

$1.718 \times 10^3 \text{kcal}$

1 Oil Barrel = $1386 \times 10^3 \text{kcal}$
1 Sugarcane ton. = 1,2 Oil Barrel

Sugarcane Sector

Harvest 15/16

665 million sugarcane tons = 758 million Oil Barrel per year

2,1 Million Oil Barrel per Day





9.600.000

HECTARES OF SUGARCANE HARVESTED

69 ton/ha

*15 tons of straw per hectare
(Brazilian Avg)*



*7 tons of straw per hectare
will take to factory*



Utopic Scenario - Biofuel

If our total straw were be collected nowadays, that's represents:
67.200.000 tons of straw.



1 ton of dry straw

=

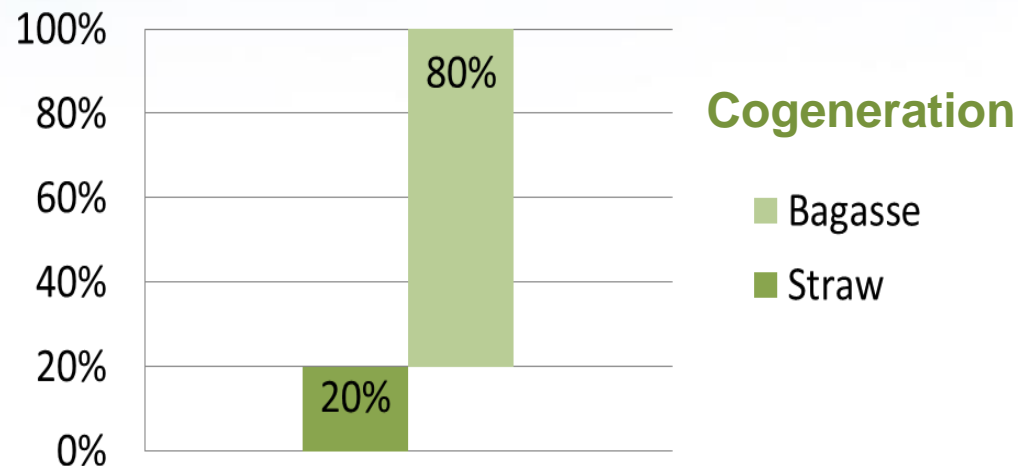


300 liters ethanol 2G

That means: 20 billion liters of ethanol extra per year.

Potential - Bioenergy

*“Nowadays the Boilers can be using a mix of bagasse and straw to cogeneration, **20% is the maximum of straw that can be mixed with bagasse**. That means not all collected straw could be produce ethanol.”*



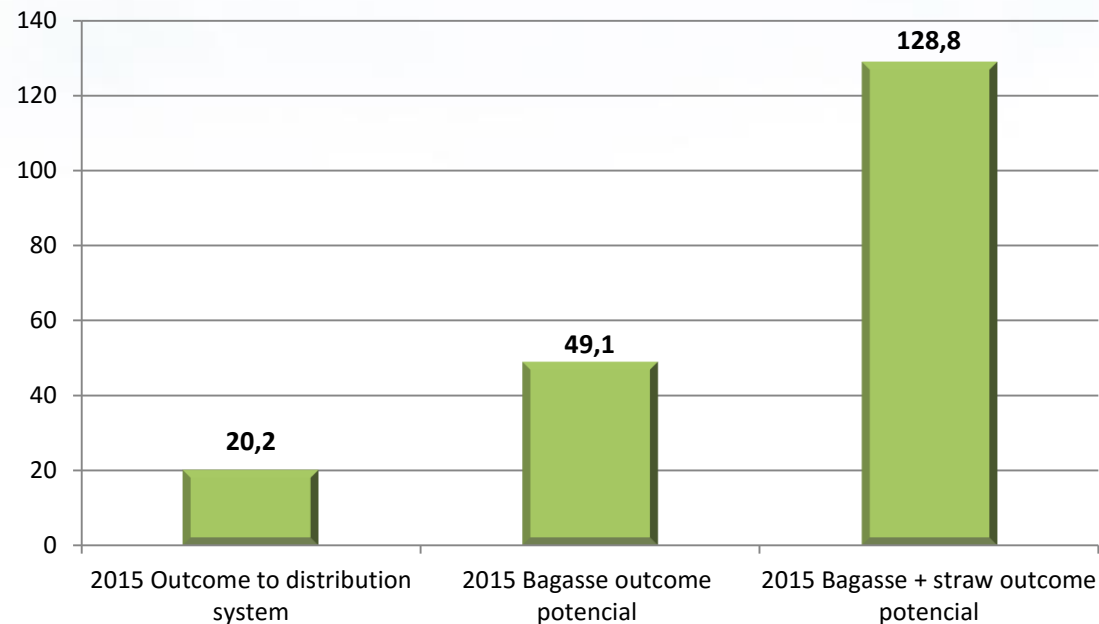
Source: Caldema

Utopic Scenario - Bioenergy

Today we have a technical potential to produce **49,1TWh** to the grid, if all of our sugar mills produce energy with the whole bagasse that we already have in the field in 2015.

The potential is up to **128,8TWh** if we uses our all straw+bagasse.

Sugarcane Bioelectrical Potencial to the Eletrical System (TWh)



Utopic Scenario - Bioenergy

According the *Expansion Energy Decennial Plan 2024*, the biomass sugarcane have the potential to produce 165THw to the grid at 2024, that means:

The energy from sugarcane is almost twice than energy produced by Itaipu





BRAZIL
Sugarcane Bioenergy Solution

APLA
BRASIL



Arranjo Produtivo Local do Álcool
Ethanol Cluster
Arreglo Productivo Local del Alcohol



**PARQUE
TECNOLÓGICO
PIRACICABA**

ENGENHEIRO EMÍLIO BRUNO GERMEK