

**BRAZILIAN WASTE & ENERGY MARKETS**

# **Waste-to-Energy Market in Brazil**

## **ISWA Working Group Energy Recovery**

29th October 2020



**ABREN**  
WtERT – Brasil

# AGENDA:

**01 | *Market Potential***

02 | *Market Drivers & Challenges*

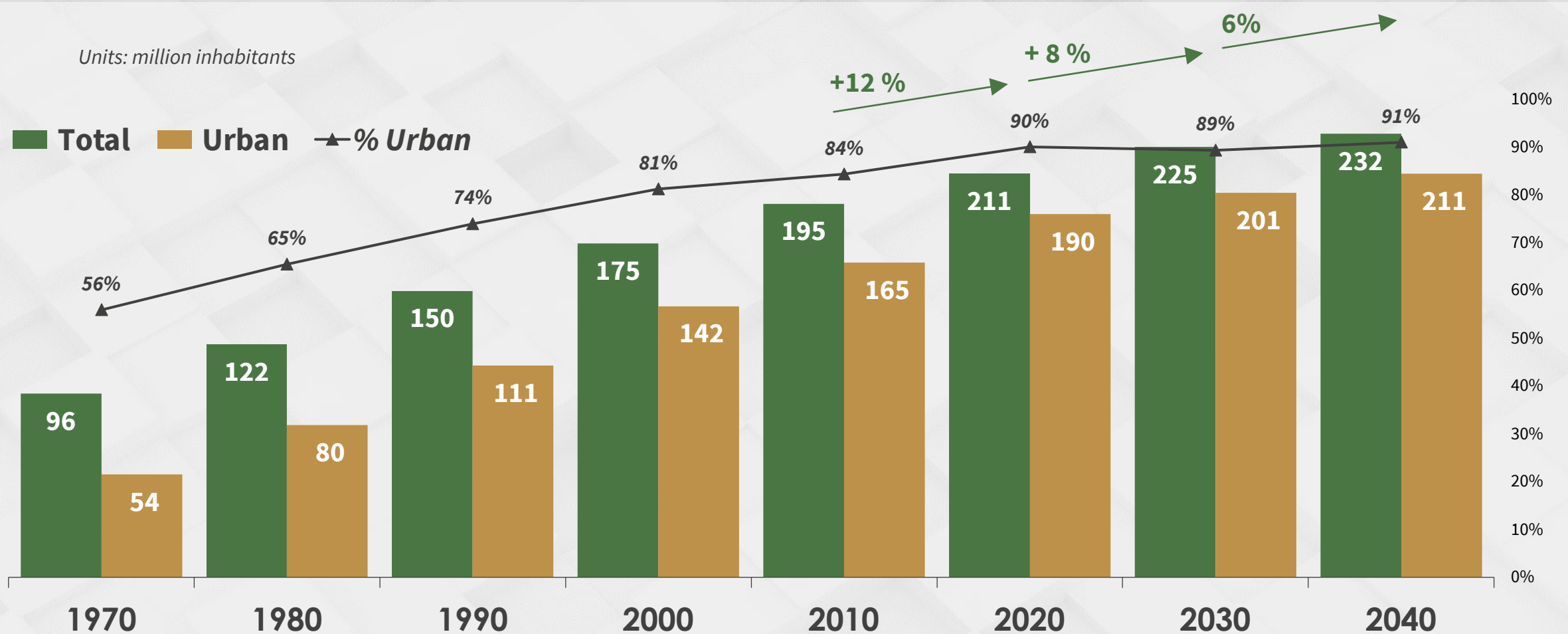
03 | *Market Opportunities*

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# BRAZILIAN POPULATION & GROWTH

Population of 211 million people is projected to reach 225 million by 2030 (average growth of 0,8% per year), of which 90% living in urban areas

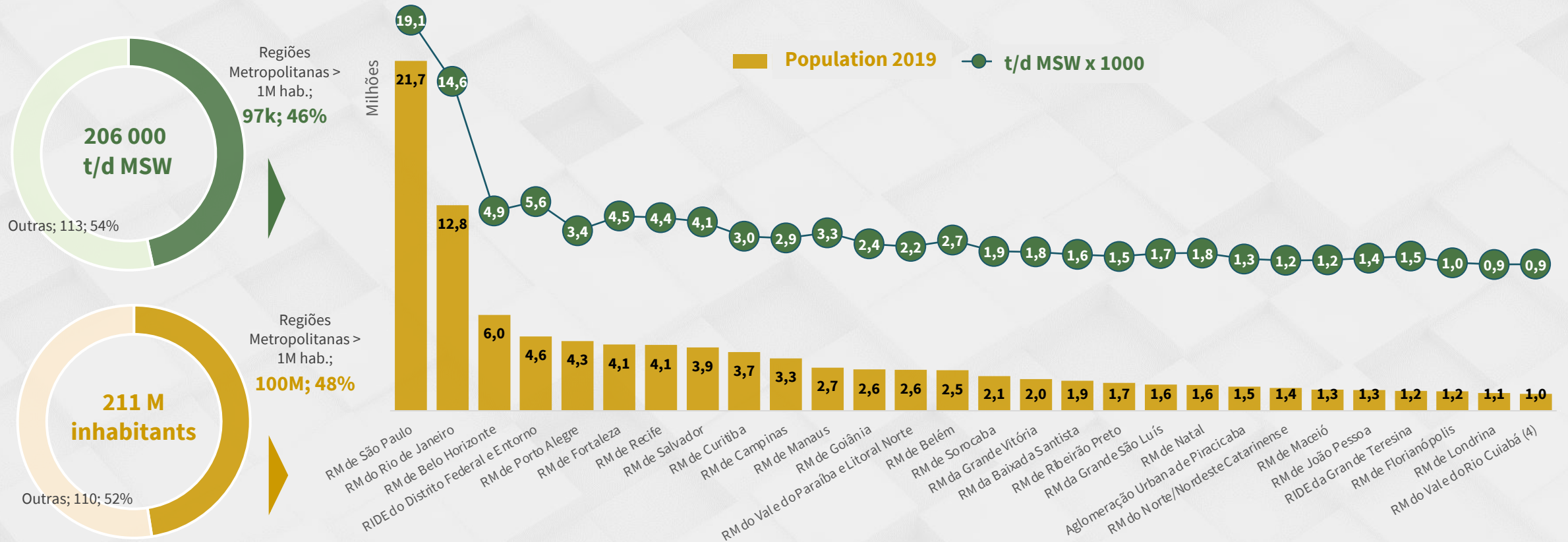


Source: Data from the Brazilian Institute of Geography and Statistics (IBGE)

# MSW GENERATION IN METROPOLITAN REGIONS WITH MORE THAN 1M INHABITANTS

48% of the Brazilian population (equivalent to 100 million people in 2019) lives in one of the 28 Metropolitan Regions with more than 1 million inhabitants, with potential to treat 97,000 t/d of MSW with WTE

Population and Generation of MSW in the 28 Brazilian Metropolitan Regions with more than 1 million inhabitants

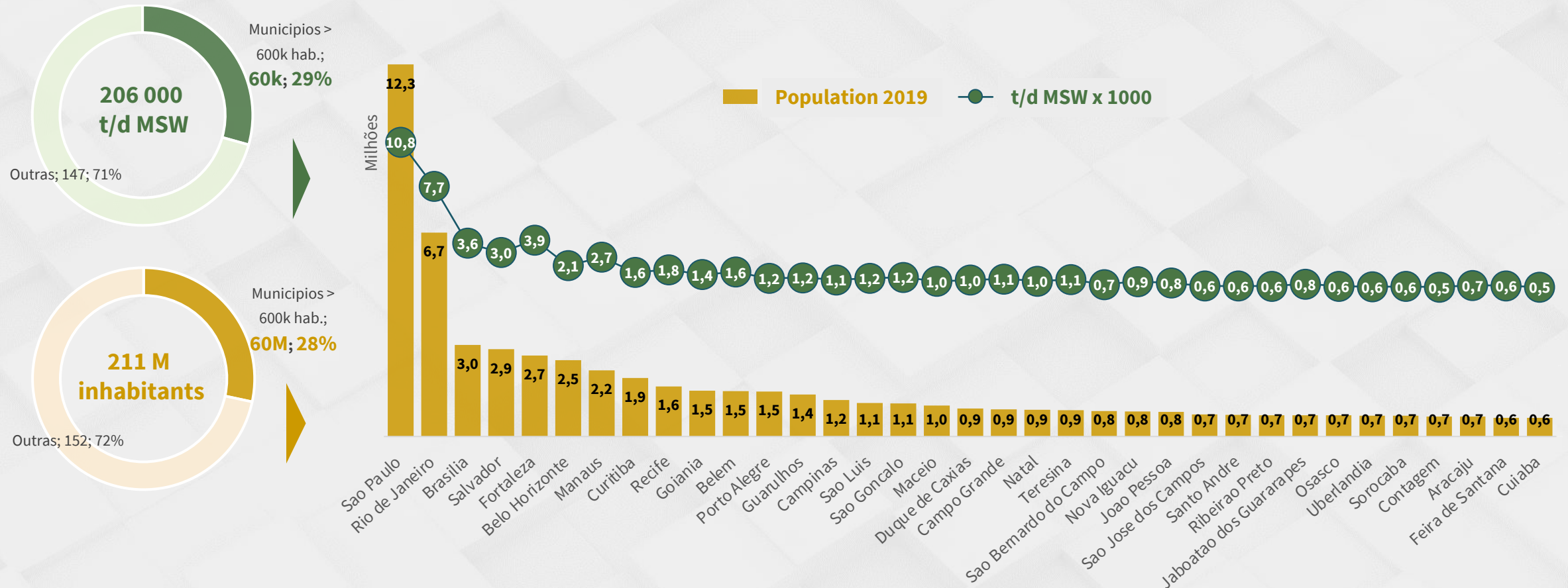


Fonte: Dados do Instituto Brasileiro de Geografia e Estatísticas (IBGE) e Sistema Nacional de Informações sobre Saneamento (SNIS)

# MSW GENERATION IN MUNICIPALITIES WITH MORE THAN 600K INHABITANTS

28% of the Brazilian population (equivalent to 59.6 million people in 2019) lives in one of the 35 municipalities with more than 600 000 inhabitants, with potential to treat 60 500 t/d of MSW with WTE

Population and Generation of MSW in the 35 Brazilian municipalities with more than 600 thousand inhabitants

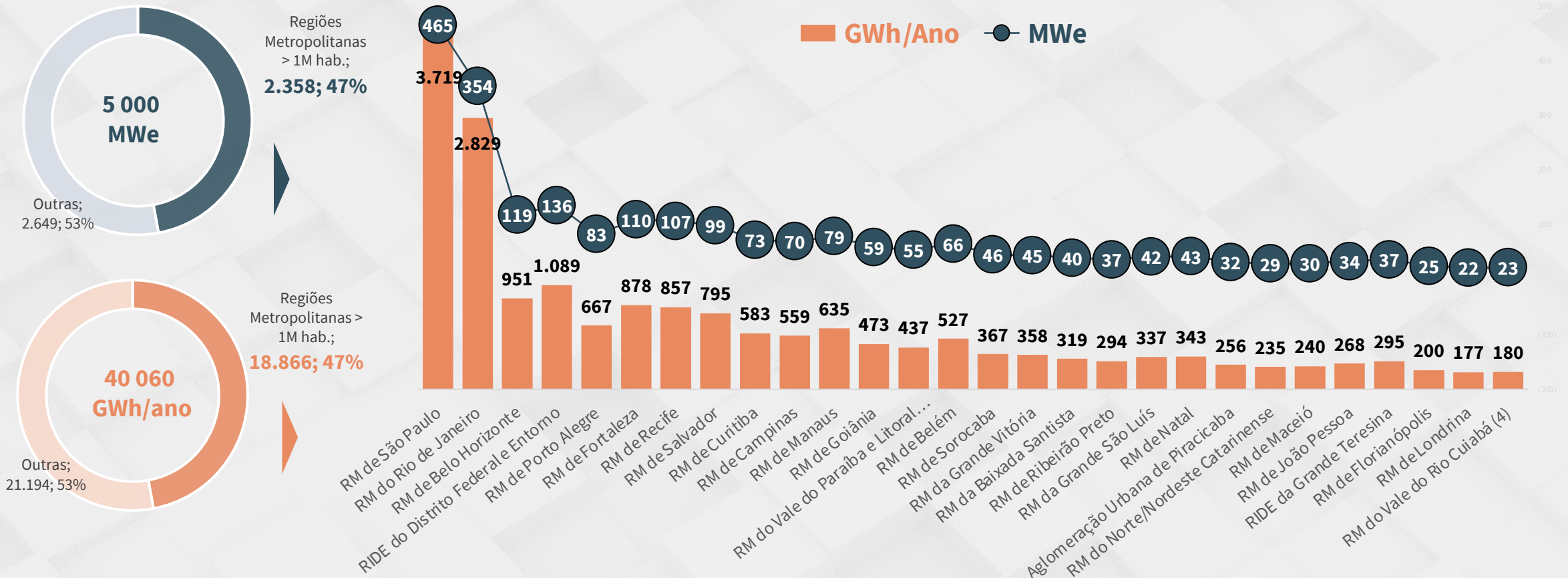


Fonte: Dados do Instituto Brasileiro de Geografia e Estatísticas (IBGE) e Sistema Nacional de Informações sobre Saneamento (SNIS), 2019

# WTE POTENTIAL IN METROPOLITAN REGIONS WITH MORE THAN 1M INHABITANTS

Based on average LHV values of 7500 kJ/kg, 28% of gross power efficiency and 8000 hours availability, the energy generation potential from MSW is around of 19 TWh per year (**2 360 MWe of installed power**) only in the 28 metropolitan regions

Potential for Energy Recovery from MSW in the 28 Brazilian Metropolitan Regions with more than 1 million inhabitants

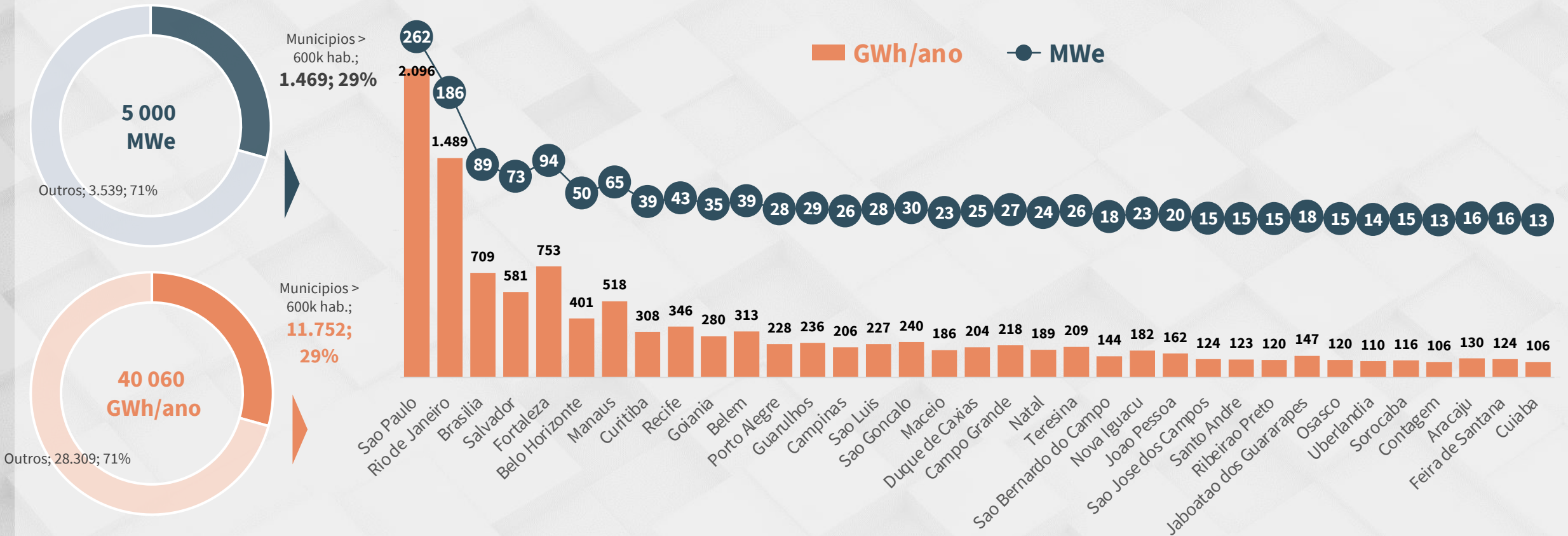


Fonte: Calculo próprio com base em dados IBGE, SNIS, e premissa de 800h/ano de disponibilidade, PCI médio de 7,5 MJ/kg, 28% rendimento elétrico bruto

# WTE POTENTIAL IN MUNICIPALITIES WITH MORE THAN 600K INHABITANTS

Based on average LHV values of 7500 kJ/kg, 28% of gross power efficiency and 8000 hours availability, the energy generation potential from MSW is around of 11,75 TWh per year (**1 470 MWe of installed power**) **only in the 35 municipalities with population above 600 k inhabitants**

Potential for Energy Recovery from MSW in the 35 Brazilian municipalities with more than 600 thousand inhabitants



Fonte: Calculo próprio com base em dados IBGE, SNIS, e premissa de 800h/ano de disponibilidade, PCI médio de 7,5 MJ/kg, 28% rendimento elétrico bruto

## SUMMARY OF WTE POTENTIAL IN BRAZIL

Potential to build the equivalent of 118 WTE plants of 20 MWe/plant in the 28 Metropolitan Regions with 1 million inhabitants, and 73 WTE plants in the 25 Municipalities with more than 600k inhabitants.

Technical WTE Market Potential in Brazil	Electricity Generation Potential	Installed Capacity Potential
	TWh/year	(GWe)
	BR / 28 MR/ 35M	BR / 28 MR/ 35M
WTE	40 (BR) / 19 (28 MR) / 12 (35M)	5 (BR) / 2,35 (28 MR) / 1,5 (35M)
National Generation, 2019 (BNE 2020)	626	170
% WTE / Total Brazil	6,4% (BR) / 3% (28 MR) / 2% (35M)	3% (BR) / 1,4% (28 MR) / 1% (35M)
<b>Potential number of WTE plants of 20 MWe</b>	<b>250 (BR) / 118 (28 MR) / 73 (35M)</b>	
<b>WTE Investment Potential, billions U\$</b>	<b>27.2 (BR) / 13.6 (28 MR) / 8.5 (35M)</b>	

Fonte: Own calculation based on IBGE, SNIS data, and assumption of 800h / year of availability, average PCI of 7.5 MJ / kg, 28% gross electrical yield, investment of 1.5m € / MWt



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# NEW LEGAL FRAMEWORK FOR SANITATION

Approval of the new legal framework for Sanitation in July 2020, imposing 30-y PPP contracts for new MSW concessions, and possibility for concessionaires to collect waste management tariffs directly from inhabitants through consumer (water) bills

## LAW N. 14.026, 15 JULY OF 2020: ART. 29 OF LAW N. 11.445

- In the event of provision of services under a concession regime, public tariffs and prices will be collected by the provider directly from the user, and this collection will be optional in case of fees.
- **Facilitates privatization of state-owned companies in the sector of basic sanitation**, without the need to count on the agreement of served municipalities, unless there are changes in the term, object or other clauses of current contract.
- It **requires bidding for the contracting of sanitation services**, previously engaged directly with the public services providers.
- The new law **imposes the obligation to formalize Public Private Partnership (PPP) contracts for 30-year concessions**.

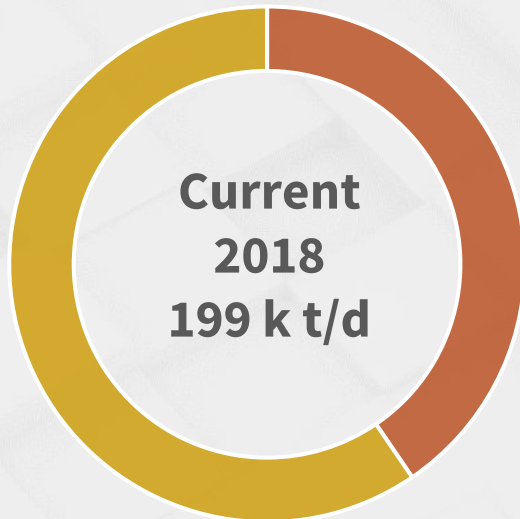
The image shows a screenshot of a news article from G1. At the top, it says 'PROJETO DE LEI Nº , DE 2019 (Do Sr. ARNALDO JARDIM e outros)'. Below that, there is a red banner with 'G1' and 'POLÍTICA'. The main headline is 'Bolsonaro sanciona com vetos novo marco legal do saneamento básico'. The article text starts with 'Nova lei facilita participação da iniciativa privada no setor e tem como meta universalizar acesso ao saneamento básico. Ministério da Economia espera investimentos de até R\$ 700 bilhões.' There are social media sharing icons for Facebook, Twitter, WhatsApp, and LinkedIn. At the bottom, there is a small text box with technical details: 'XXI - recuperação energética de resíduos sólidos: utilização de gases provenientes da biodigestão anaeróbica ou aeróbica da fração biodegradável dos RSU, incineração, gasificação, pirólise, coprocessamento para produção de cimento ou outras aplicações energéticas industriais, captação de biogás de aterro sanitário ou do lodo de estações de tratamento de esgoto, ou outras tecnologias que tenham como objetivo a recuperação energética e de insumos dos resíduos sólidos urbanos, hospitalares, comerciais, industriais, agrosilvopastoris e do esgotamento sanitário, para a geração de energia elétrica.'

# 1ST NATIONAL WASTE MANAGEMENT PLAN IN HISTORY

The 1<sup>st</sup> National Waste Management Plan in history (Planares 2020), includes the elimination of controlled landfills & dumps and diversion of 20% of organics from sanitary landfills by 2024, generating a need for new destinations / treatments for almost 100 000 t/d MSW

Current Situation 2018

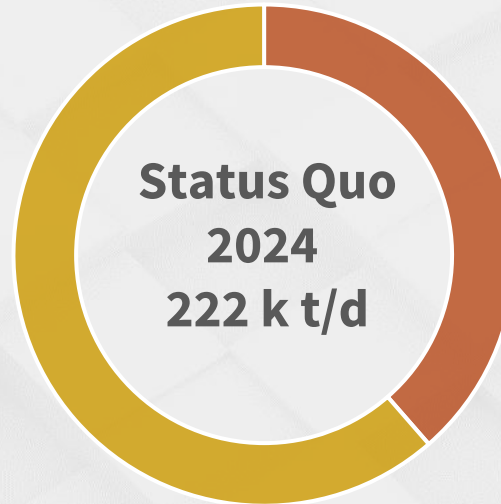
Controlled Landfills & Dumps; 80.680 ; 40%



Sanitary Landfill;  
118.631 ; 60%

Scenario 2024 « Status Quo »  
(without Targets)

Controlled Landfills & Dumps; 87.649 ; 39%

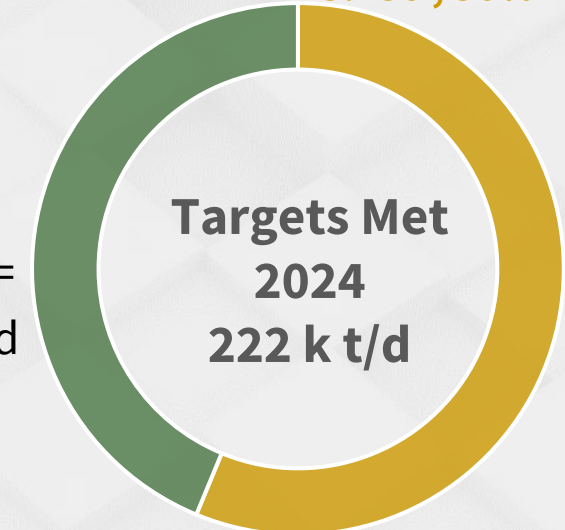


Sanitary Landfill;  
139.490 ; 61%

Scenario 2024 « Targets Met »  
(Planares)

Sanitary Landfill;  
125.150 ; 56%

 =  
97 000 t/d



New Destination/ Treatment;  
97.369 ; 44%

## BAN OF LANDFILLS IN ENVIRONMENTALLY PROTECTED AREAS

In 2018, the Supreme Court banned the construction/ extension of landfills in environmentally protected areas, resulting in the search for alternative treatments for 37 000 t/D of MSW due to lack of new available areas

### Landfills in Environmentally Protected Areas

12 out of 28 landfills across 11 state capitals located in protected areas

Capital	Unidade de tratamento	Quantidade de resíduos recebidos por dia, em toneladas - em 2016
Salvador (BA)	Aterro Metropolitano Centro	3.000
Vitória (ES)	Central de Tratamento de Resíduos Vila Velha	476
Belo Horizonte (MG)	Central de Tratamento de Resíduos Macaúbas	1.976
Curitiba (PR)	Centro de Gerenciamento de Resíduos Iguaçu	1.675
Recife (PE)	CTR Candeias	4.459
Teresina (PI)	CTR Teresina	1.123
Rio de Janeiro (RJ)	Seropédica	9.500
Porto Alegre (RS)	Cia Riograndense de Valorização de Resíduos	1.613
Florianópolis (SC)	Aterro Sanitário de Bigaçu	548
São Paulo (SP)	Central de Tratamento de Resíduos Leste/UVS Caietas*	12.000
Aracaju (SE)	Aterro Rosário do Catete	655

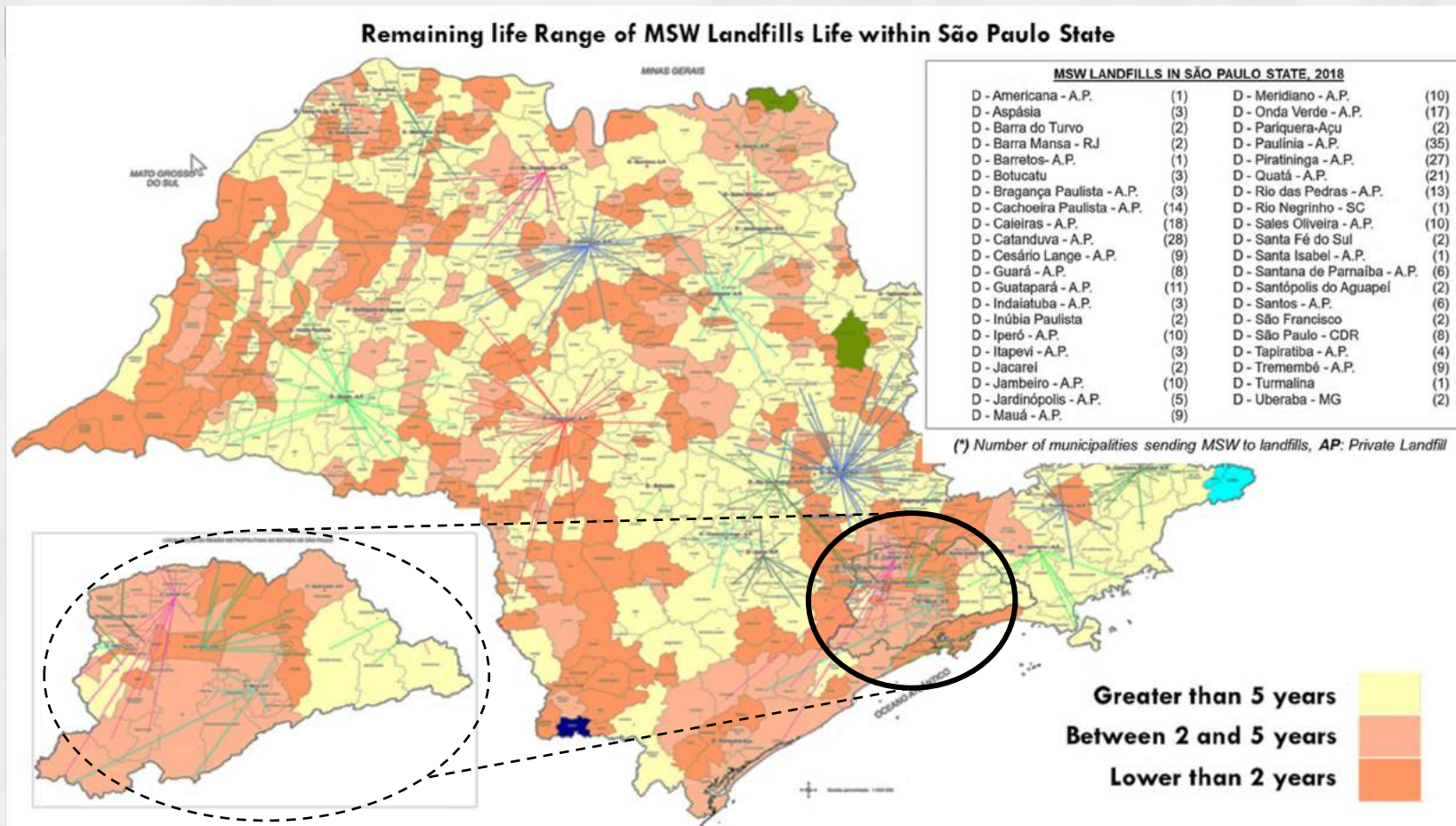
\*Total das duas empresas

- "Regarding permission to intervene in a permanent preservation area for waste management, the risks of contamination of the soil, groundwater and water courses impose a declaration of unconstitutionality of the permissive on canvas, considering the use of biological and chemical contaminants that are inherent in the installation and operation of landfills. "
- "Permission to intervene in the Permanent Preservation Area - APP for the installation of landfills is not reasonable, and other places must be sought to install them"

Source: <https://valor.globo.com/empresas/noticia/2020/03/04/aterros-sanitarios-de-onze-capitais-podem-se-tornar-ilegais.ghtml+&cd=2&hl=en&ct=clnk&gl=fr;>  
<http://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=TP&docID=750504737>

# COLLAPSE OF LANDFILLS WITHIN 3-5 YEARS AND LACK OF NEW AREAS

Landfills are reaching capacity limits, mainly in the states of Rio de Janeiro and São Paulo, where the majority will collapse within 3 to 5 years, requiring greater transportation distances and disposal costs



Source: State Inventory of Urban Solid Waste, 2018, CETESB

# FEDERAL FUND TO SUPPORT STRUCTURING OF WASTE MANAGEMENT PPP PROJECTS

Federal fund to support the structuring of Waste Management PPP projects through state owned bank Caixa (FEP). 4 Municipalities have ongoing projects and other 23 have just had theirs approved.

Resultado do Edital de Chamada Pública nº 001/2020 - Setor de Resíduos Sólidos Urbanos - 01/10/2020

Relação dos entes públicos habilitados				
Ordem	Protocolo	UF	Ente Público	Situação
1	706648	SP	CMM Consorcio de Municípios da Mogiana	Habilitado
2	104832	MG	Consorcio Intermunicipal de Aterro Sanitario do Centro Oeste Mineiro - Cias Centro Oeste	Habilitado
3	288603	RS	CONSORCIO INTERMUNICIPAL DE DESENVOLVIMENTO DO PAMPA GAÚCHO	Habilitado
4	638251	SP	CONSÓRCIO INTERMUNICIPAL DE RESÍDUOS SÓLIDOS DO OESTE PAULISTA	Habilitado
5	685659	MG	ECOTRES- Consórcio Intermunicipal de Tratamento de Resíduos Sólidos	Habilitado
6	977754	SP	CONSORCIO INTERMUNICIPAL CEMMIL - SANEAMENTO AMBIENTAL	Habilitado
7	135968	RS	CONSÓRCIO INTERMUNICIPAL DA REGIÃO CENTRO DO ESTADO DO RIO GRANDE DO SUL - CI/CENTRO	Habilitado
8	800816	SP	Consórcio Intermunicipal de Saúde do Vale do Ribeira e Litoral Sul - Consaúde	Habilitado
9	615062	RS	Consórcio Público de Saneamento da Bacia Hidrográfica do Rio dos Sinos	Habilitado
10	394740	BA	CONSTESF	Habilitado
11	268959	MT	Consórcio Público de Saúde Vale do Teles Pires	Habilitado
12	123492	MG	Consórcio Público Intermun. de Desenv. Sustentável do Triângulo Mineiro e Alto Paranaíba	Habilitado
13	933415	BA	CONSORCIO INTERMUNICIPAL DO OESTE DA BAHIA	Habilitado
14	634408	SC	CONSÓRCIO INTERMUNICIPAL MULTIFINALITÁRIO DOS MUNICÍPIOS DA AMUREL - CIM AMUREL	Habilitado
15	148376	ES	Consórcio Público Prodnote	Habilitado
16	440783	PE	CONSÓRCIO PÚBLICO INTERMUNICIPAL DO AGRESTE PE E FRONTEIRAS (CONIAPE)	Habilitado
17	944443	RS	Consórcio Intermunicipal de Desenvolvimento Sustentável da Serra Gaúcha - CISGA	Habilitado
18	441984	BA	Consórcio Intermunicipal do Semiárido Nordeste II	Habilitado
19	612022*	BA	CONSORCIO INTERMUNICIPAL DE DESENVOLVIMENTO DO CIRCUITO DO DIAMANTE	Habilitado
20	151830	BA	Consórcio De Desenvolvimento Sustentável do Alto Sertão	Habilitado
21	855001	BA	consorcio de desenvolvimento sustentável do território de Irecê	Habilitado
22	932819	BA	Consórcio do Território do Recôncavo	Habilitado
23	347062	BA	Consórcio Público de Desenvolvimento Sustentável Portal do Sertão	Habilitado

\* Número de protocolo corrigido - antiga proposta 577315.



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# IMPROVEMENT OF FINANCING CONDITIONS

Loans by The National Development Bank under the “**Environmental Sanitation**” line with maturity up to 34 years, financing of up to 95% of total investment and reduced spreads (all-in debt rate within 6-8%)

## BNDES Finem - Environmental sanitation and water resources

Financing from R \$ 10 million for public or private investment projects aimed at universal access to basic sanitation services and the recovery of environmentally degraded areas.

### ^ Deadlines

The maximum financing term is 34 years. This term comprises the grace period and the amortization period and is determined according to the payment capacity of the project, the client and the economic group.

During the grace period, which will be up to six months after the project enters commercial operation, interest may be capitalized or paid by the client.

### ^ BNDES participation

For states and municipalities, up to 90% of the total value of the project, limited to 100% of the financeable items.

For other clients, up to 95% of the total value of the project, limited to 100% of the financeable items.

Source: Brazilian National Development Bank (BNDES), 2020

### ^ Interest rate

**Direct support** (request made directly to BNDES)

In direct operations, the **interest rate** is composed of the **financial cost**, the **BNDES remuneration** and the **credit risk rate**. [Understand](#).

FINANCED ITEMS	Companies		
	Financial cost	BNDES remuneration	Credit risk rate
Solid waste and sewage treatment	TLP	0.9% per year (aa)	Variable according to client risk and financing terms
Other investments		1.3% per year (aa)	

**Indirect support** (request made through a financial institution accredited by BNDES)

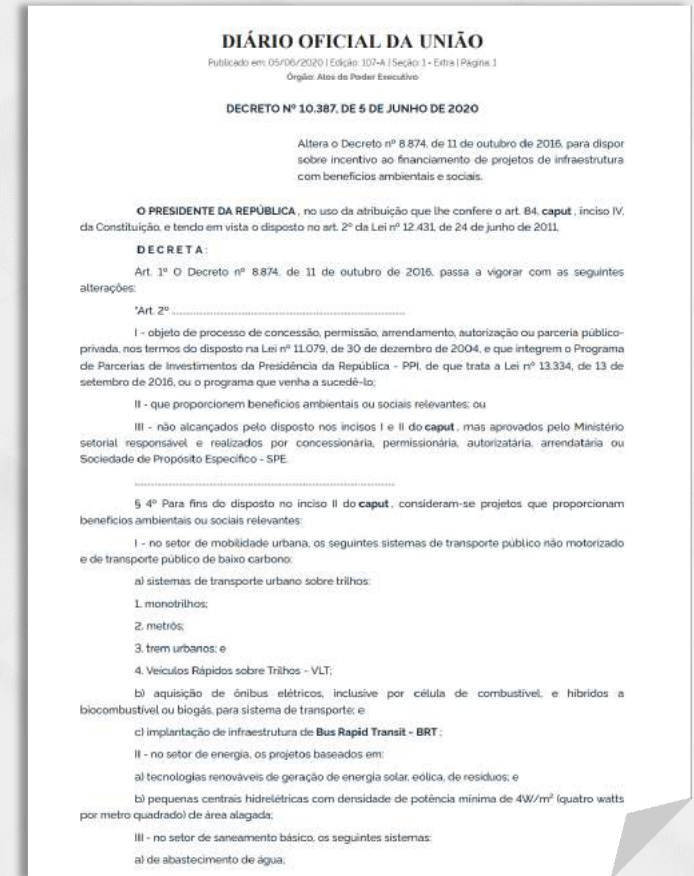
In indirect operations, the **interest rate** is composed of the **financial cost**, the **BNDES fee** and the **financial agent fee**. [Understand](#).

FINANCED ITEMS	Financial cost	BNDES rate	Financial agent fee
	Solid waste and sewage treatment	TLP	1.05% per year (aa)
Other investments	1.45% per year (aa)		

# GREEN DEBENTURES PROGRAMME FOR WASTE TO ENERGY PROJECTS

Brazilian Government introduced a Green Debentures Programme for Waste to Energy projects through Decree 10.387 from 5<sup>th</sup> June 2020

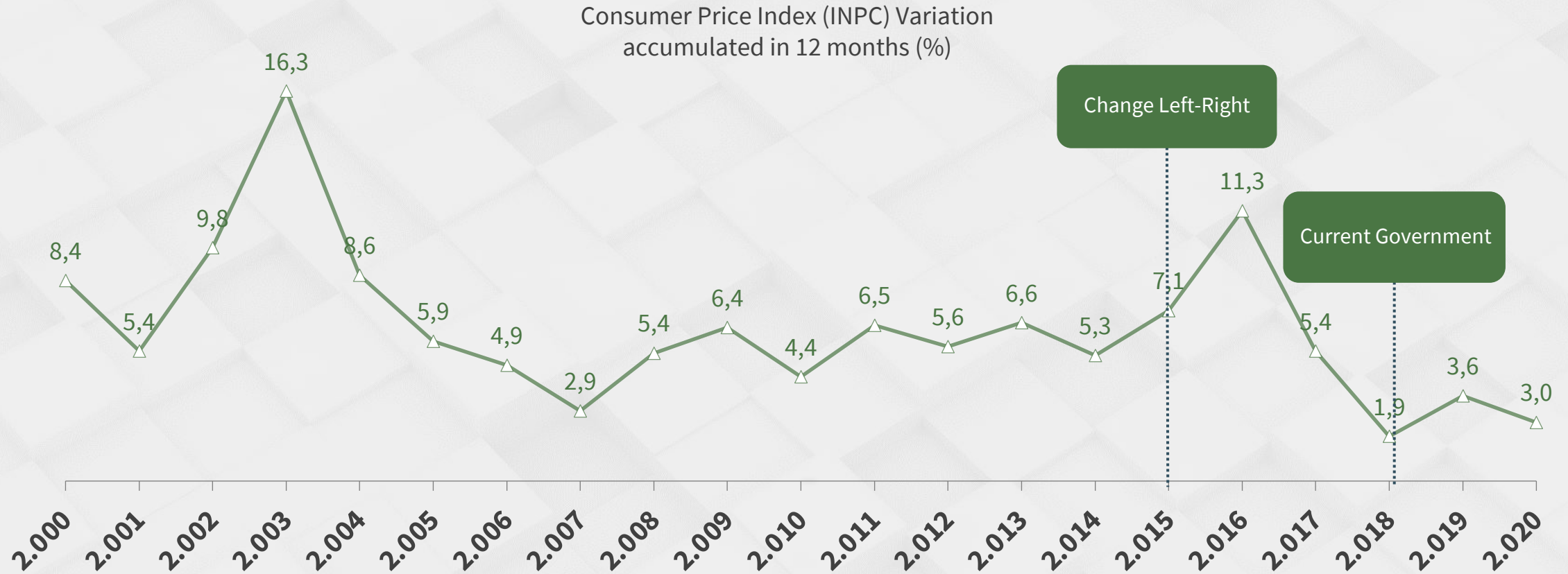
- With a Green Debentures Programme, the Government of Brazil plans to introduce channel funding towards renewable energy projects, including Waste-to-Energy.
- A corresponding decree has recently been signed by the president. The funds will be made available through so-called green debentures.
- Decree n° 10,387 benefits the construction of WTE plants, since it creates new mechanisms for issuing green debentures. The objective is to finance infrastructure projects that bring relevant environmental or social benefits.
- The new decree promotes the implementation of new renewable energy sources, creating more favorable conditions for obtaining financing for the construction of plants powered by MSW.





# INFLATION RATE AT LOWEST LEVELS EVER

12-m cumulated **Inflation Rate is currently at 3%**, **2<sup>nd</sup> lowest historic level** and down from 11,3% in 2016

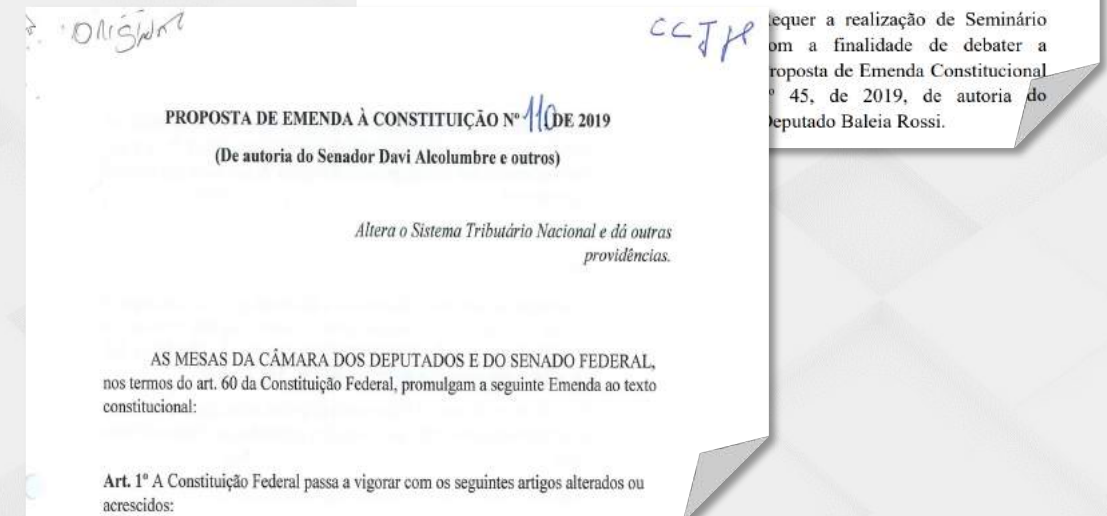


# TAX REFORM TO DECREASE CORPORATE TAX FROM 34% TO 20-25%

Government has made tax reform a top priority and is considering several tax reform measures, of which the simplification and **reduction of Corporate Tax from current's 34% rate to 20%-25%**

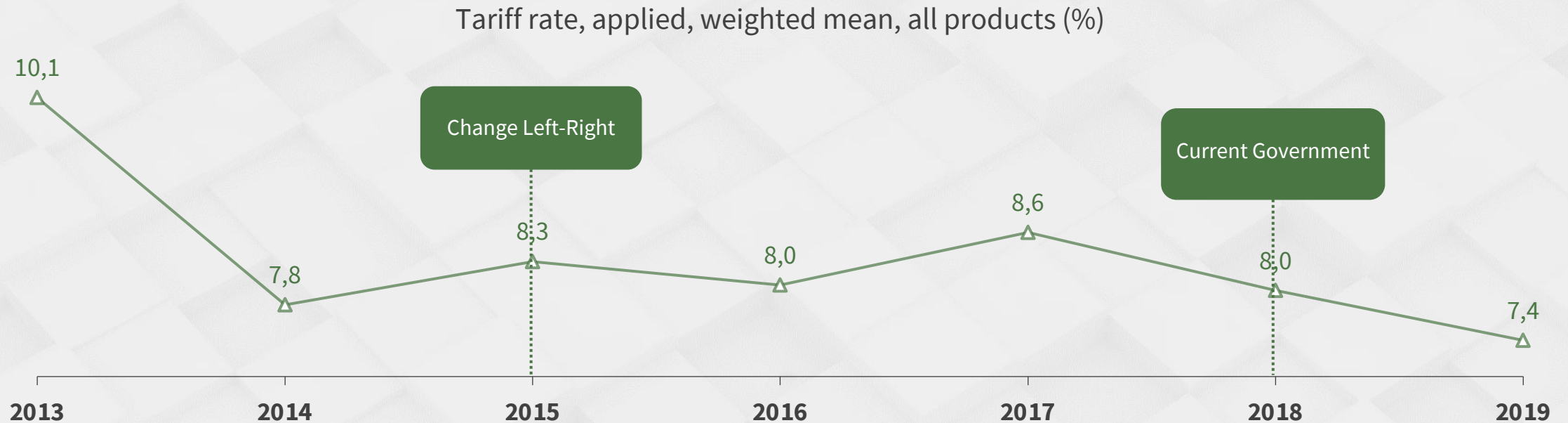
Various proposals are being discussed, the two main ones being the Constitutional Amendments PEC No. 45/19 (House of Representatives) and PEC No. 110/19 (Senate), both currently under review. These two amendments could significantly impact the taxation of goods, services, social security and corporate profits in Brazil. The key features of these Amendments with far-reaching implications are:

- Simplification of the system by replacing five taxes (IPI, PIS, Cofins, ICMS, ISS) with a single VAT (Value Added Tax) type Tax on Goods and Services (IBS).
- Combination of the two existing income taxes (IRPJ and CSLL) into a single, unified corporate income tax;
- Reduction of the standard Brazilian overall tax burden from 34% to approximately 20%-25%;
- Introduction of a withholding tax regime on dividends with possible tax rates varying from 15%, 18% and 25%.



## DECREASE OF AVERAGE IMPORT DUTIES

Avg. Import duties have decreased from 10% in 2013 to 7,4% in 2019 and Government is further facilitating the import of several machines & equipment (at 0% rate) for the Brazilian industry, inc. for Waste Treatment



The Special Secretariat for Foreign Trade and International Affairs of the Ministry of Economy announced in the Official Gazette on 20th August 2019, by the Decree No. 531, the reduction until December 2021 of the rates of the Import Tax on Capital Goods, including several machines, equipment and technology (at 0% import duties) for the Brazilian industry.

## DEDICATED WTE AUCTIONS PLANNED FOR 2021

The Ministry of Energy and Mines (MME) is preparing an auction for WTE projects in 2021. ABREN is contributing with the Ministry to define appropriate Power Tariff Levels to allow projects feasibility

8/19/2020 3:53 pm

### **MME prepares generation auction for solid urban waste, says Reive Barros**

The Ministry of Mines and Energy (MME) is preparing an auction aimed at the source of solid urban waste (MSW) in 2021, said Reive Barros, secretary of Energy Planning and Development of the portfolio, in an event held by the Secretariat of the Environment of Bahia and transmitted virtually.

According to Barros, the auction will treat the source in the same way as other renewables, such as biomass and wind, were treated in the past. "The consumer will pay a little more, and this is a little more in line with making the cost of the source feasible," he said.

The projects, in turn, will reduce costs in the health area, which will be transferred to the electricity sector, according to Barros.

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# PROJECTS UNDER DEVELOPMENT

#	Project Name	Development Stage	Promoters	Technology Adopted/ Supplier	Capacity t/d	Power Capacity
1	Maua	End of environmental licensing process	Grupo Lara	Upcoming bid	3.000 t/d	80 MWe
2	Barueri	Construction License obtained	Foxx-Haztec	Jing Jang	825 t/d	15 MWe
3	Rio de Janeiro	Construction licensing process	Ciclus	?	1.300 t/d	30 MWe
4	Santos	End of environmental licensing process	Grupo Valoriza	?	2.000 t/d	50 MWe
5	Diadema	Under development	Sabesp	Outotec	500 t/d	15 MWe
6	Consimares	Under development	LBR	tbd	700 t/d	17 MWe

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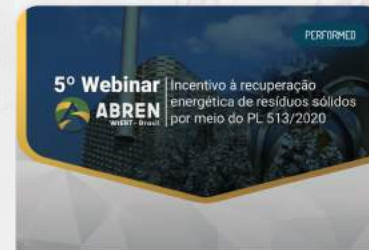
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# ABREN-WTERT Brazil

- Contribution to Planares - National Waste Management Plan;
- MBA FGV/SP: 1<sup>st</sup> Waste treatment course in Brazil, focused on WtE;
- National WtE Guide: under development;
- 14 webinars in 2020 (of which 4 international experts of WtE sector)
- Publications on newspapers/magazines: 1 article every 2 weeks on large newspapers.



5th ABREN Webinar: Encouraging the energy recovery of solid waste through PL 513/2020

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4th ABREN International Webinar: Biogas and Biomethane

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3rd International Webinar ABREN: Brazil-Portugal cooperation for the energy recovery of waste

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ABREN holds its 7th Webinar to discuss CDR Regulation

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6th ABREN Webinar: Environmental licensing of Waste-to-Energy plants

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Launch of the Waste Energy Recovery Coalition

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1st ABREN International Webinar: Waste-to-Energy in the context of the Circular Economy

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# ABREN-WTERT Brazil



## EXECUTIVE MBA IN ADMINISTRATION: ENERGY RECOVERY OF WASTE

### Executive MBA in Administration: Energy Recovery of Waste

Be welcome!

The **Executive MBA in Administration: Energy Recovery of Waste**, unprecedented in Brazil, was born from the partnership between **ABREN** and **FUNDAÇÃO GET U LIO VARGAS** and its program is fully customized for those who seek to promote best practices of integrated and sustainable waste management through its energy recovery.

It is an unprecedented course in Brazil and has a highly qualified faculty, with almost all professors with Master's and Doctorate degrees and extensive market experience. At the end of the course, participants will receive guidance and support for preparing a **Business Plan**.

- Public Policy for Sustainable and Integrated Waste Management
- Legal and Regulatory Aspects Applied to Waste Management
- Contracting Models & Public-Private Partnerships (PPPs)
- Environmental Licensing Process
- Municipal Plans for Integrated Solid Waste Management
- Environmental Education and Social Inclusion
- Public Acceptance & Communication

- Solid Waste Characterization
- Selective Collection, Composting and Recycling of Materials
- Solid Waste Heat Treatment Systems
- Biological Solid Waste Treatment Systems
- Construction and Operational Aspects
- Maintenance and performance improvement
- Generation and Valorization of Energy from Solid Waste

- **Executive MBA in Energy from Waste**
- **360 hours over 18 months**
- **20 courses : Political, Legal & Regulatory, Environmental and Social, Technical, Economic & Financial, Business Plan Development**

- Financial Feasibility of Waste to Energy Projects
- Economic & Financial Analysis of WTE Projects
- Economic & Financial Analysis of Biogas Projects
- Project Financing applied to Waste to Energy Projects
- Market Analysis, Opportunities and Public Bids
- Business Plan Orientation



FGV IN COMPANY



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