

# BIOEN

 **FAPESP**



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# Brazilian Energy Matrix

01

Largely renewable  
energy matrix

05

Electricity matrix of 17%  
bagasse-derived  
sugarcane

04

43% of its total energy  
renewable – more than  
twice the global average

02

No country with more  
than 60 million people has  
an energy matrix with  
more than 40% of  
renewables

06

Small land use (7%)

03

Fuel matrix of 50.2% ethanol  
in 2018 – an all time record

07

Avoided CO2 emissions  
in 20 years  
(4 billion trees)







# RENOVABIO

1

**RENOVABIO** – Establishes a **strategic plan for biofuels in Brazil**

2

All certified production must originate from land that was not deforested after December 26<sup>th</sup>, 2017

3

Sugarcane and palm must comply with the Brazilian agroforestry zoning (Decrees 6961 and 7172)

4

All area must be in conformity with the Forest Code and regularized through CAR

5

Annual decarbonization targets set by the government: 10% carbon intensity reduction target for the transport fuels matrix by 2028

6

Producers undergo certification of emissions reduction and are issued GHG emissions reduction certificates “CBios” (Decarbonization Credits)

7

One CBio corresponds to a reduction of one ton of carbon dioxide equivalent (CO<sub>2</sub>eq), in comparison to fossil fuel emissions

8

Distributors have individual targets to purchase CBios sold in the Stock Exchange



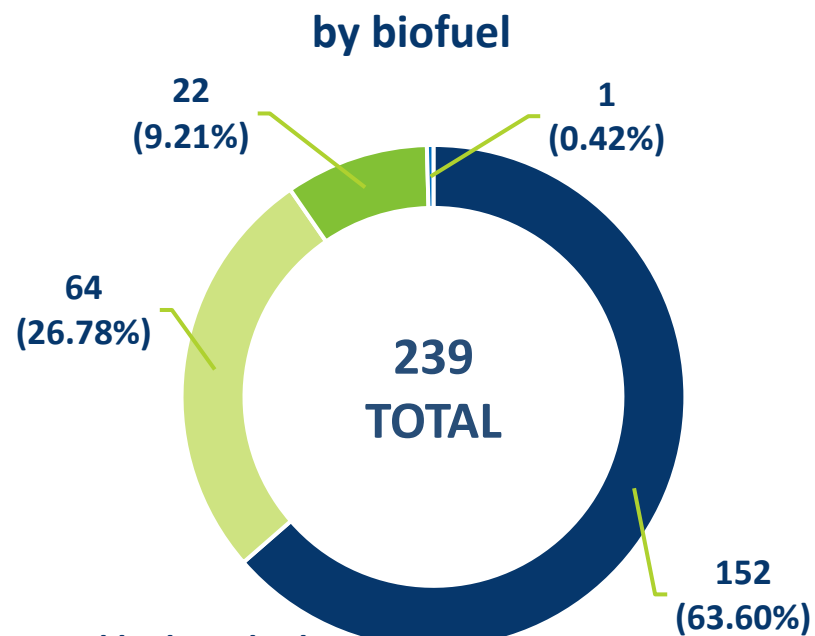
# **Renovabio**

## **Statistics 2020**

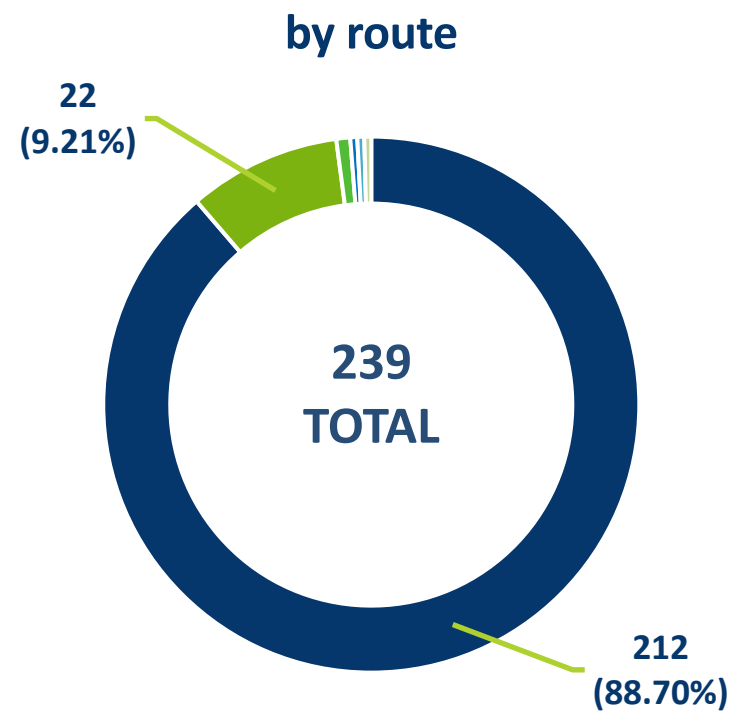
14,535,334 CBIOS

1 CBIO → 1 ton CO<sub>2</sub> eq

## Renovabio – 239 Certified Mills



- Anhydrous and hydrated ethanol
- Hydrated ethanol
- Biodiesel
- Biomethane



- E1GC
- Biodiesel
- E1GFlex
- Biomethane
- E1GE2G
- E1GM



## **BIOREFINERIES**

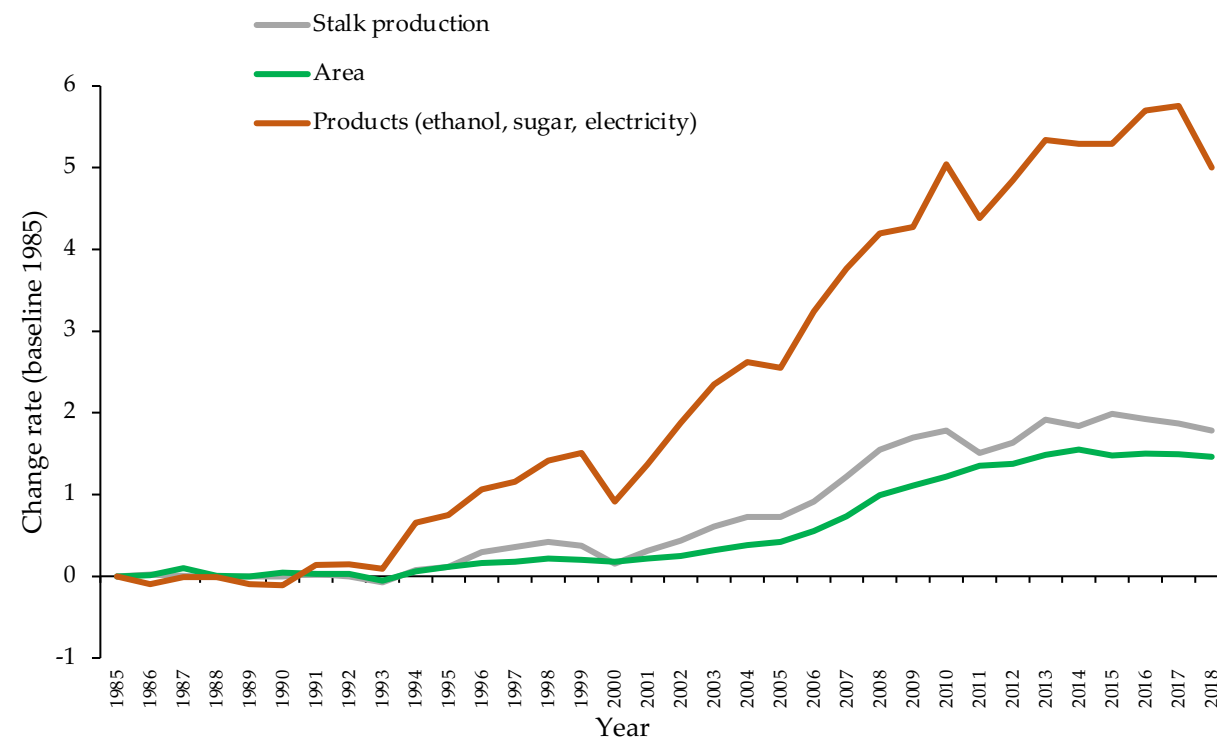
**Numbers from ethanol and bioelectricity**

**Sugarcane sector**

## Sugarcane biomass production vs land vs products

	19/20 harvest	20/21 harvest	%
Cultivated area (10 <sup>3</sup> ha)	8442	8605	1.9
Productivity (kg/ha)	76133	77293	1.5
Production (10 <sup>3</sup> t)	643	665	3.5
SG used to ethanol (10 <sup>3</sup> t)	419	358*	-

\*Sep 20.

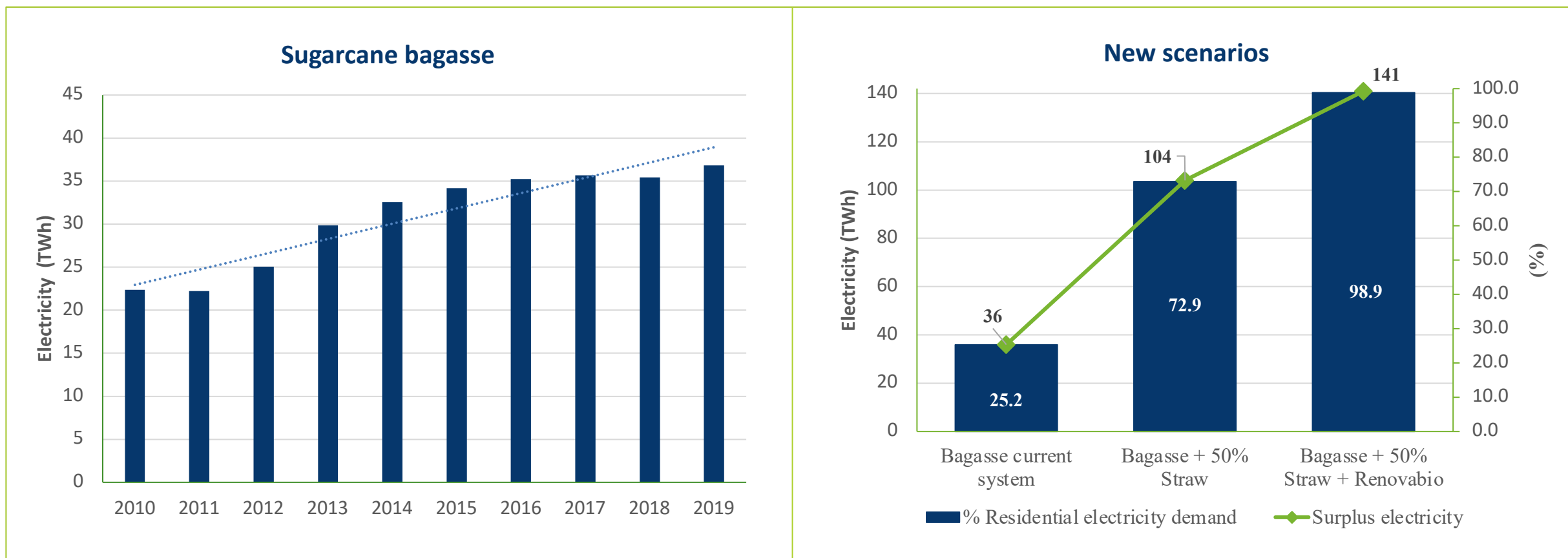




Straw yield → 120 kg straw/ton sugarcane

Electricity consumption by residential sector  
(2019) → 142,6 TWh

## Bioelectricity from sugarcane byproducts



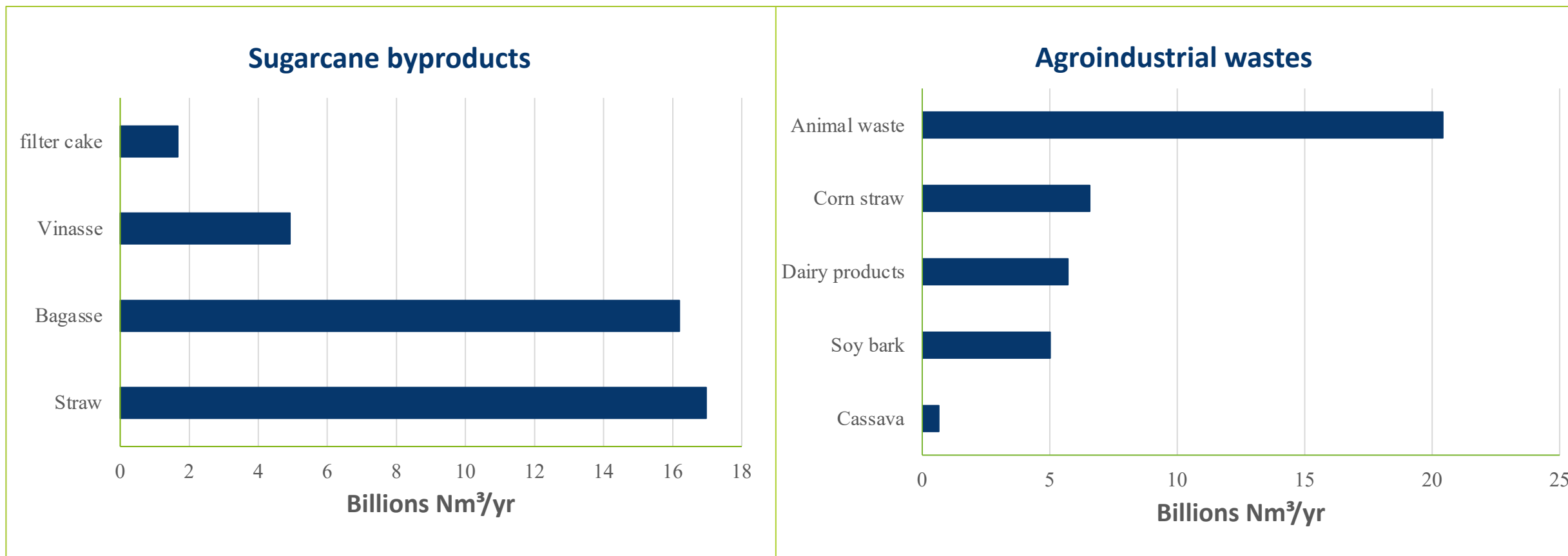
Sources: ANP, 2020; SUCRE, 2020; EPE, 2020.



# **BIOGAS PERSPECTIVES**

## **Potential raw materials**

## Biogas production potentials

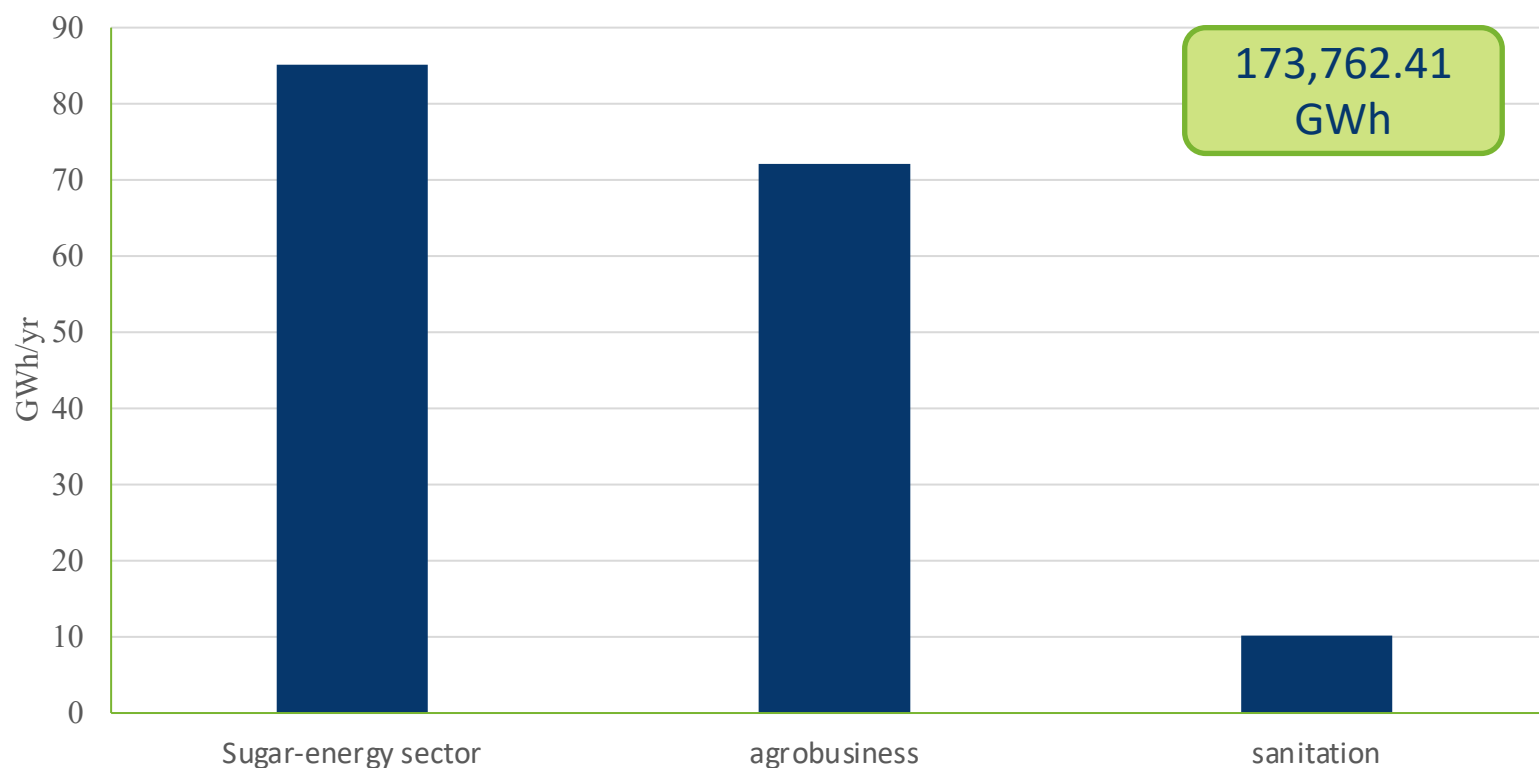


Source: Abiogás, 2020.

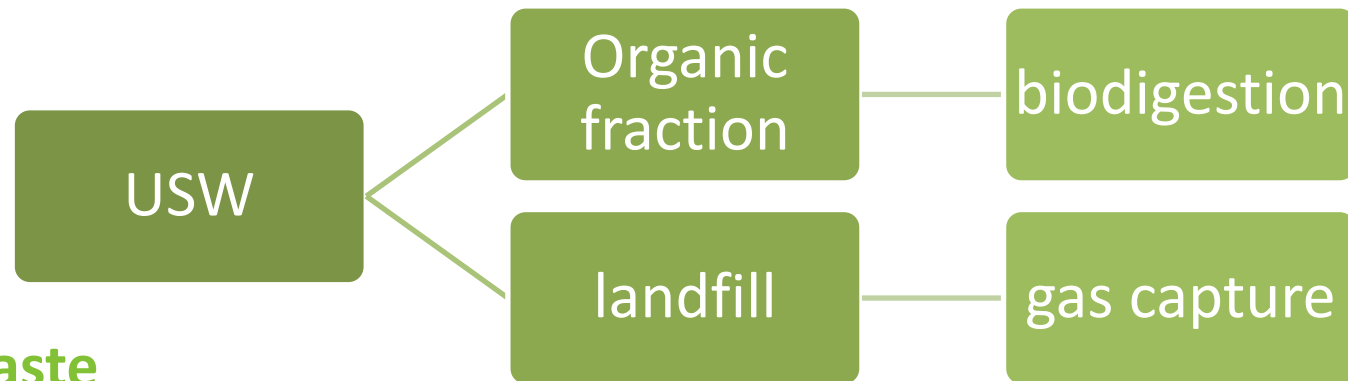


## Electricity from biogas

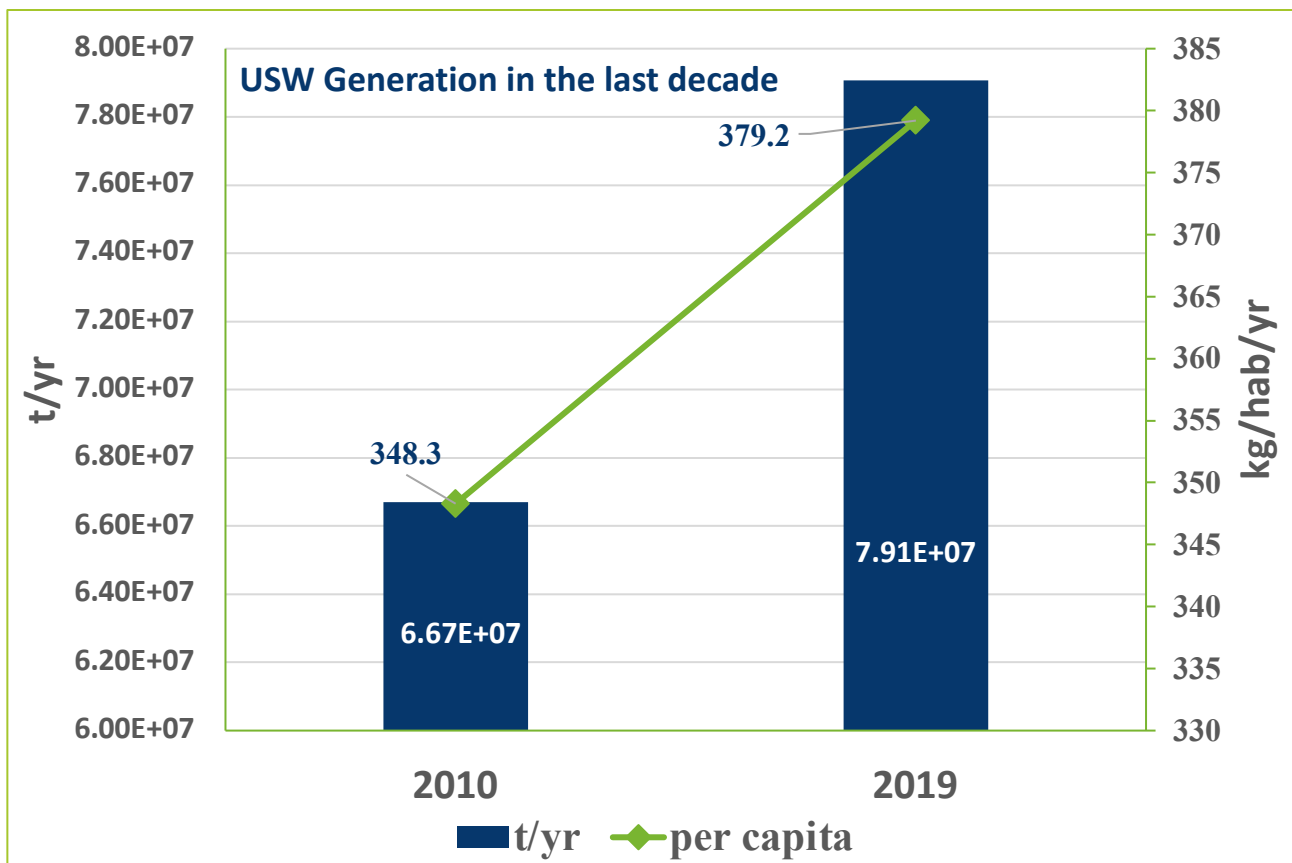
**Bioelectricity potential from biogas (2019)**



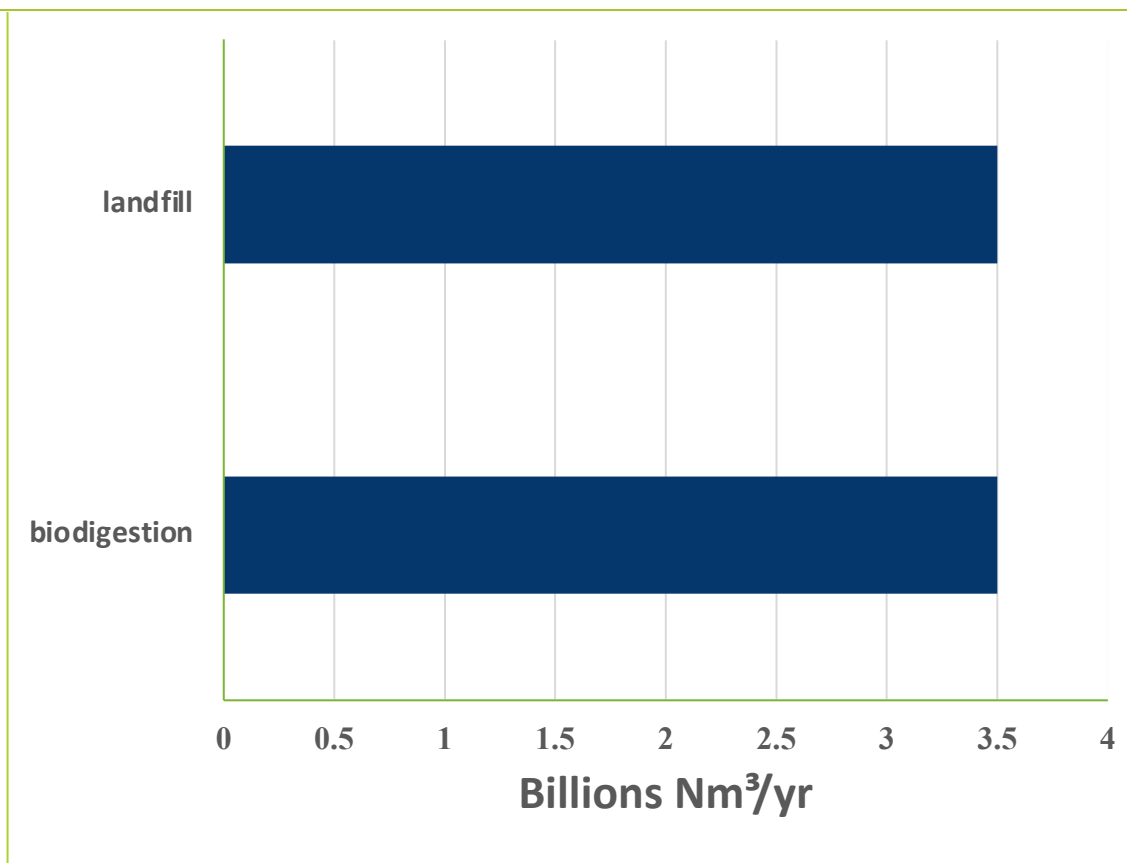
Source: Abiogás, 2020.



## Biogas production from urban solid waste



Source: Abrelpe, 2020.



Source: Abiogás, 2020.



# São Paulo could be **NEGATIVE EMISSIONS!**

**Biomass can be stored** to produce continuous, non-intermittent bioelectricity, facilitating the use and integration with non-dispatchable energy sources;

**Bioenergy uses local resources;**

**Bioenergy uses existing infrastructure** to supply fuels;

**Bioenergy generates local wealth**, relies on goods and services produced in the country;

**Electric cars are compatible with biofuels** with efficiency gains in various configurations and reduced emissions (hybrids, H2, on-board conversion) compared to plug-in models.

Gasoline  
vehicle  
257g  
CO2e/km

Hybrid  
gasoline  
vehicle  
122g  
CO2e/km

Ethanol  
vehicle  
E100 117g  
CO2e/km

Electric  
vehicle EU  
92g  
CO2e/km

Hybrid  
ethanol  
vehicle  
59g  
CO2e/km

Electric  
ethanol FC  
vehicle  
29g  
CO2e/km



**BIOEN 2020-2030**

**Increase  
Biomass Yields**

**Accelerate the  
Transition to  
a Bioeconomy**

**Improve Energy  
Efficiency and  
Sustainability of  
Bioenergy  
End Use**

**Develop Efficient  
and Competitive  
Biomass  
Conversion  
Platforms**

**Broaden and Diversify**





<http://bioenfapesp.org>

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