



MÉXICO-ALEMANIA  
DIÁLOGOS POR UN FUTURO SUSTENTABLE | ENERGÍA DE RESIDUOS

# FORO INTERNACIONAL 2015 VALORIZACIÓN ENERGÉTICA DE RESIDUOS URBANOS

Experiencias y estrategias globales

México, D.F. 7 de octubre del 2015

## A broad market perspective – BRASIL

Silvano Silvério da Costa  
Serviço de Limpeza Urbana do Distrito Federal – Brasil

MÉXICO  
GOBIERNO DE LA REPÚBLICA



SENER  
SECRETARÍA DE ENERGÍA

SEMARNAT  
SECRETARÍA DE  
MEDIO AMBIENTE  
Y RECURSOS NATURALES



Embajada  
de la República Federal de Alemania  
Ciudad de México



giz  
Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

## **INTERNATIONAL FORUM 2015**

Energetic valorization of urban waste Experiences and opportunities in Mexico and other countries

### **Panel: INTERNATIONAL CLUSTER – A BROAD MARKET PERSPECTIVE**

### **BRASIL**

*Silvano Silvério da Costa*

*Urban Cleaning Service of the Federal District – SLU – Brasil*

**Camino Real Polanco Hotel México City, October 7-8, 2015**

Reference:



solutions  
treatments  
opportunities



# Current situation of MSW management in Brazil: possibility of energy recovery

*Prof. José Fernando Thomé Jucá*  
*Federal University of Pernambuco, Brazil*

**and**

**PLANO DE GESTÃO INTEGRADA  
DOS RESÍDUOS SÓLIDOS  
DA CIDADE DE SÃO PAULO  
Decreto 54.991/2014**

**Source of information used**





MINISTÉRIO DAS CIDADES  
Secretaria Nacional de Saneamento Ambiental

*Sistema Nacional de Informações sobre Saneamento*

# PANORAMA OF SOLID WASTE IN BRAZIL

## 2 0 1 2



**BRAZILIAN MINISTRY OF THE ENVIRONMENT**

**National Policy on Solid Waste – Law n. 12.305/2010**

**IBGE**





ANALYSIS OF THE VARIOUS TECHNOLOGIES OF TREATMENT AND FINAL DISPOSAL OF URBAN SOLID WASTE IN BRAZIL, EUROPE, JAPAN, AND USA

SEARCH:



HOME PROJECT TEAM NEWS PUBLICATIONS RESTRICTED AREA WALL CONTACT

Português/Inglês



### NEWS

All

25 JUN ISWA Advisory Committee – Meeting in Vienna on 7 and 8 June 2013

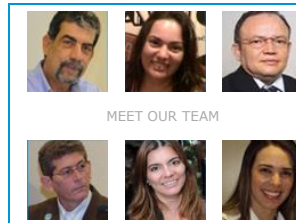
07 DEC Specialists discuss the National Politic for Solid Waste

### RESTRICTED AREA

Restricted area, please use your login the form below, enter your username and password:

LOGIN: PASSWORD: ENTER

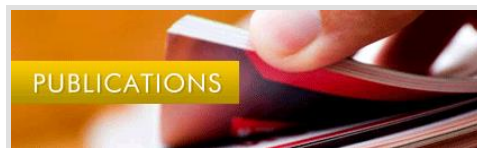
### TEAM



MEET OUR TEAM

### Contacts

Direct communication with project team



In the publications you have free access to legislation, scientific papers, studies, cases and other informations about to the area of technology for treating municipal solid waste.

This project is being implemented with financial support from the National Bank of Economic and Social Development (BNDES), through non-reimbursable financing with resources from the BNDES Project Structuring Fund (EFF). The content of studies and research is the sole responsibility of the authors and do not necessarily reflect the views of the BNDES. For more information on this type of financing, visit <http://www.bndes.gov.br/programas/ outros/ fep.asp>



Database is a restricted area of research consultants to the project, which documents that underlie the study are discussed and listed for further formatting and publishing.

### MURAL /PANEL

To open discussion

Instituição Executora:



Instituição Financiadora:

<http://www.tecnologiasresiduos.com.br/>

Project: motivation, goal, planning and methodology

Publications Files open to society

# **SOME ASPECTS OF BRAZILIAN CONSUMER AND MUNICIPAL SOLID WASTE MANAGEMENT**

# Indicators for Regions:



Infrastructure, political stability, security, market, economic aspects, incentives for investments, policies for foreign capital, skilled labor, university graduates, quality of communications, road network.

- ▲ INÍCIO
- CATEGORIAS**
- ESTADOS/REGIÕES
- COMPARAR RESULTADOS

## Ranking geral

Pontuação de 0(pior) a 100(melhor)

RANKING GERAL

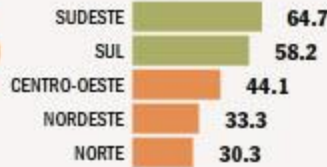
CATEGORIAS (CLIQUE NOS ÍCONES)



### CLASSIFICAÇÃO



### REGIÕES



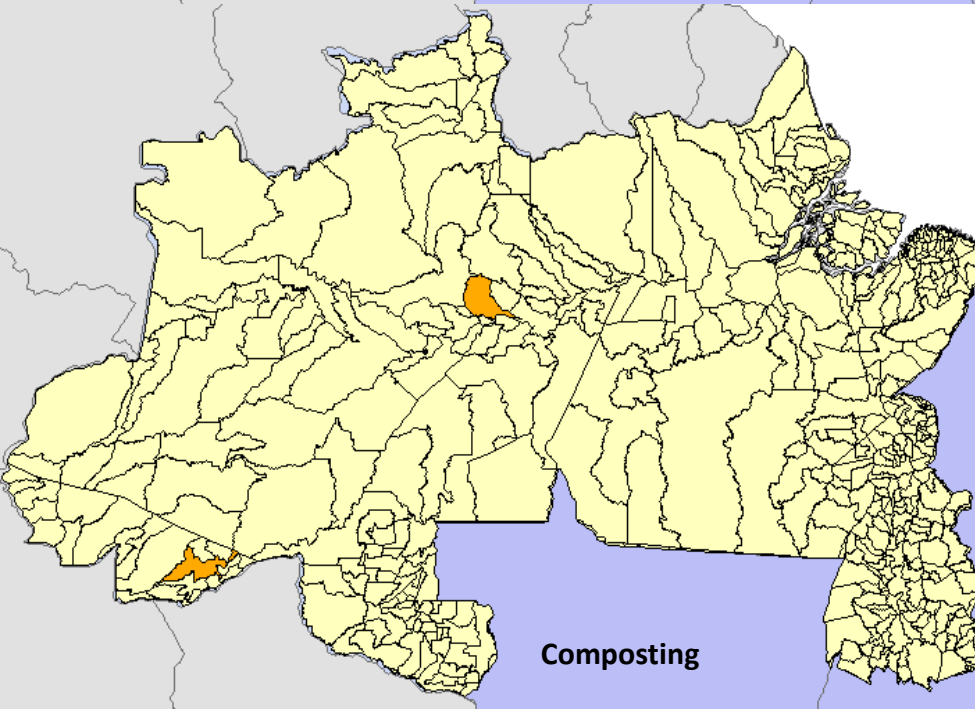
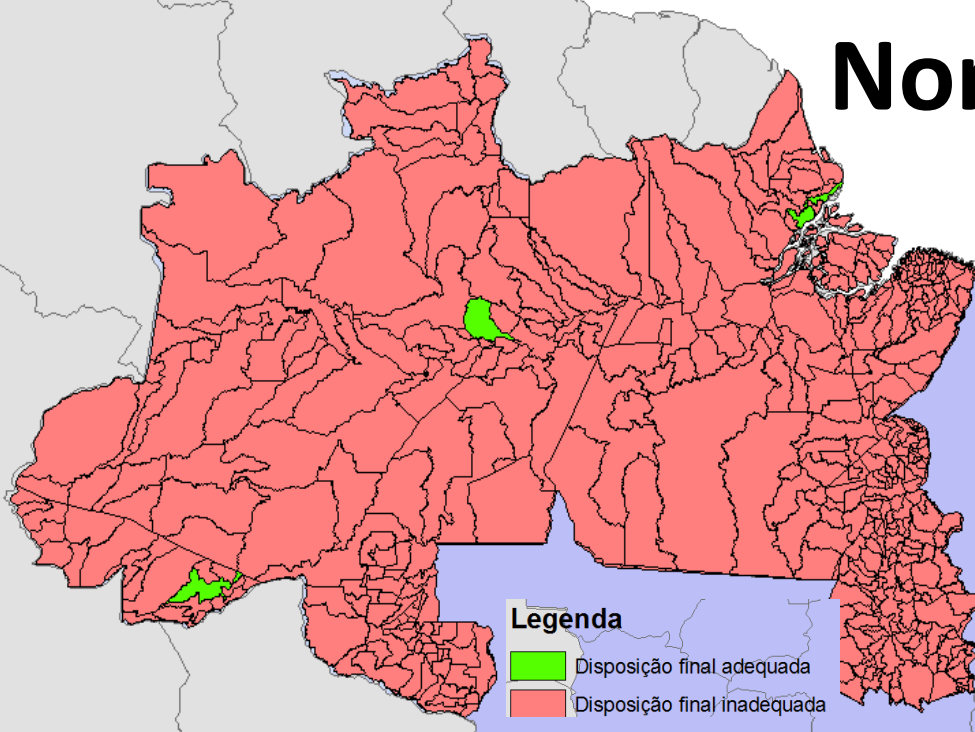
ESTADOS





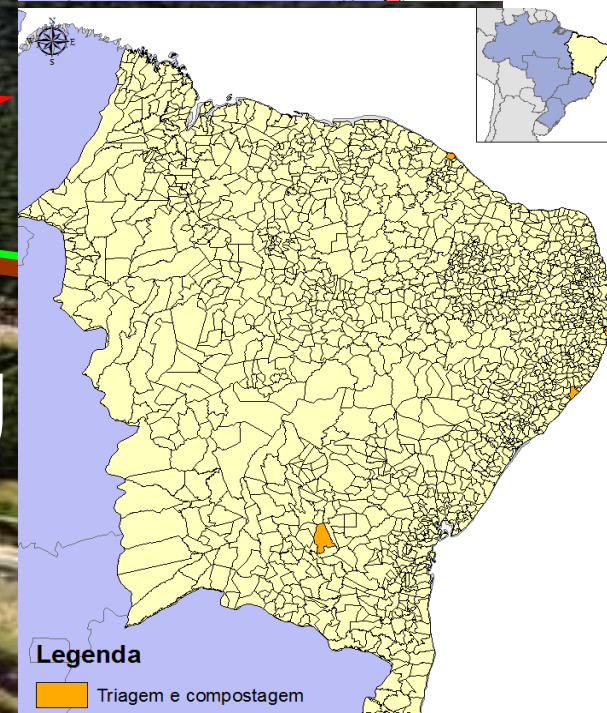
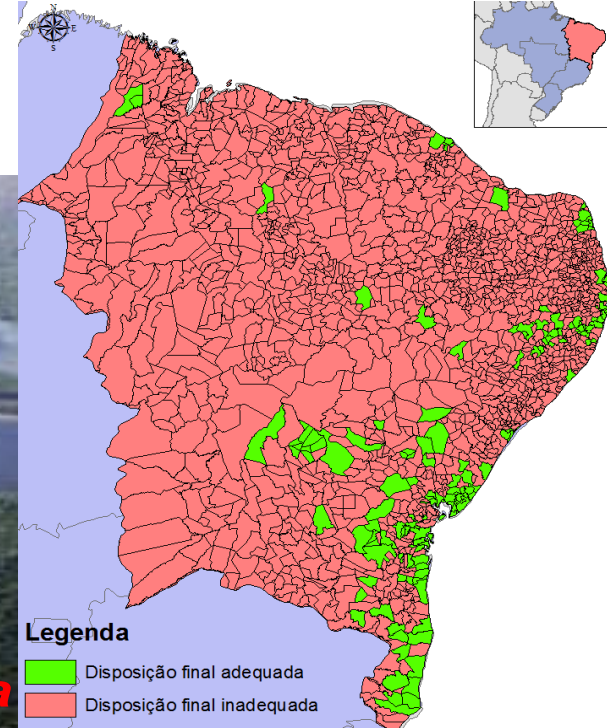
# North Region

Área: 3.853.327,2 km<sup>2</sup>  
45% do território nacional  
7% da população do país

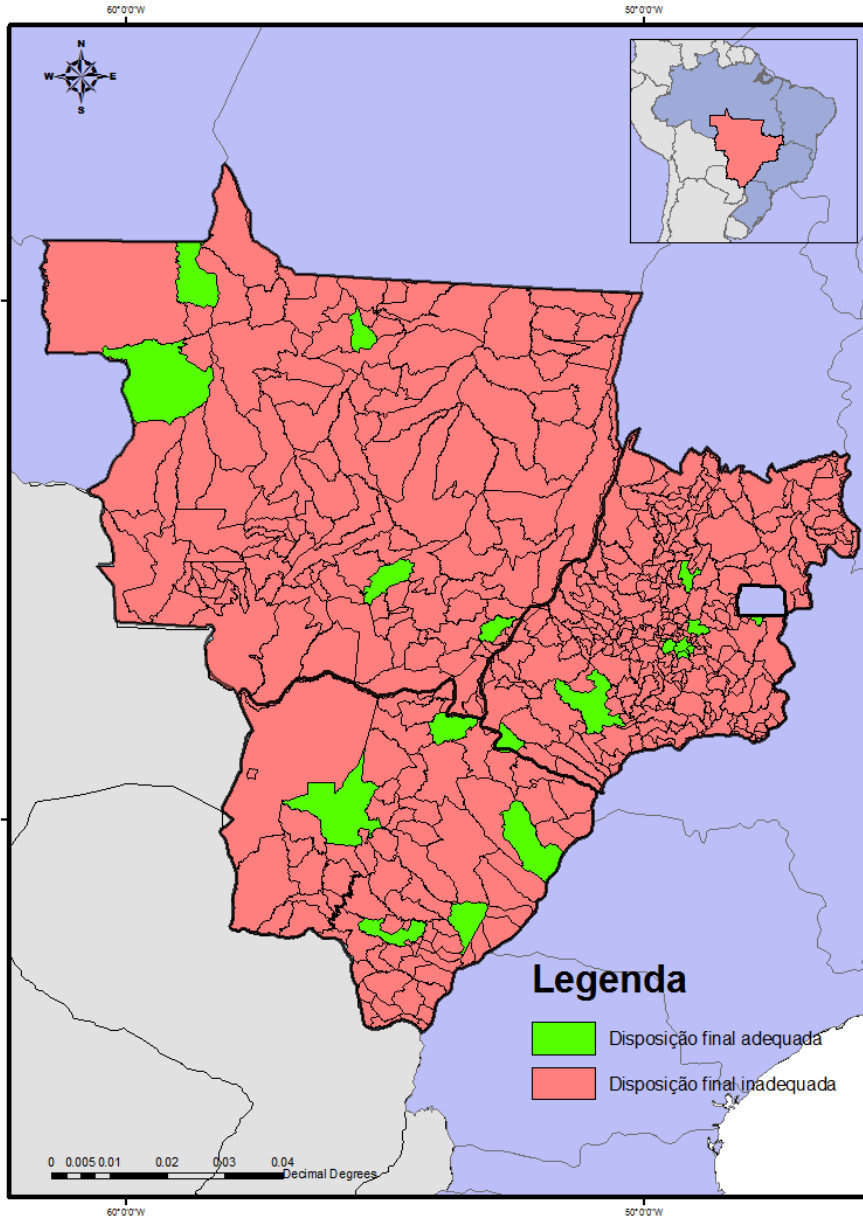




# Northeast Region

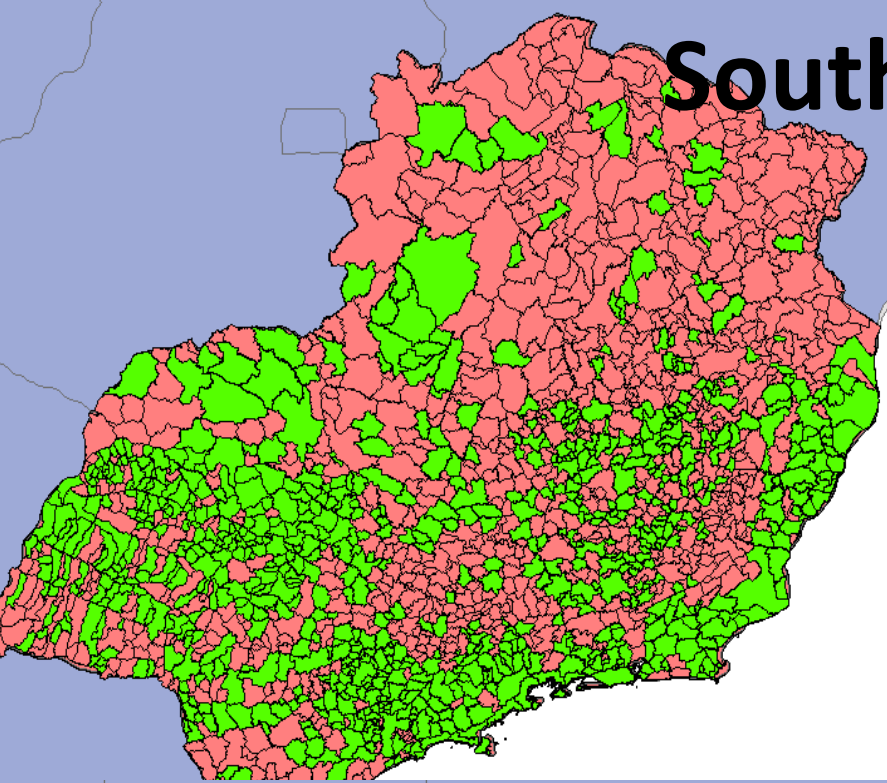


# Central-West Region

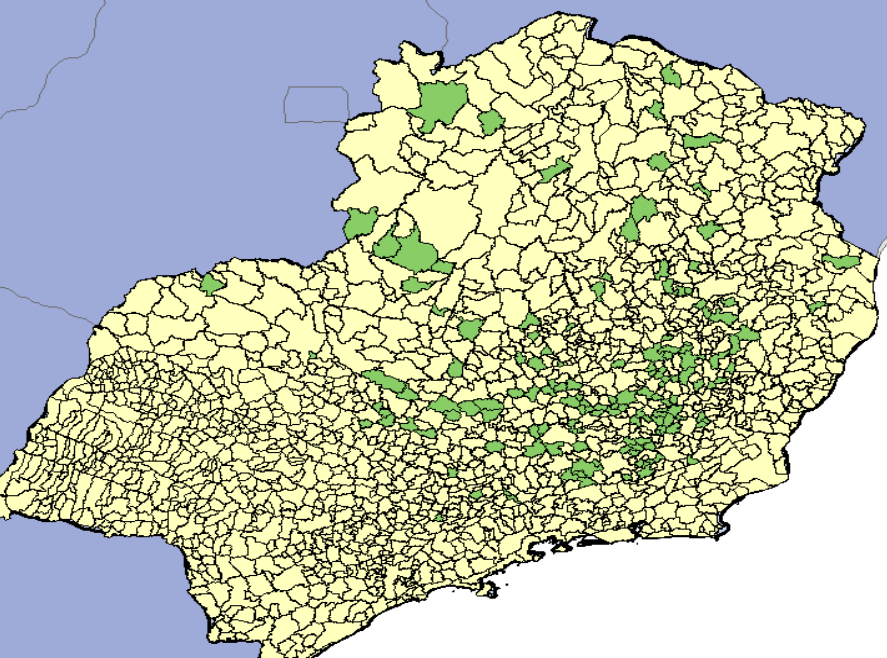




# Southest Region



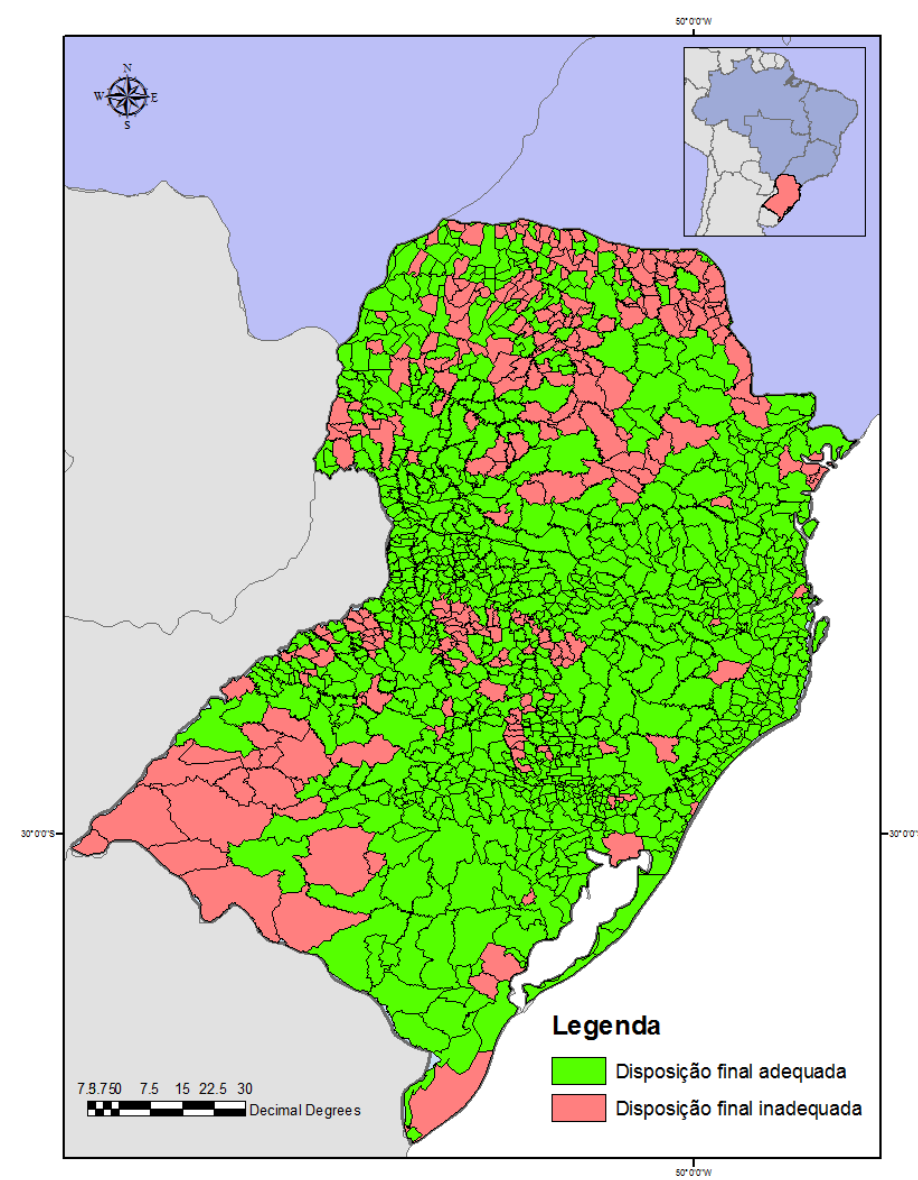
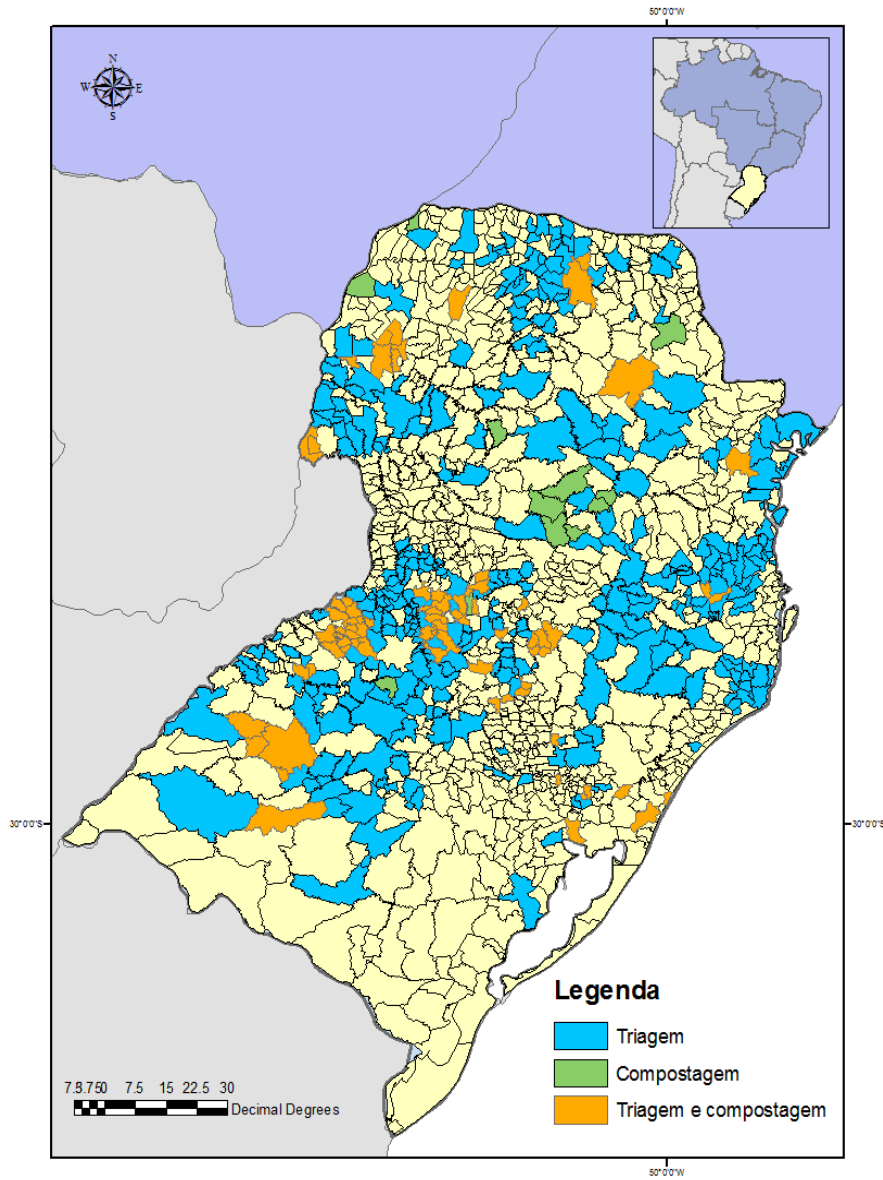
Sanitary Landfill of Bandeirantes, São Paulo



Composting treatment, Espírito Santo



# South Region



# Municipal Solid Waste Disposal in Brazil



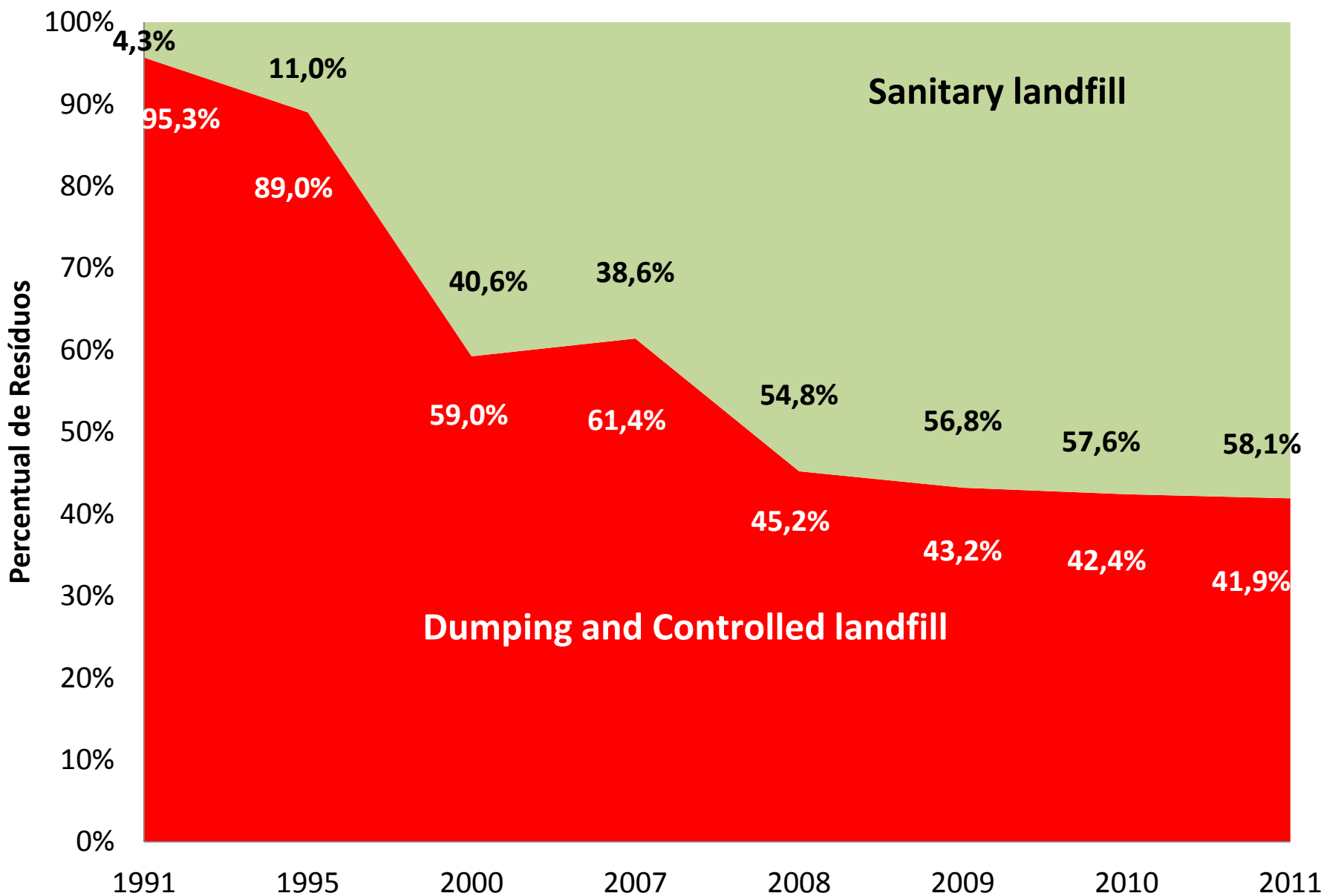
## Type of Disposal

 **Dumping**

 **Sanitary landfill**

(IBGE, 2010)

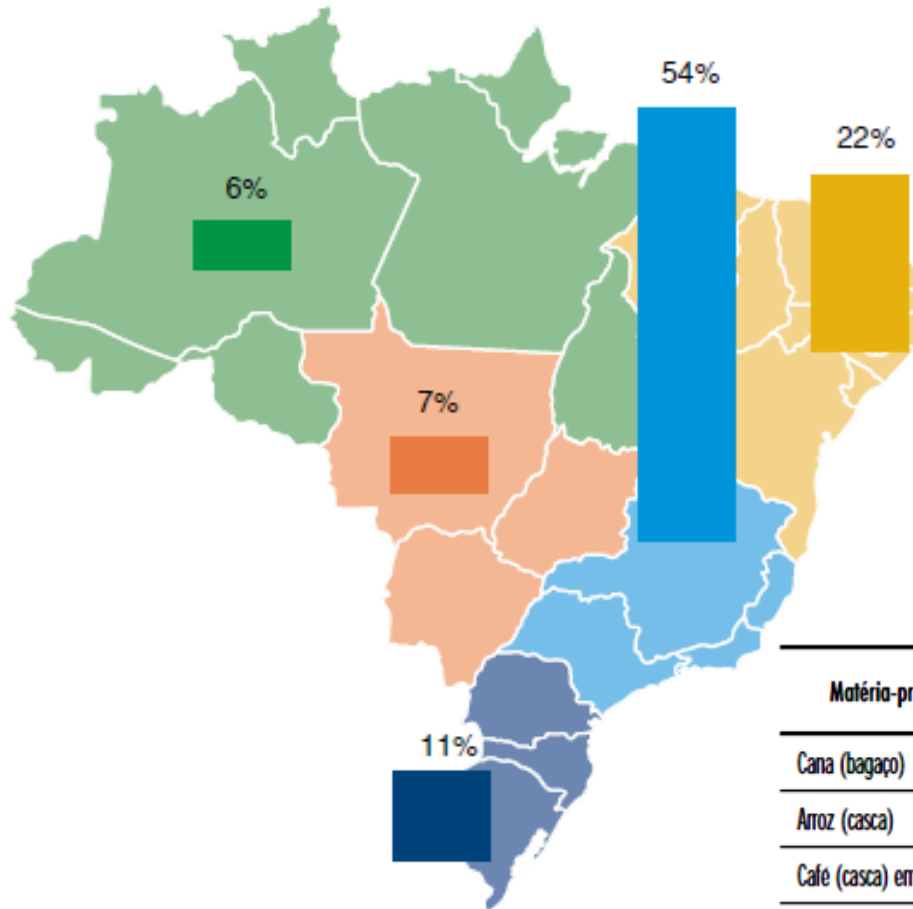
# Evolution of MSW final disposal in Brazil from 1991 to 2011





# MUNICIPAL SOLID WASTE GENERATION IN BRASIL

# MUNICIPAL SOLID WASTE GENERATION PER REGION



**MSW Generation in Brazil**  
(172.000 ton/day or 62.730.096 ton/year) – ABRELPE 2012

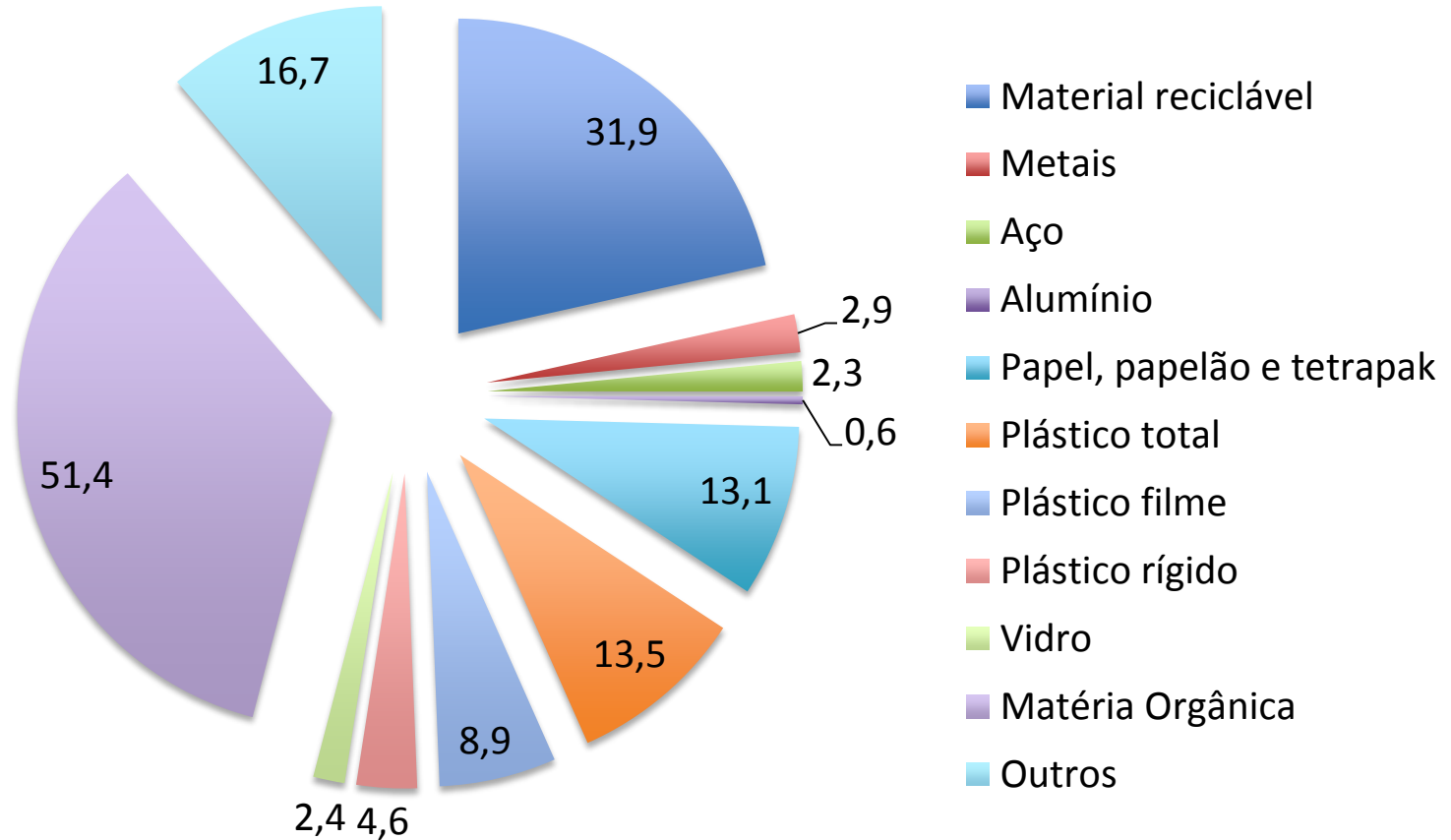
**Population: 190.732.694 (IBGE2010)**  
in 5.565 municipalities

## Solid Waste Annual Generation from Agriculture

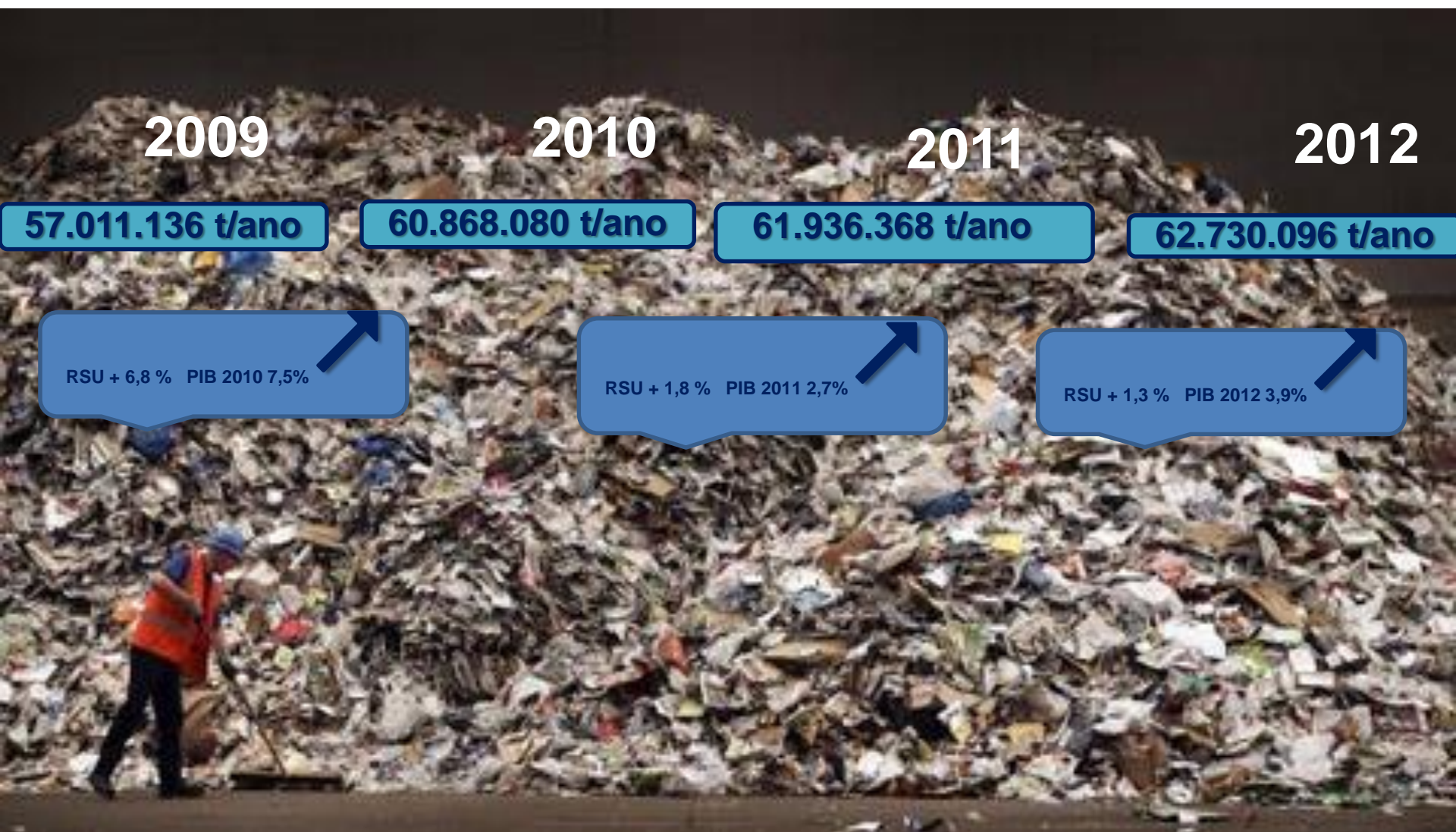
| Matéria-prima            | Produção agrícola (tons)* | Produção de resíduos (t/ha)** | Matéria seca (%)** | Produção total de resíduos (tons)*** |
|--------------------------|---------------------------|-------------------------------|--------------------|--------------------------------------|
| Cana (bagaço)            | 396.012.158               | 7,0 - 13,0                    | 23,4               | 59.401.824                           |
| Arroz (casca)            | 10.334.603                | 4,0 - 6,0                     | 89,0               | 2.937.094                            |
| Café (casca) em coco     | 2.454.470                 | -                             | -                  | 1.662.658                            |
| Mandioca (rama)          | 21.961.082                | 6,0 - 10,0                    | 90,4               | 6.542.206                            |
| Milho (palha e sabugo)   | 48.327.323                | 5,0 - 8,0                     | 90,5               | 64.028.870                           |
| Soja (restos de cultura) | 51.919.440                | 3,0 - 4,0                     | 88,5               | 80.746.839                           |
| Mamona                   | 111.100                   | -                             | -                  | -                                    |
| Algodão                  | 2.199.268                 | -                             | -                  | -                                    |



# Average Composition of MSW



# Municipal Solid Waste Generation in Brasil



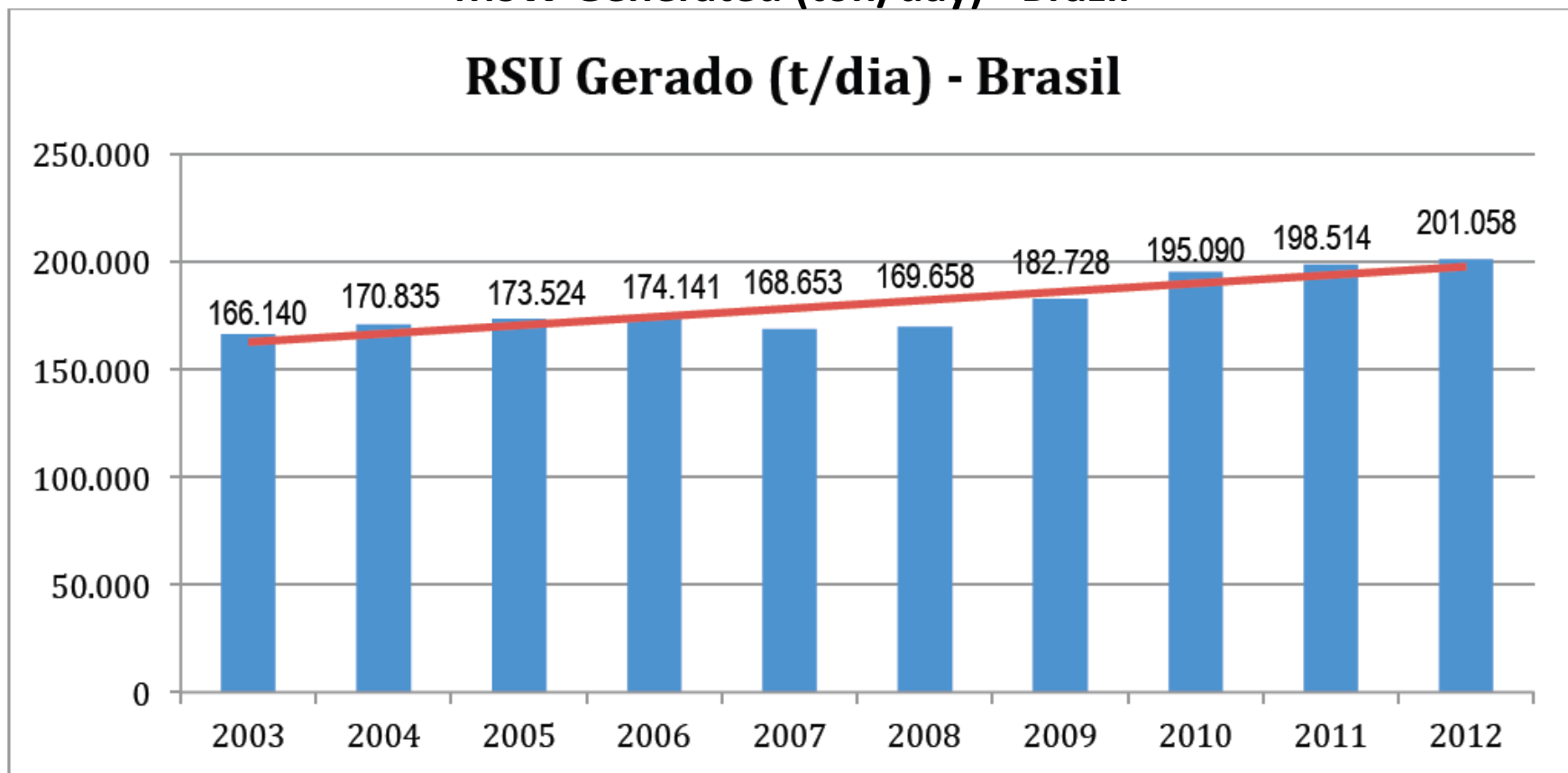
Fontes: RSU -Panorama dos Resíduos Sólidos no Brasil 2010 - ABRELPE  
PIB (GDP) – Instituto Brasileiro de Geografia e Estatística - IBGE

**VARIATION OF  
THE GPD PER  
CAPITA = +20,8%**

**MSW GENERATION  
2003-2012 = +21%**

**MSW Generated (ton/day) - Brazil**

**RSU Gerado (t/dia) - Brasil**

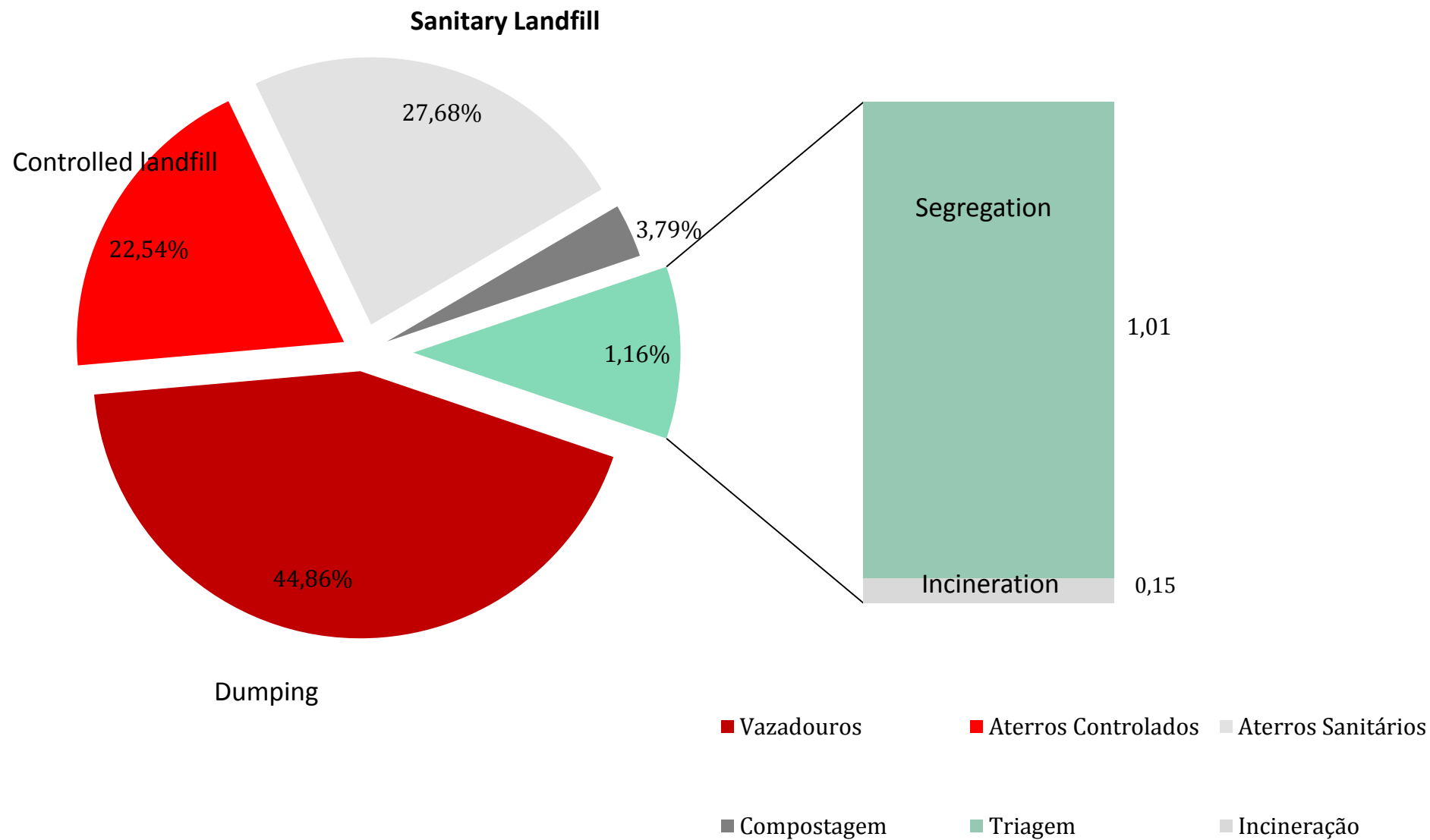


**POPULATION GROWTH  
2003-2012 = +9,65%**



# ***AVAILABLE TECHNOLOGIES FOR MUNICIPAL SOLID WASTE TREATMENT IN BRAZIL***

# Municipal Solid Waste Disposal (IBGE2010)



**MINISTRY OF THE ENVIRONMENT  
SECRETARIAT OF WATER RESOURCES AND URBAN  
ENVIRONMENT**

**National Policy on Solid Waste – Law n.  
12.305/2010**

## Solid Waste National Policy Process

1989 – Bill nº 354/89 from the Senate

**1991 – Bill nº 203/91 from the Chamber of Deputies**

**2007 (Sept 06) Bill nº 1991/2007 from the Executive – appended to the Bill 203/91)**

**2010 (Aug 02) Law N° 12.305 - SWNP**

2010 (Dec 23) Decree N° 7.404 - Regulation of the SWNP

# Solid Waste National Policy - Definition

**THE SWNP gathers:  
Principles,  
Objectives,  
Instruments,  
Guidelines, Goals  
and Actions**

**To be adopted by the Union alone or in  
partnership with States, Federal District,  
and Municipalities**

**Integrated and**

**Environmentally sound  
management of**

**Solid Waste**

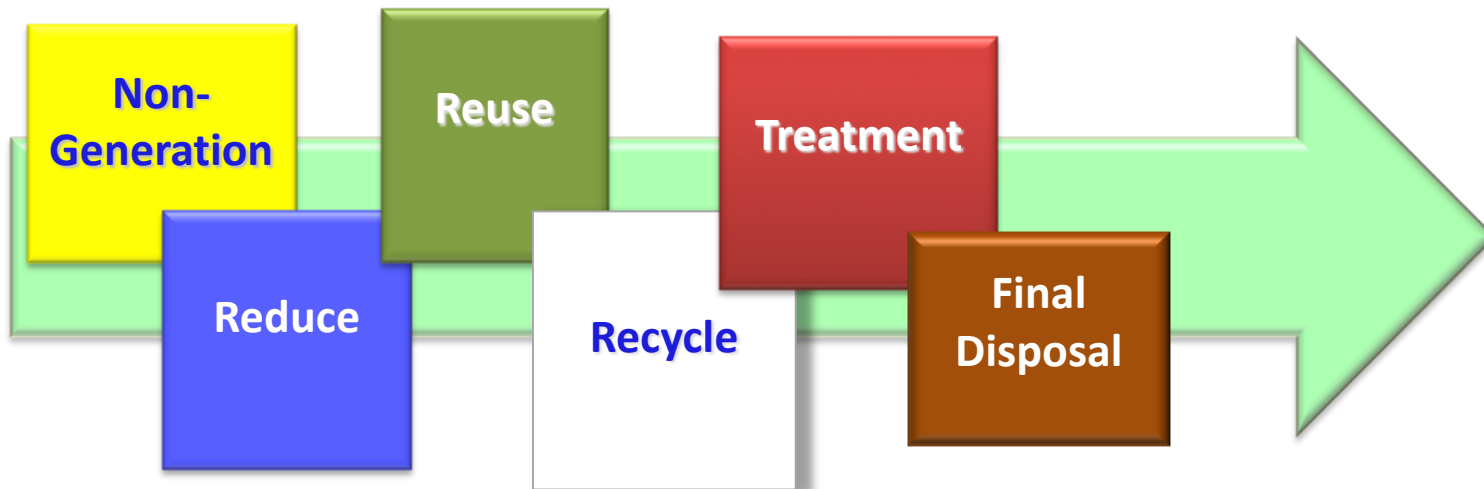
**A  
I  
M  
I  
N  
G  
T  
H  
E**

## **Solid Waste National Policy – Main Instruments**

- ✓solid waste plans
- ✓selective collection, reverse logistics and other tools related to the implementation of shared responsibility over products' life cycle
- ✓incentive to the creation and development of cooperatives or other forms of association of waste-pickers collecting reusable and recyclable material
- ✓environmental education
- ✓fiscal, financial and credit incentive
- ✓the National Solid Waste Management Information System (hereinafter referred to as Sinir)

# **ACTION HIERARCHY FOR SOLID WASTE MANAGEMENT (ART. 9)**

## **The Heart of the Solid Waste National Policy**



**MANDATORY FROM AUGUST 02, 2010**

# The Building Bricks of SWNP

**The National Solid Waste Plan**

**The Solid Waste State Plan**

**The Micro  
Region  
And The  
Metropolitan  
Region  
Plans**

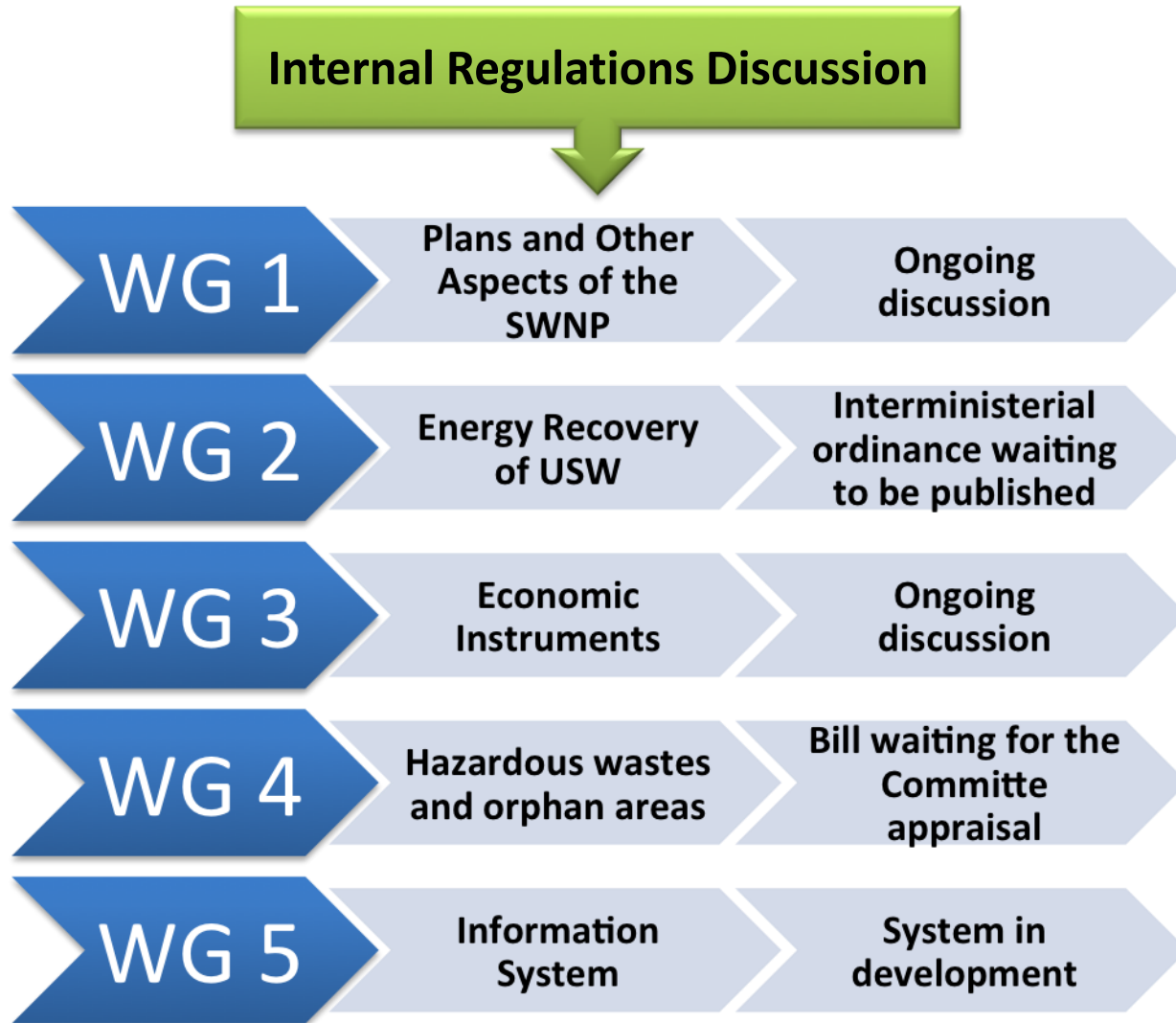
**The Municipalities  
Group Plan  
(Consortium)**

**The Solid Waste  
Municipal  
Plan**

**The Solid Waste Management Plan  
(to be done by Solid Waste Generators)**



# Interministerial Committee for Implementation of NSWP



# Solid Waste National Policy



- ✓ Fixes 24 months for the elaboration of Municipalities and States Waste Management Plans
- ✓ Fixes 48 months for the closure of all dumps and implementation of landfills

# *Energy recovery of Municipal Solid Waste*

# what we can do for energy recovery from MSW?



**Organics**

**Biodegradation  
(Biogas)** ⚡

**Inorganics**

**Incineration** ⚡

## BRAZILIAN RELEVANT POINTS:



**1) Low-level segregation  
(organic x inorganic)**

**2) Possible conflict of  
recycling x incineration  
(social aspects)**





# WHY DOES NOT GROW took advantage of the MSW AND OTHER SOURCES?



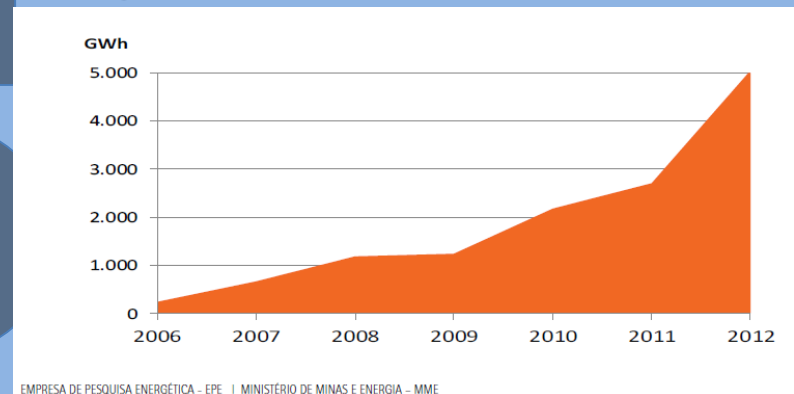
# Eletric energy cost

| Classificação | País          | Custo anual por família (300 kW/mês) em US\$ | Preço do kWh em US\$ |
|---------------|---------------|--|----------------------|
| 1º lugar      | Alemanha      | 1.108,80                                     | 0,308                |
| 2             | Austria       | 918  | 0,255                |
| <b>3</b>      | <b>BRASIL</b> | <b>914</b>                                   | <b>0,254</b>         |
| 4             | Itália        | 907,2  | 0,252                |
| 5             | Japão         | 885,6  | 0,246                |
| 6             | Irlanda       | 849,6  | 0,236                |
| 7             | Holanda       | 777,6  | 0,216                |
| 8             | Portugal      | 723,6  | 0,201                |
| 9             | Inglaterra    | 720,0  | 0,200                |
| 10            | Turquia       | 658,8  | 0,183                |
| 11            | Suíça         | 655,2  | 0,182                |
| 12            | Polonia       | 655,2  | 0,182                |
| 13            | Noruega       | 655,2  | 0,182                |
| 14            | Grécia        | 540  | 0,150                |
| 15            | França        | 532,8  | 0,148                |
| 16            | USA           | 478  | 0,133                |
| 17            | México        | 295,2  | 0,082                |

| Comparação de custos da energia |  |
|---------------------------------|--|
| Tipo de recurso                 | Custo médio (centavos de US\$ por kWh) |
| Hidrelétrica                    | 2-5                                    |
| Nuclear                         | 3-4                                    |
| Carvão                          | 4-5                                    |
| Gás natural                     | 4-5                                    |
| <b>Vento</b>                    | 4-10                                   |
| Geotérmica                      | 5-8                                    |
| Biomassa                        | 8-12                                   |
| Célula de hidrogênio            | 10-15                                  |
| Solar                           | 15-32                                  |

Fontes: Associação Americana de Energia Eólica, Wind Blog, Stanford School of Earth Sciences.

## Energia eólica



Fonte: ANEEL, AIE (Agencia Internacional de Energia) e FIESP (09/09/2011)

**Energia solar: 34 empreendimentos em operação (total = 2 MW)**

# Failures or mistakes in predicting biogas generation?

| ATERRO ANACONDA/SP                     |             |
|--|-------------|
| Total Previsto (jan/2007 a maio 2008)  | 145.323,3   |
| Total Realizado (jan/2007 a maio 2008) | 22.276,4    |
| Diferença em tCO <sub>2</sub> e        | 123.046,9   |
| Variação %                             | -84,67%     |
| ATERRO BANDEIRANTES/SP                 |             |
| Total Previsto (até junho 2008)        | 4.996.749,0 |
| Total Realizado (até junho 2008)       | 2.768.380,0 |
| Diferença em tCO <sub>2</sub> e        | 2.228.369,0 |
| Variação %                             | -44,60%     |
| ATERRO CAIEIRAS/SP                     |             |
| Total Previsto (fev/2007 a out/2007)   | 144.489,8   |
| Total Realizado (fev/2007 a out/2007)  | 102.984,0   |
| Diferença em tCO <sub>2</sub> e        | 41.505,8    |
| Variação %                             | -28,73%     |

| ATERRO PAULINEA/SP                        |             |
|---|-------------|
| Total Previsto (Set/2006 a Fev/2008)      | 265.428,3   |
| Total Realizado (Set/2006 a Fev/2008)     | 251.176,0   |
| Diferença em tCO <sub>2</sub> e           | 14.252,3    |
| Variação %                                | -5,37%      |
| ATERRO METROPOLITANO SALVADOR/BA          |             |
| Total Previsto (Mar/2004 a 2005)          | 1.084.650,3 |
| Total Realizado (Mar/2004 a 2005)         | 315.851,0   |
| Diferença em tCO <sub>2</sub> e           | 768.799,3   |
| Variação %                                | -70,88%     |
| ATERRO SÃO JOÃO/SP                        |             |
| Total Previsto (junho/2007 a junho/2008)  | 1.100.112,0 |
| Total Realizado (junho/2007 a junho/2008) | 717.468,0   |
| Diferença em tCO <sub>2</sub> e           | 382.644,0   |
| Variação %                                | -34,78%     |





## Brazilian Matrix of Electric Power

| Empreendimentos em Operação |                |                      |                    |            |               |                    |            |
|-----------------------------|----------------|----------------------|--------------------|------------|---------------|--------------------|------------|
| Tipo                        |                | Capacidade Instalada |                    |            | Total         |                    |            |
|                             |                | N.º de Usinas        | (kW)               | %          | N.º de Usinas | (kW)               | %          |
| <b>Hidro</b>                |                | 1.080                | 85.559.680         | 64,24      | 1.080         | 85.559.680         | 64,23      |
| <b>Gás</b>                  | Natural        | 111                  | 11.945.109         | 8,97       | 150           | 13.628.772         | 10,23      |
|                             | Processo       | 39                   | 1.683.663          | 1,26       |               |                    |            |
| <b>Petróleo</b>             | Óleo Diesel    | 1.092                | 3.506.928          | 2,63       | 1.125         | 7.455.751          | 5,60       |
|                             | Óleo Residual  | 33                   | 3.948.823          | 2,96       |               |                    |            |
| <b>Biomassa</b>             | Bagaço de Cana | 375                  | 9.156.436          | 6,87       | 472           | 11.225.482         | 8,43       |
|                             | Licor Negro    | 16                   | 1.530.182          | 1,15       |               |                    |            |
|                             | Madeira        | 50                   | 422.837            | 0,32       |               |                    |            |
|                             | Biogás         | 22                   | 79.594             | 0,06       |               |                    |            |
|                             | Casca de Arroz | 9                    | 36.433             | 0,03       |               |                    |            |
| <b>Nuclear</b>              |                | 2                    | 1.990.000          | 1,49       | 2             | 1.990.000          | 1,49       |
| <b>Carvão Mineral</b>       | Carvão Mineral | 12                   | 3.024.465          | 2,27       | 12            | 3.024.465          | 2,27       |
| <b>Eólica</b>               |                | 103                  | 2.137.372          | 1,60       | 103           | 2.137.372          | 1,60       |
| <b>Importação</b>           | Paraguai       |                      | 5.650.000          | 5,46       |               | 8.170.000          | 6,13       |
|                             | Argentina      |                      | 2.250.000          | 2,17       |               |                    |            |
|                             | Venezuela      |                      | 200.000            | 0,19       |               |                    |            |
|                             | Uruguai        |                      | 70.000             | 0,07       |               |                    |            |
| <b>Total</b>                |                | <b>2.978</b>         | <b>133.198.640</b> | <b>100</b> | <b>2.978</b>  | <b>133.198.640</b> | <b>100</b> |

**USINAS do tipo UTE em Operação**

| Usina                            | Potência (kW) | Destino da Energia | Proprietário   | Município                    |
|----------------------------------|---------------|--------------------|--|------------------------------|
| Salvador                         | 19.730        | PIE                | 100% para <b>Termoverde Salvador S.A.</b>  | Salvador - BA                |
| Bandeirante                      | 20.000        | APE<br>PIE         | 70% para <b>Biogeração Energia S/A</b><br>30% para <b>União de Bancos Brasileiros S.A.</b> | São Paulo - SP               |
| São João Biogás                  | 21.560        | PIE                | 100% para <b>São João Energia Ambiental S/A</b>  | São Paulo - SP               |
| Energ-Biog                       | 30            | REG                | 100% para <b>BiomassUsers Network do Brasil</b>  | Barueri - SP                 |
| Indústria Industrial de Aves     | 160           | REG                | 100% para <b>Cooperativa Agroindustrial Lar</b>  | Matelândia - PR              |
| Indústria Industrial de Vegetais | 40            | REG                | 100% para <b>Cooperativa Agroindustrial Lar</b>  | Itaipulândia - PR            |
| ETE Ouro Verde                   | 20            | REG                | 100% para <b>Companhia de Saneamento do Paraná – Sanepar</b>                               | Foz do Iguaçu - PR           |
| Star Milk                        | 110           | REG                | 100% para <b>Ibrahim Faiad</b>   | Céu Azul - PR                |
| Asja BH                          | 4.278         | REG                | 100% para <b>Consortio Horizonte Asja</b>  | Belo Horizonte - MG          |
| Arrudas                          | 2.400         | REG                | 100% para <b>Companhia de Saneamento de Minas Gerais</b>                                   | Belo Horizonte - MG          |
| Granja São Pedro/Colombari       | 80            | REG                | 100% para <b>José Carlos Colombari</b>   | São Miguel do Iguaçu - PR    |
| Ambient                          | 1.500         | REG                | 100% para <b>Ambient Serviços Ambientais de Ribeirão Preto S.A</b>                         | Ribeirão Preto - SP          |
| Granja Makena                    | 80            | REG                | 100% para <b>Altair Olimpio de Oliveira</b>  | Patrocínio - MG              |
| Ajuricaba                        | 80            | REG                | 100% para <b>Prefeitura Municipal de Marechal Cândido Rondon</b>                           | Marechal Cândido Rondon - PR |
| Fazenda Nossa Senhora do Carmo   | 80            | REG                | 100% para <b>Sérgio Elias Saraiva</b>  | Ituiutaba - MG               |
| Uberlândia                       | 2.852         | REG                | 100% para <b>Energas Geração de Energia Ltda</b>   | Uberlândia - MG              |
| Granja São Roque                 | 424           | não identificado   | não identificado   | Videira - SC                 |
| Del Bioenergia JB                | 874           | REG                | 100% para <b>UTE Cetrel Bioenergia JB</b>  | Cachoeirinha - PE            |
| Fazenda Da Luz                   | 90            | REG                | 100% para <b>Da Luz Energia Ltda.</b>  | Abelardo Luz - SC            |
| Cogeração Bio Springer           | 848           | REG                | 100% para <b>Bio Springer do Brasil Indústria de Alimentos S.A.</b>                        | Valinhos - SP                |
| CTR Juiz de Fora                 | 4.278         | REG                | 100% para <b>VALORGAS - ENERGIA E BIOGAS LTDA</b>  | Juiz de Fora - MG            |
| José Carlos Colombari            | 80            | REG-RN482          | 100% para <b>José Carlos Colombari</b>   | São Miguel do Iguaçu - PR    |

: 22 Usina(s)

Potência Total: 79.594 kW

**22 Energy Plants  
with = 79 MW**

**Low growth in the  
last decade  
compared to other  
alternative sources!!**

# Challenges for sustainable recovery of MSW

## Environmental



## Social



## Economic Sustainability



- Foco atual da gestão dos resíduos (pouca ênfase na coleta diferenciada)

-Arranjos político-institucionais pouco consolidados (ex: consórcios);

-Necessidade de maior invest. e incentivos fiscais (ex. ICMS verde, crédito carbono);

- Falta conhecimento técnico e capacitação de RH para valorização dos resíduos.



# INTEGRATED MANAGEMENT PLAN OF SOLID WASTE THE CITY OF SÃO PAULO

Decree 54,991 / 2014

(Laws 12.305 / 2010, 11.445 / 2007 and 12.187 / 2009)

**Implementing the National Policy on  
Solid Waste in the City of São Paulo**





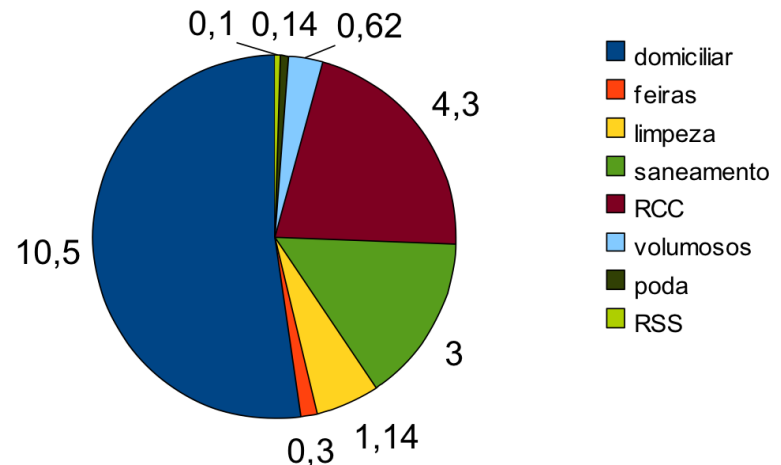
# DIAGNOSIS AND FUTURE SCENARIOS

## ➤ Socioeconomic Aspects

- with 11.2 million inhabitants in 2012, São Paulo has been growing at rates (0.8%) less than the state (1.0%) and the country (1.2%). Accounts for 12% of national GDP
- of the budget (2014) of 50 billion reais, 2.01 billion reais (R \$ 14 monthly / person) will be spent on the management of solid waste
- 947 million for the payment of two concession contracts
- 893 million to pay for urban sanitation services
- 27 million to support waste pickers
- 87 million for payment handling inert waste
- 59 million for investment and funding
- not considered - the big pools of streams and cleaning costs made by the boroughs
- Situação geral dos resíduos sólidos

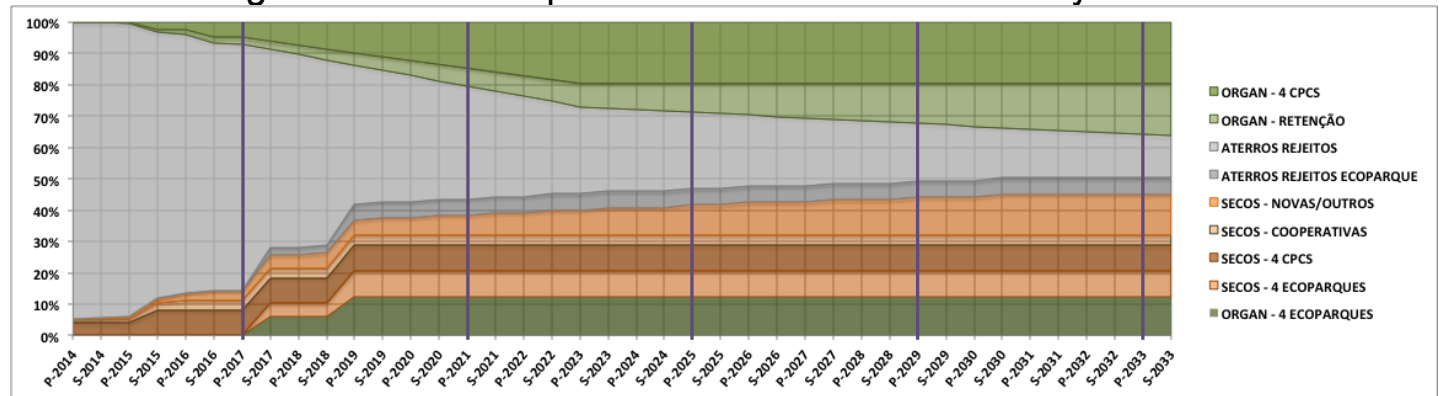
• The government managed, in 2012, 20.100 tons per day  
Solid waste

Composição dos resíduos coletados (mil toneladas/dia)



# GUIDELINES FOR THE MANAGEMENT DIFFERENTIATED WASTE

- These guidelines are translated at full segregation of waste in generating sources and their valuation, encouraged the retention of waste at source and the elaboration of a plan of selective collections, involving the most significant residues
- Induction of selective collection practices for companies that need to have their Solid Waste Management Plans
- The PGIRS adopts solution for treating waste (Mechanical Biological Treatment) enabling amplify the results of previous steps in the order of priorities required by the National Solid Waste Policy
- Outlook for differentiated management of municipal waste in the horizon of 20 years

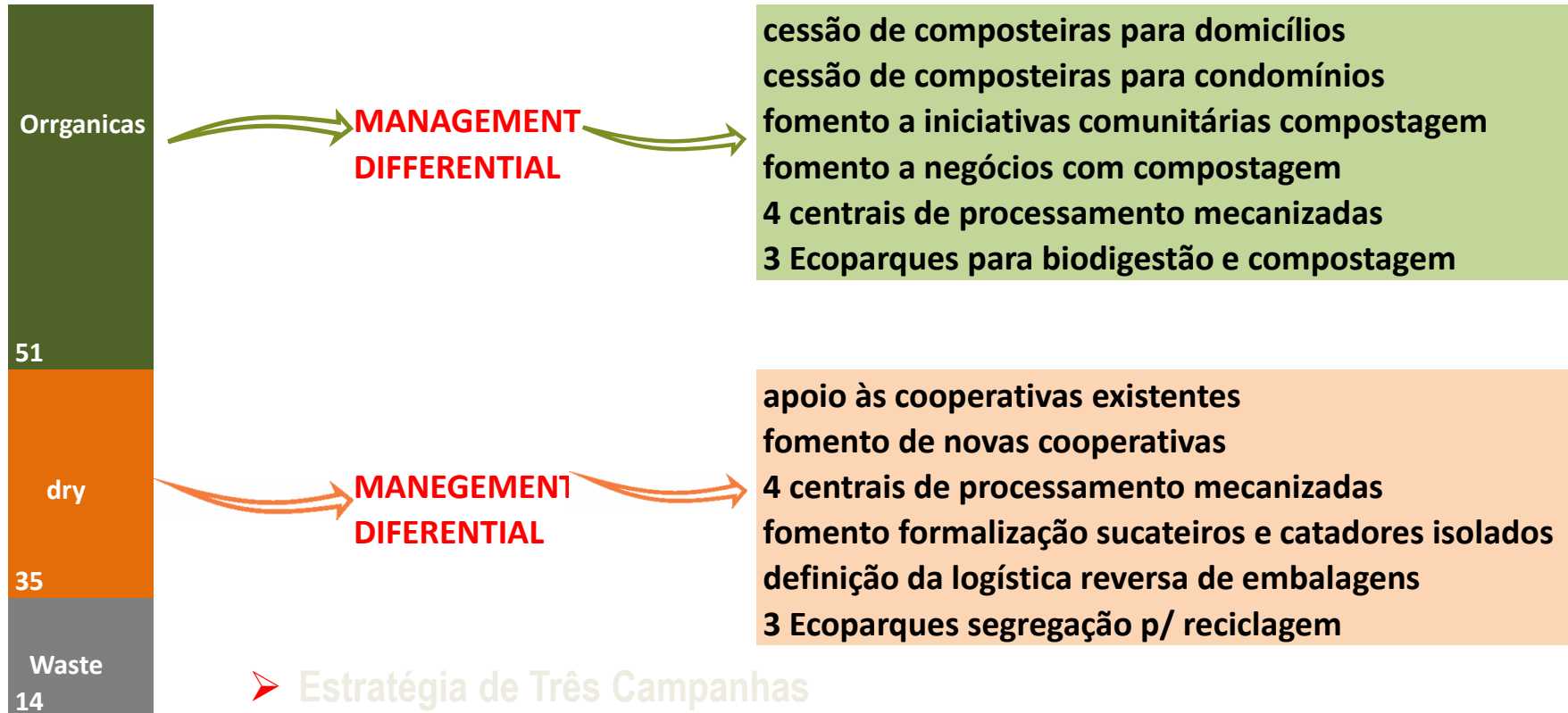


- The solutions point to the maximum reduction of anthropogenic emissions of greenhouse gases to a positive energy balance and seek compliance with the requirement of economic sustainability for public services

# DOMESTIC WASTE - definition of new flows

composition of the  
Urban waste

Micro actions to  
the macro impact



## ➤ Estratégia de Três Campanhas

- Primeira Campanha (início 2º Sem 2014) para expansão coleta seletiva de Secos
- Segunda Campanha (início 1º Sem 2015) para início cessão de composteiras
- Terceira Campanha (início 1º Sem 2016) articulando coleta seletiva Orgânicos e coleta de rejeitos

# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge**





# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge**



# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge**





# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge Carolina Maria de Jesus**





# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge Carolina Maria de Jesus**





# **GUIDELINES - DOMESTIC WASTE DRY**

## **Mechanized Central Screening Little Bridge Carolina Maria de**





# GUIDELINES - DOMESTIC WASTE ORGANIC

## ➤ Actual situation

- 6,300 t / day, compostable, are arranged in landfill
- 14% of GHG emissions - greenhouse gas emissions originate in the organic waste
- 60% waste in the production cycle and 20% in households
- history of disastrous experiences with old plants
- Composting

## ➤ relevant experience

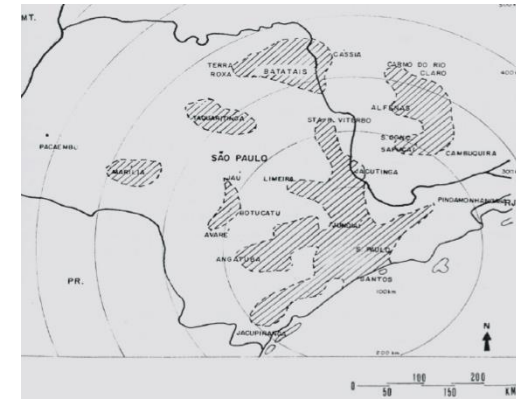
- companies and institutions developing composting in situ



## ➤ International References

- Belgium, Flanders, 30% retention and composting in situ
- Germany, 80% adherence to the separate collection of organic
- in developed countries the success is linked to segregation
- at source, with efficiency up to 80%

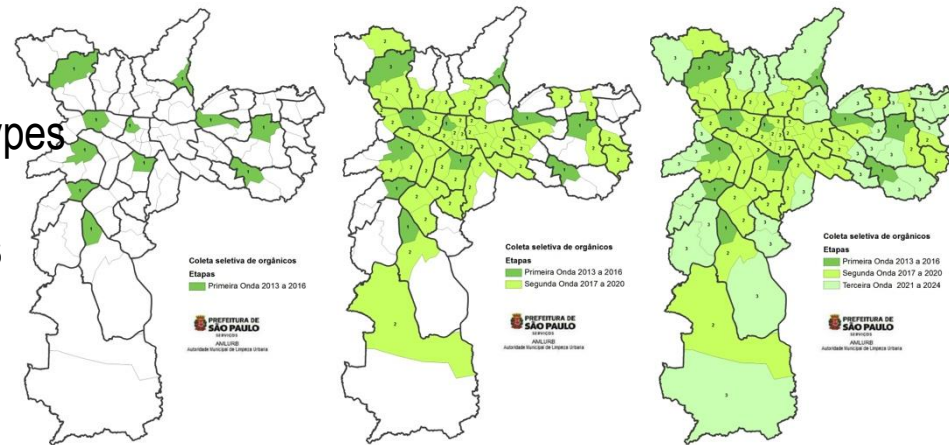
Distribuição do composto (1975)



# GUIDELINES - DOMESTIC WASTE ORGANIC

- Pilot deployment to verify the responsiveness to the assignment of composters the two groupings in downtown areas, middle and high income in condominiums and individual houses
- Selective collection of regionally distributed deployment It will be complementary to the waste containment effort in situ (composting), introduced in the Second Campaign and continued in the Third Campaign
- advance ever collection sectors that have already implemented the collection of DSW Dry
- studies to define the collection model, containerized or door to door, with various types of vehicles
- prioritization of Trade and Municipal Schools
- containers assignment for condominiums
- partnership only partner areas

| Momento                   | Total de distritos envolvidos |
|---------------------------|-------------------------------|
| final da gestão 2013-2016 | 11                            |
| final da gestão 2017-2020 | 62                            |
| final da gestão 2021-2024 | 96                            |



Compostagem  
CEPAGRO-SC  
aeração por  
convecção

| Instalação de recepção                                    | Modalidade   |
|---|--|
| 8 unidades simplificadas (total 400 TPD)                  | operando em pátios, com pilhas aeradas por convecção (CEPAGRO) |
| 4 Centrais de Processamento mecanizadas (total 2.400 TPD) | digestão aeróbia com oxigenação forçada, em processo acelerado |

# GUIDELINES - DOMESTIC WASTE ORGANIC

## ➤ Distribution of investments

- 8 Units simplified Composting, 4 Organic Processing Plants - Modular

|  | S-2013 | P-2014 | S-2014 | P-2015 | S-2015 | P-2016 | S-2016 | P-2017 | S-2017 | P-2018 | S-2018 | P-2019 | S-2019 |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| data referência                            | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez |
| entrada quatro centrais simplificadas SE   |        |        | 50     | 50     | 50     | 50     |        |        |        |        |        |        |        |
| entrada quatro centrais simplificadas NO   |        |        | 50     | 50     | 50     | 50     |        |        |        |        |        |        |        |
| entrada Central Proces Orgânicos 1 SE      |        |        |        |        |        | 150    |        |        |        | 150    |        |        |        |
| entrada Central Proces Orgânicos 2 NO      |        |        |        |        |        | 150    |        |        |        |        | 150    |        |        |
| entrada Central Proces Orgânicos 3 SE      |        |        |        |        |        |        |        | 150    |        |        |        | 150    |        |
| entrada Central Proces Orgânicos 4 NO      |        |        |        |        |        |        |        | 150    |        |        |        |        | 150    |
| capacidade total acumulada data referência | 0      | 0      | 100    | 200    | 300    | 700    | 700    | 1000   | 1000   | 1150   | 1300   | 1450   | 1600   |

Recepção Orgânicos e Túneis de Compostagem  
aeração mecanicamente forçada – processamento em 21 dias



4% of the agricultural area (17 largest units) of the municipalities located within 50 km from São Paulo is sufficient for the application of organic

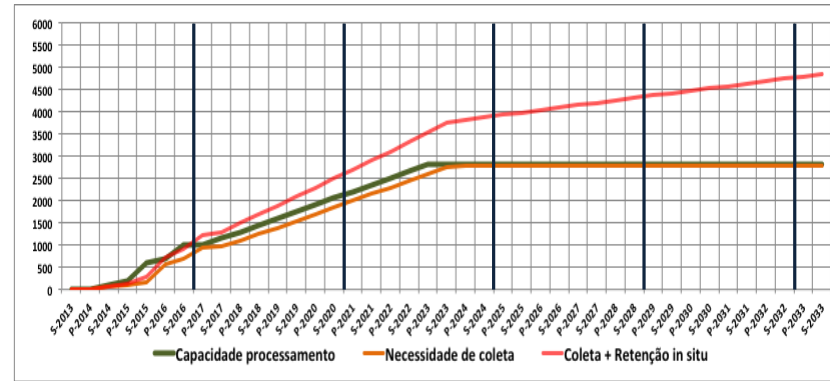




# GUIDELINES - DOMESTIC WASTE ORGANIC

Full use of the capacity of processing  
ent installed

- harmonization of selective collection with the entrance of Central Processing



## Investment in Ecoparques

|  | S-2013 | P-2014 | S-2014 | P-2015 | S-2015 | P-2016 | S-2016 | P-2017 | S-2017 | P-2018 | S-2018 | P-2019 | S-2019 | P-2020 |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| data referência                            | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun | 31/dez | 30/jun |
| entrada 2 Ecoparques SE                    |        |        |        |        |        |        |        |        |        |        | 1.250  |        | 1.250  |        |
| entrada 2 Ecoparques NO                    |        |        |        |        |        |        |        |        |        |        | 1.250  |        | 1.250  |        |
| capacidade total acumulada data referência | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 2500   | 2500   | 5000   | 5000   | 5000   | 5000   |

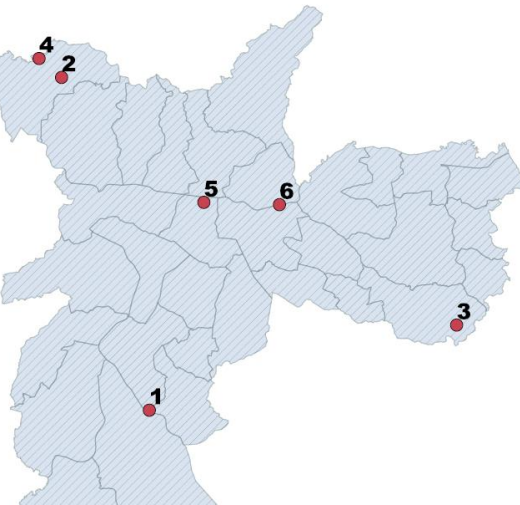
- allocation of volumes remanescent of selective collection
- elimination of 100% of Greenhouse Gas
- issued by organic
- methanisation, biogas generation
- and energy surplus
- results in leverage
- recycling and reusing
- and organic dried

TMB – segregação das embalagens e biodigestão seca dos orgânicos



# USE AREAS AND WASTE DISPOSAL

- preserving the use of closed areas for accommodation of new management of Solid Waste
- reserve areas for recycling points in new subdivisions and large shopping centers
- Groups SW - reduction of ground CTL; NW - use of private landfill is not viable public area



Secos automatizada (LIPOR)

| Central de Processamento de Resíduos da Coleta Seletiva de Secos | LESTE    | SUL                                 | OESTE                            | NORTE                     |
|--|----------|-------------------------------------|----------------------------------|---------------------------|
| Area próxima ao CTL  |          | Area contígua ao Aterro Santo Amaro | Area no Transbordo Ponte Pequena | Area no Parque Novo Mundo |
| S = 15 mil m <sup>2</sup>  | <b>3</b> | <b>1</b><br>equacionada             | <b>5</b><br>equacionada          | <b>6</b>                  |



Orgânicos galpão pressão negativa (LIPOR)

| Central de Processamento de Resíduos da Coleta Seletiva de Orgânicos | LESTE    | SUL  | OESTE              | NORTE                       |
|--|----------|--|--------------------|-----------------------------|
| Area no CTL  |          | Area contígua ao Aterro Santo Amaro        | Fazenda Manquinhos | Area no Aterro Bandeirantes |
| S = 120 mil m <sup>2</sup>   | <b>3</b> | <b>1</b><br>Necessária negociação com EMAE | <b>4</b>           | <b>2</b>                    |



| Ecoparque Tratamento Mecânico Biológico dos Indiferenciados | LESTE    | SUL  | OESTE                           |
|---|----------|--|---------------------------------|
| Area no CTL   |          | Area contígua ao Aterro Santo Amaro        | Fazenda Manquinhos              |
| S = 100 mil m <sup>2</sup>                                  | <b>3</b> | <b>1</b><br>Necessária negociação com EMAE | <b>4</b><br>Dobro de capacidade |

Ecoparque TMB Biodigestão (Bélgica)



# Solid Waste Federal District

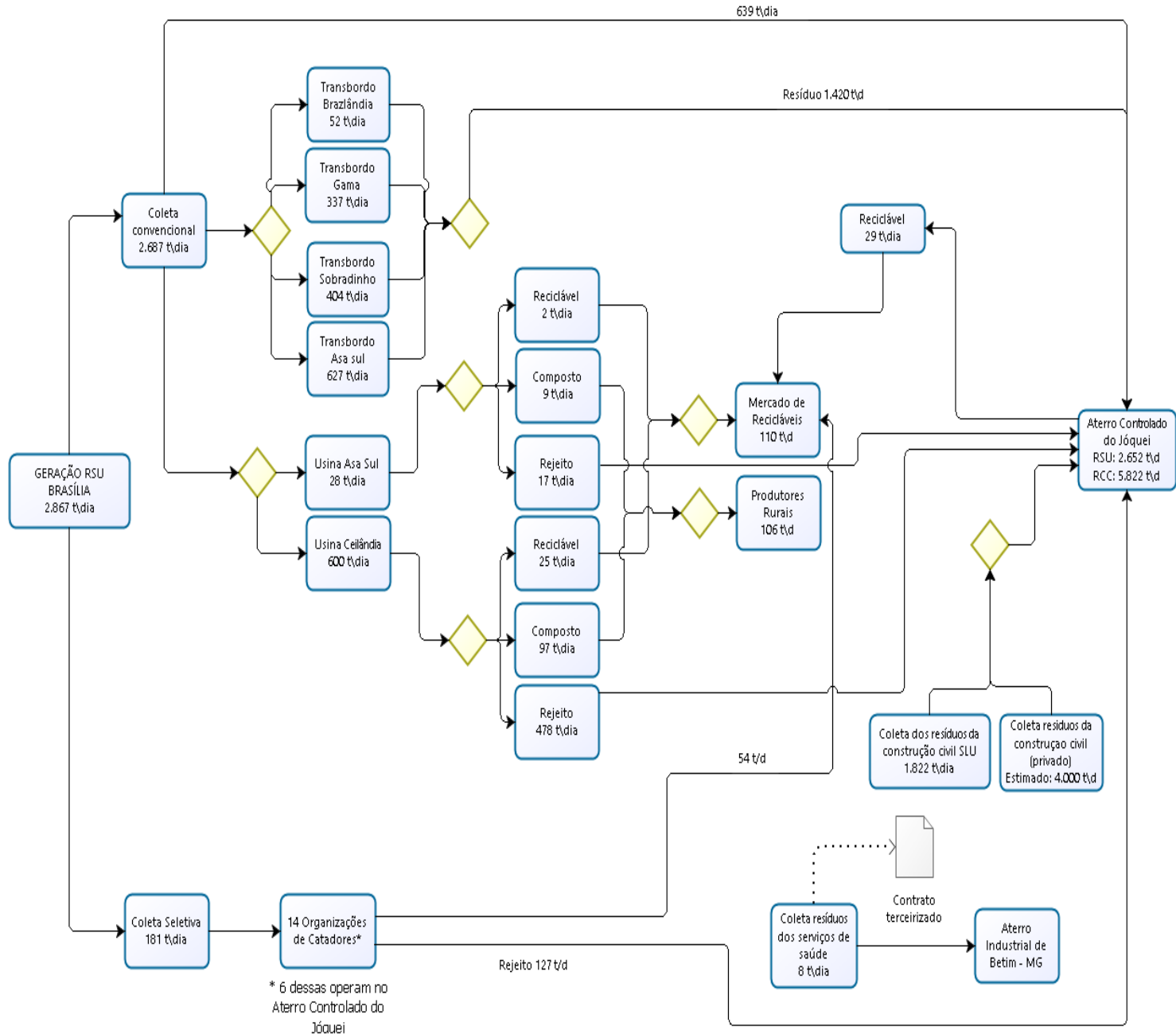
## SLU Diagnosis

- 98% of the population served with home collection (PNAD, IBGE)
- 2,700 tons / day of municipal solid waste collected → 0.81 kg / person / day
  - 6,000 ton / day of rubble (construction)
- 75,000 ton. of waste recycled or composted in 2014 → 9% of total
- R \$ 443 million of cost of services in 2014 → R \$ 154.00 per person / year
  - 6,000 workers Cleaning Service DF Urban
- Dump Jockey (ACJ) of the 50 largest in the world (Atlas Trash, Waste D)
  - Environmental liabilities estimated at 33 million tonnes of waste



# Flows and quantitative MSW procesados FD 2015

Rota tecnológica dos Resíduos Sólidos Urbanos - DF



**Muchas Gracias!**

*Silvano Silvério da Costa*

*Urban Cleaning Service of the Federal District– Brasil*

[silvanosilverio@hotmail.com](mailto:silvanosilverio@hotmail.com)