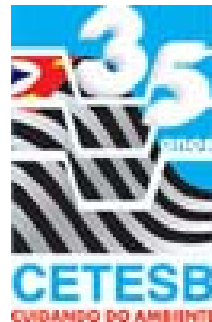


# Country profile – Brazil

First draft

May, 12st, 2006

Joao Wagner Alves - CETESB



SECRETARIA DE ESTADO  
DO MEIO AMBIENTE



GOVERNO DO ESTADO DE  
**SÃO PAULO**  
CUIDANDO DE GENTE

## Brazilian Country Profile

By Afonso José Wagner Alves<sup>§</sup> & Jacson Geraldo dos Santos<sup>§</sup>

Five years ago, in the country there were less than ten initiatives related with biogas use,

Five years ago, in the country there were less than ten initiatives related with biogas use, including experiments in landfills, wastewater treatment plants and farms.

Today there is a remarkable project with a generating capacity of 20MW in Sao Paulo. There are also more than ten energetic recoveries (100 to 500kW steam) of biogas in breweries and dozens of small scale (50 to 200kW) of electric generation with biogas in farms.

More than forty projects of biogas recovery are being designed and submitted, with electric capacities ranging between 1, 5, 10 until 20MW (in the State of Sao Paulo) and 60MW (in the State of Rio de Janeiro).

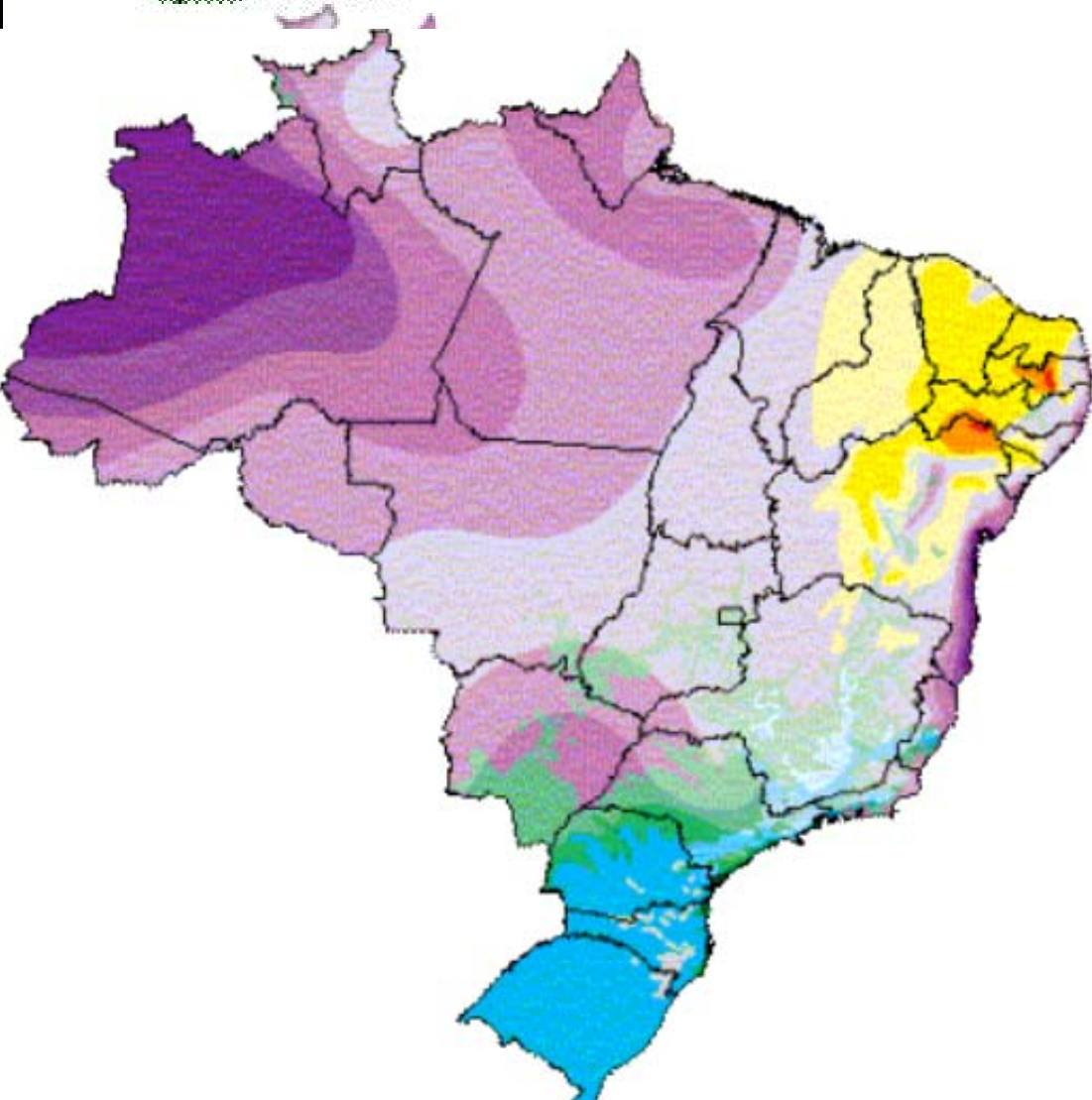
In Rio de Janeiro, the World Bank has supported a project replacing of a large open dump by a landfill. There are many other opportunities like that in the country, attracting interest and research on their feasibility.

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Figure 1. Brazilian climate



Legend:

- Hot, super wet, super dry
- Hot, super wet, dry
- Hot, wet, 1 to 2 months dry
- Hot, wet, 3 months dry
- Hot, wet 3 to 5 months dry
- Hot, dry
- Hot, 6 months dry
- Hot, 7 to 8 months dry
- Semi hot, super wet, without dry
- Semi hot, super wet
- Semi hot, wet
- Semi hot, 3 months dry
- Medium, super wet, without dry
- Medium, wet, without dry
- Médium, super wet

CENBR - São Paulo (applied research in use with energy), UFPEJ - Rio de Janeiro (energy use of mineral oil waste).

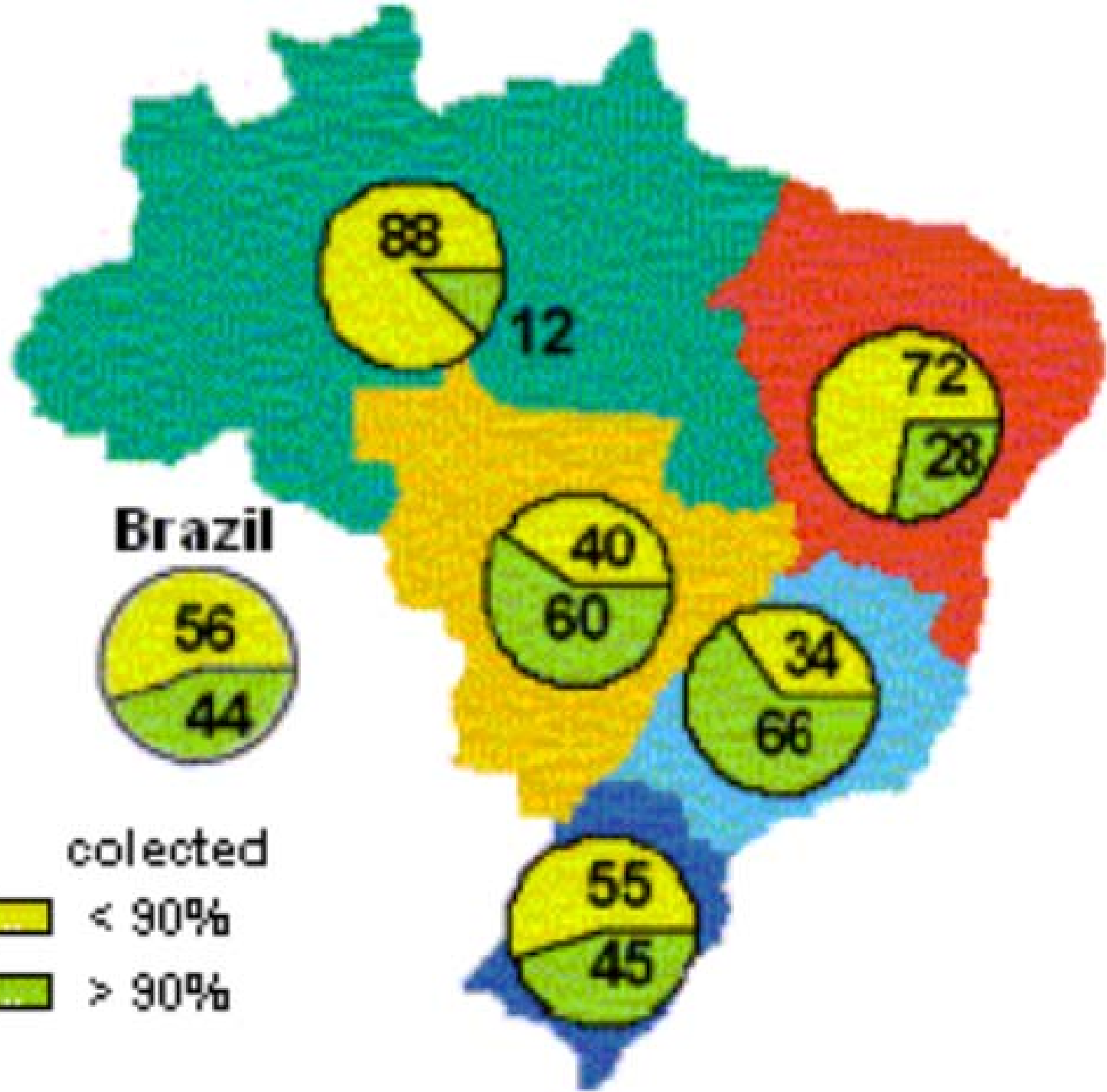
Figura



60  
40  
20

Fonte:

Landis et al. (2004)



**Brazil**

coletado

< 90%  
 > 90%

Brazil

Table 1. Sanitary landfill operated by the private sector in Brazil.

Owner	Municipality	State	Medium amount of waste landfilled (t/d)	Year of start
ANACONDA	Santa Isabel	SP	850	2002
CORPUS	Indaiatuba	SP	140	2002
EPPO	Itú	SP	100	2001
ESSENCIS	Caieiras	SP	5.000	2003

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ESSENCIS	Caieiras	SP	5.000	2003
ESTRE	Guarulhos	SP	2.000	2004
ESTRE	Itapevi	SP	800	2005

The Annexes 2, 3 and 4 present the potential landfill gas from the existing sites, as well as their present characteristics and operational conditions<sup>4</sup>.

The Baurmeisters Landfill in the city of São Paulo is the only LFG-to-energy project in the country. The landfill is more than 30 years old and will remain opened for more five years.

<sup>4</sup> Source: National Network of Sanitation Data (NNIS) <http://www.sanis.gov.br/#>



Today, the site receives from the city of São Paulo more than 7000 t of MSW daily, 343

There are several other Clean Development Mechanism projects on the waste sector (landfill gas and manure management) submitted to the Brazilian Designated National Authority, including:

- São João 20MW – SP;
- Anaconda – Flaring – SP;
- Sadia Farms – Faxinal dos Guedes and Toledo – SC;
- Granja Becker Farm – MG;
- Bandeirantes Landfill 20MW – SP;
- Caieiras Landfill – SP;
- Estre Landfill – SP;
- Onix/Sasa Landfill – (leachate evaporation) SP;
- Lara Landfill – SP;
- Marca Landfill – ES;
- Vega Landfill – BA;
- Nova Gerar Landfill 10MW – RJ;
- Aura Landfill – PA;
- Canabrava Landfill – BA and;
- Bragança Landfill – SP.



Also, a software to study alternatives of biogas recovery and utilization was developed in partnership between CENESB, MMA-EP and Ministry of Science and Technology; the software "Biogas, generation and energy use", is an open source, with two versions: one to landfill and other to wastewater and rural waste. This financial software makes a draft project with investment cost and net of Carbon Credit, cost of generated energy and income.

#### Market assessment and reform issues

End uses for LFG, prices and tariffs

Some projects of Clean Development Mechanism in landfills include electric generation. Until 2005, one with 20MW is installed.

Breweries are converting boilers that burn natural gas or oil to burn also biogas, with payback of conversion in 4 months.

Farms are generating electricity with biogas (50 to 200kW), with payback of 10 months.

A barrier to be considered is the monopoly on gas pipeline transport and trade. Also the transport in bottles is controlled.

(LAW 10730/03), WITH INCREASE GENERATION OF 1,000 MW OF ELECTRICITY FROM BIOMASS (plus other 2,000 MW from wind and small hydro)

The energy sector's reformulation process, conceived at federal level, has accorded special status to non-conventional energy sources, through the Law 10433/02 that created the Incentive Program for Alternative Electric Generation Sources (PROINFA – Programa de Incentivo a Fontes Alternativas). Such program provides incentives to wind, small hydro and biomass thermoelectric plants, to be connected to the national grid. Producers can be either independent or even those with the commitment of contract of no more than 25% of

- ✧ [http://www.bancoreal.com.br/campanha/campanha\\_2005/tao/tao\\_inf\\_credito.htm](http://www.bancoreal.com.br/campanha/campanha_2005/tao/tao_inf_credito.htm)
- ✧ <http://www.carbondeal.com/home.asp?id=3>
- ✧ <http://www.bndf.com.br/index.asp>
- ✧ <http://www.bndf.com.br/2004/naoconhece2/>



annual gas production and without preference over an independent producer. Contracting is upon public bidding, taking into account environmental permits. Equipment suppliers are allowed to join in, if their supplies are at least 50% national. Contracted capacity will be equally distributed amongst all energy sources and electricity purchasing price will have as a lower limit 30% of national final tariff. After the attainment of the targeted capacity of 3,300 MW until 2004, the second phase of PROINFA aims at achieving share of 10% of alternative renewable sources for electricity production in the next 20 years. The 15 years guaranteed electricity purchasing contract with ELETCOBRAS (the federal electricity utility) will have the price based upon the weighted average cost of generation from natural gas, thermoelectric plants and hydro plants above 30 MW. Price paid for energy will be equally distributed to final consumers. To compensate the difference between the contracted value and generation cost from each technology, producers will be granted with a monthly credit covered by the Development Energy Account (CDE – *Conta de Desenvolvimento Energético*) the latter covered by financial resources from fines applied by the National Electricity Agency (ANEEL - *Agência Nacional de Energia Elétrica*). The entity will also inspect producers, providing to them the so-called Renewable Energy Certificates - (CER - *Certificados de Energia Renovável*). Therefore, several new

Current international cooperation in Brazil include the agreement with the Japanese Government to develop studies and evaluation of biogas potential (US\$979.300,00) and the agreement with UNDP to develop a new edition of National Inventory of GHG from waste management and a network related (US\$100.000,00).

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## References and Sources

Quoted in the text. Not the full reference is given.

<sup>10</sup> Goldman, Coslle and Liron, "How adequate policies can push renewables, *Energy Policy*" 31 (2003) 101-104

*ANNEX 1: Key stakeholders in the solid waste disposal sector*

**Federal Government**

- Ministry of Cities (MCidades) [www.cidades.gov.br](http://www.cidades.gov.br)
- Ministry of Environment (MMA) [www.mma.gov.br](http://www.mma.gov.br)

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- Ministry of Environment (MMA) [www.mma.gov.br](http://www.mma.gov.br)
  - o National Fund of Environment (FNMA)  
[www.mma.gov.br/port/fnma/index.cfm](http://www.mma.gov.br/port/fnma/index.cfm)
- Ministry of Science and Technology [www.mct.gov.br/clima](http://www.mct.gov.br/clima)
  - o Interministerial Commission of Global Climate Change  
[www.mct.gov.br/clima/cimgc/default.htm](http://www.mct.gov.br/clima/cimgc/default.htm)
- National Statistics Foundation [www.ibfe.gov.br](http://www.ibfe.gov.br)
- National Bank of Economic and Social Development (BNDES)  
<http://www.bndes.gov.br/empresa/default.asp>
  - o Economic Foundation (FE, FEA)  
<http://www.feua.sp.gov.br/fe/universidade.asp>
- PE (Paraná)
  - o Environmental Secretary (SEMMA)  
<http://www.pe.gov.br/semma/semma/semma.html>

# Annex 1

Name/ State	Landfills									
	Name or the unit	Municipality	Amount of waste						Trees and grass	other
			Total	Dom+Pub	Medical	Industrial	Construction			
<b>Alagoinhas/BA</b>	Sanitary Landfill	Alagoinhas/BA		24.616,6						
<b>Anápolis/GO</b>	Landfill	Anápolis/GO	60.936,9	60.049,2	887,7					
<b>Aparecida de Goiânia/GO</b>	Sanitary Landfill	Aparecida de Goiânia/GO	84.462,0	75.120,0			9.342,0			
<b>Aracaju/SE</b>	Open dump	Aracaju/SE	235.328,3	137.654,9			100.984,8	759,7		
<b>Aracaju/SE</b>	Small Sanitary Landfill	Aracaju/SE	1.189,2		1.189,2					
<b>Aracruz/ES</b>	AMBITEC	Aracruz/ES	60.550,0	22.500,0	50,0		30.000,0	8.000,0		
<b>Araçuaí/MG</b>	Landfill	Araçuaí/MG	2.210,0							
<b>Araguaína/TO</b>	Controlled Landfill	Araguaína/TO	25.819,0	25.312,6	506,5					
<b>Araguaína/TO</b>	Controlled Landfill	Araguaína/TO	186.336,0				124.244,0	32.000,0	30.112,0	
<b>Arapiraca/AL</b>	Sanitary Landfill	Arapiraca/AL	64.980,0	64.480,0	180,0					
<b>Arcos/MG</b>	Landfill Amâncio Alves	Arcos/MG	4.300,0	3.500,0				500,0	300,0	
<b>Arcos/MG</b>	Landfill of inerts	Arcos/MG	9.600,0				9.600,0			

## Annex 2

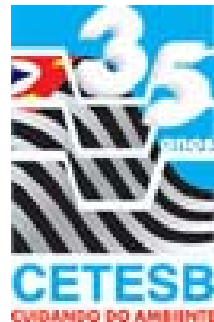
Name/State	Name of landfill	Type, according municipality	municipality responsible	Operator	Start of operation	Total of waste in place	Waste from other municipalities
						ton	
<b>Alagoinhas/BA</b>	Sanitary Landfill	Sanitary Landfill	the same	Municipality	2000		no
<b>Anápolis/GO</b>	Landfill	Controlled Landfill	the same	Private company	1999	60.936,9	no
<b>Aparecida of Goiânia/GO</b>	Sanitary Landfill	Open Dump	the same	Municipality	2002	84.462,0	no
<b>Aracaju/SE</b>	Open Dump	Controlled Landfill	the same	Municipality	1986	235.328,3	no
<b>Aracaju/SE</b>	Vala séptica	Sanitary small scale technology of RSS	the same	Municipality		1.189,2	no
<b>Aracruz/ES</b>	AMBITEC	Sanitary Landfill	the same	Private company	1999	60.550,0	no
<b>Araçuaí/MG</b>	Landfill	Controlled Landfill	the same	Municipality	2003	2.210,0	no
<b>Araguaína/TO</b>	Controlled Landfill	Controlled Landfill	the same	Private company	1998	25.819,0	no
<b>Araguaína/TO</b>	Controlled Landfill	other	the same	Municipality	2003	186.336,0	no
<b>Araguari/MG</b>	Controlled Landfill	Sanitary Landfill	the same	Private company	2001		no
<b>Araguari/MG</b>	Incinerator	Unit of treatment incineration	the same	Private company	2001		no
<b>Arapiraca/AL</b>	Sanitary Landfill	Sanitary Landfill	the same	Municipality	1997	64.980,0	no
<b>Araraquara/SP</b>	Controlled Landfill	Controlled Landfill	the same	Private company	1975		Yes
<b>Araraquara/SP</b>	Bolsão	other	the same	Private company	2003		
<b>Araraquara/SP</b>	Incinerator	Unit of treatment incineration	the same	Private company	1990		Yes

# Annex 3

Name/State	Name of the landfill	Characteristics															
		Environmental Licence	Limits	Office	Impermeabilization	Cover of waste	Gas drain	Gas recovery	Leachate recirculation	Leachate drain	Internal Leachate Treatment	External Leachate Treatment	Security	Environmental Monitoring	Waste burning	Animals present (exc. birds)	People living in site
Alagoínas/BA	Sanitary Landfill	Not licenced	Yes	Yes	Yes		Yes		No	Yes	Yes	No	Yes	Yes	No	Yes	10
Arápolis/GO	Landfill	Not licenced	Yes	No	Yes	Daily	Yes	No	No	Yes	No	No	Yes	No	No	No	No
Aparecida de Goiânia/GO	Sanitary Landfill	Operation licence	Yes	Yes	Yes	Weekly	Yes	No	No	Yes	Yes	No	Yes	No	No	No	No
Aracaju/SE	Open dump	Not licenced	Yes	Yes	Yes	Daily	No	No	No	No	No	No	Yes	No	No	Yes	No
Aracruz/ES	AMBITEC	Operation licence	Yes	Yes	Yes	Daily	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	No
Araguaína/MT	Landfill	Not licenced	Yes	Yes	No	Daily	No	No	No	No	No	No	Yes	No	No	No	No
Araguaína/TO	Controlled Landfill	Operation licence	Yes	Yes	No	Daily	Yes	No	No	No	No	No	Yes	Yes	No	No	No
Araguari/MT	Controlled Landfill	Operation licence	Yes	Yes	No	Weekly	No	No	No	No	No	No	Yes	Yes	Yes	No	No
Arapiraca/AL	Sanitary Landfill	Operation licence	Yes	Yes	Yes	Weekly	Yes	No	No	Yes	No	No	No	No	No	Yes	
Araraquara/SP	Controlled Landfill		Yes	Yes	No	Daily	Yes	No	Yes	Yes	No	No	Yes	No	No	No	No
Arcos/MT	Old Open dump																
Arcos/MT	Landfill Amâncio Alves	Operation licence	Yes	Yes	Yes	Daily		No		Yes	Yes	No	Yes	Yes	No	No	No
Barbacena/MT	Controlled Landfill	Not licenced	Yes	Yes	No	Daily	No	No	No	No	No	No	Yes	No	No	No	No
Barra do Piraí/RJ	Open dump Municipal	Not licenced	No	No	No		No	No	No	No	No	No	No	No	No	Yes	No
Bauru/SP	Sanitary Landfill de Bauru	Operation licence	Yes	Yes	Yes	Daily	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	No
Belém/PA	Sanitary Landfill do Aurá	Operation licence	Yes	Yes	Yes	Daily	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	No
Belmonte/BA	Open dump	Operation licence	Yes	No	No		No	No	No	No	No	No	No	No	Yes	Yes	No

**Thank you**

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