



Case Study of Rio de Janeiro Sustainable Waste Management

The search for environmental and economic
sustainability with social responsibility

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COMLURB – Cia. Municipal de Limpeza Urbana

Rio de Janeiro

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and Sustainable Urbanisation**

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1. CARACTERÍSTICAS NACIONAIS



The City of Rio de Janeiro and COMLURB

The Municipal Waste Management Company

- Rio: territory and population:
- 1,100 km² and 6,2 million inhabitants
- **COMLURB:**
 - 22.000 employees; Annual budget: US\$ 600 million
 - Services under its responsibility:
 - Household collection and street cleansing (10,000t/day)
 - Collection on islands of the Jacarepagua lagoon
 - Free collection of bulk goods and household debris
 - Collection and street cleansing in low-income communities with special equipment
 - Transfer and final disposal of waste
 - Treatment: composting and RDF production

The City of Rio de Janeiro and COMLURB The Municipal Waste Management Company

– Services under its responsibility, not related to regular waste management services:

- Cleaning and disinfection of 5 main hospitals of the municipal network
- Final disposal of hospital waste from the municipal public network (incineration and autoclave)
- Internal and external cleaning of 1,051 municipal schools
- Meal preparation for 350 municipal public schools
- Cleaning of the water surface of lakes and lagoons
- Cleaning of 58 km of beaches
- Trimming of 600.000 public trees
- Maintenance of the 1,200 public squares and parks
- Cleaning of public buildings (City Hall)
- Vectors Control (rodents and African snail)
- Manufacture of sweepers, tools and urban equipment (toys, slides, seesaws, comfort station, etc.)



HOUSEHOLD COLLECTION



STREET CLEANSING



**WATER SURFACE CLEANING AND
HOUSEHOLD COLLECTION ON ISLANDS**



**FREE COLLECTION FOR HOUSEHOLD DEBRIS AND
BULK MATERIALS**



BEACH CLEANING



STREET MARKET CLEANING



HILLSIDE CLEANING



SPECIAL EVENTS (CARNIVAL AND NEW YEAR'S EVE)



EMERGENCIAS



**TRIMMING AND
STUMP REMOVAL**



WASTE MANAGEMENT IN LOW-INCOME COMMUNITIES



CURBSIDE COLLECTION



SCHOOLS AND HOSPITALS CLEANING

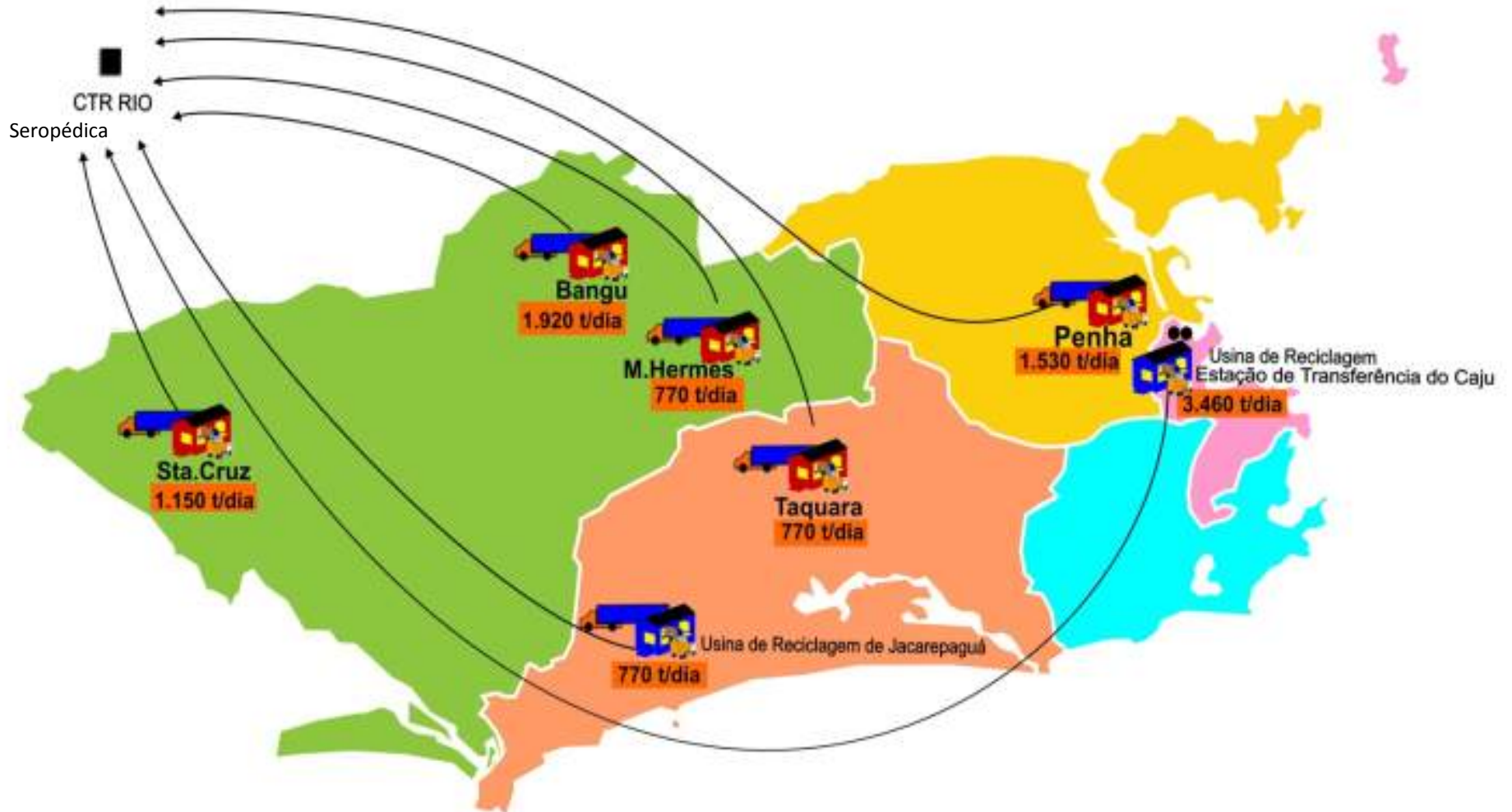


Fabricação de ferramentas e mobiliário



MAINTENANCE OF URBAN FURNITURE

Fluxo do Lixo - CTR Rio (t/dia) Município do Rio de Janeiro



Tonelada / Dia :

-  Transferência Comlurb
-  Área de Planejamento 1
-  Área de Planejamento 4
-  Futuras Estações
-  Área de Planejamento 2
-  Área de Planejamento 5
-  Estações Existentes
-  Área de Planejamento 3



ETR – Santa Cruz



ETR – Marechal Hermes



ETR – Caju



ETR – Jacarepaguá



7 Transfer Stations

COMLURB'S SUSTAINABLE AGENDA

- **Legal Framework**
- **Studies**
- **Being Implemented**
- **Installed and in Operation**

COMLURB's Sustainable Agenda

- **Legal Framework**

- **NACIONAL POLITICS OF WASTE MANAGEMENT**
- **MUNICIPAL SUSTAINABILITY FOR THE CITY**
- **INTEGRATED MUNICIPAL WASTE MANAGEMENT PLAN**
- **MUNICIPAL DECREE FOR C&D REGULATION**
- **MUNICIPAL DECREE CREATING THE CARIOCA GROUP FOR CLIMATE CHANGES**
- **JOINT RESOLUTION BETWEEN SMAC-COMLURB ABOUT COMPOST**

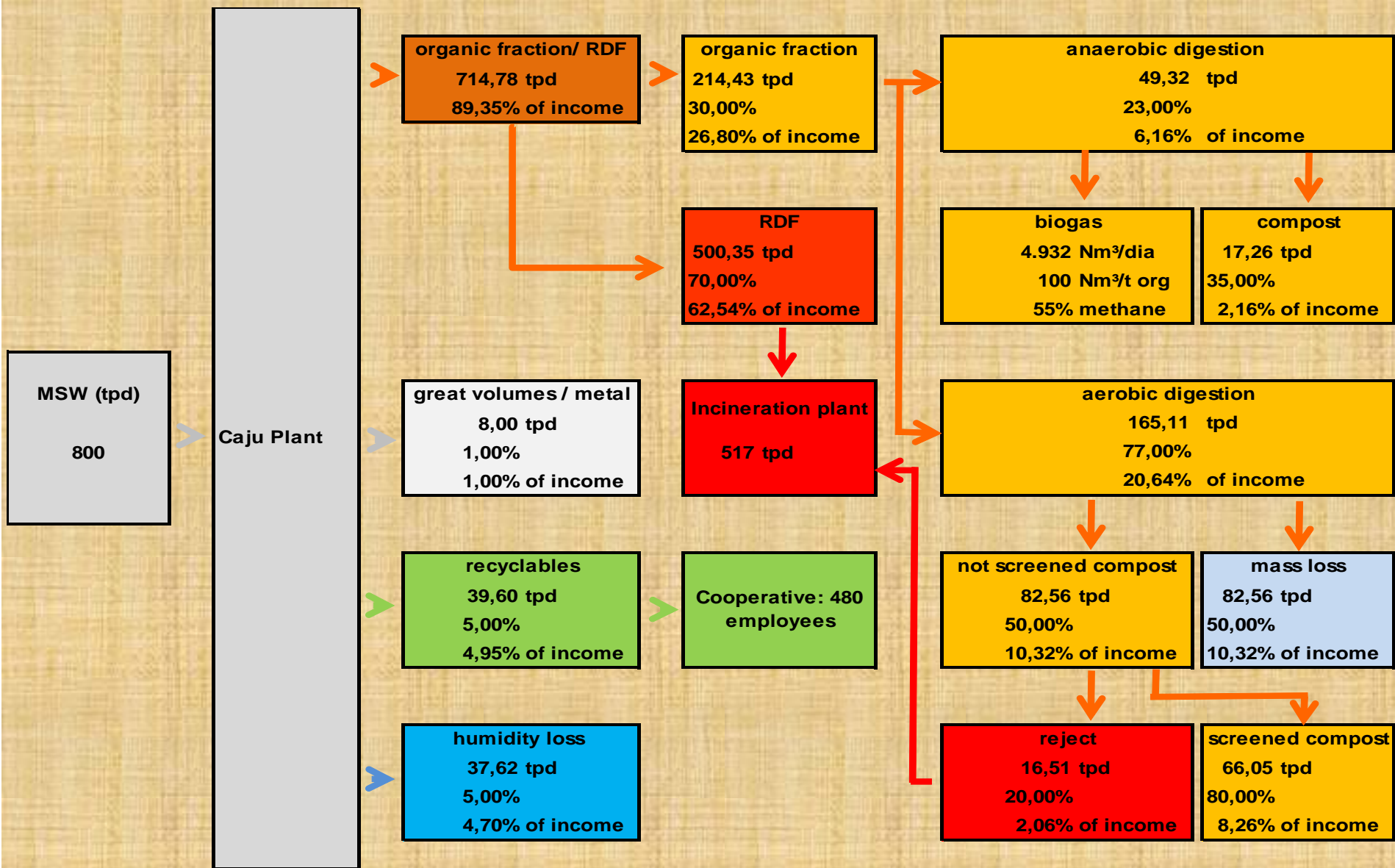
COMLURB'S SUSTAINABLE AGENDA

Studies and Implemented Projects



STUDIES

ENERGY GENERATION IN CAJU RECYCLING PLANT



STUDIES

C&D recycling in ATT's – Sites of Recycling and Transfer

- **Missões - Up to 400 t/day**
- **Caju - Up to 600 t/day**
- **Gericinó - Up to 400 t/day**

STUDIES

ENERGETIC EFFICIENCY IN ALL COMLURB BUILDINGS

- a) Study of consumer units**
- b) Draw the consumption profile**
- c) Check the adequacy of electricity fares**
- d) Make an inventory of installed equipment and their operating regimes (Procel)**
- e) Check the consumption habits of users**
- f) Adequate actions and targets for energy savings**

THE NEW RECYCLING PROGRAM



R\$ 28.000.000,00

Assignment of land for construction of six Recycling Centers

Curb side collection in 120 neighborhoods

Transport of the recyclables to the Recycling Centers

Installation of Ecopoints

Awareness Campaigns



R\$ 22.000.000,00

Construction of six Recycling Centers equipped with machinery and equipment

Improvement of the production structure and marketing of the cooperatives

Training, management consulting and training of the network marketing to be operated by the cooperatives

Regularization of cooperatives and environmental permits

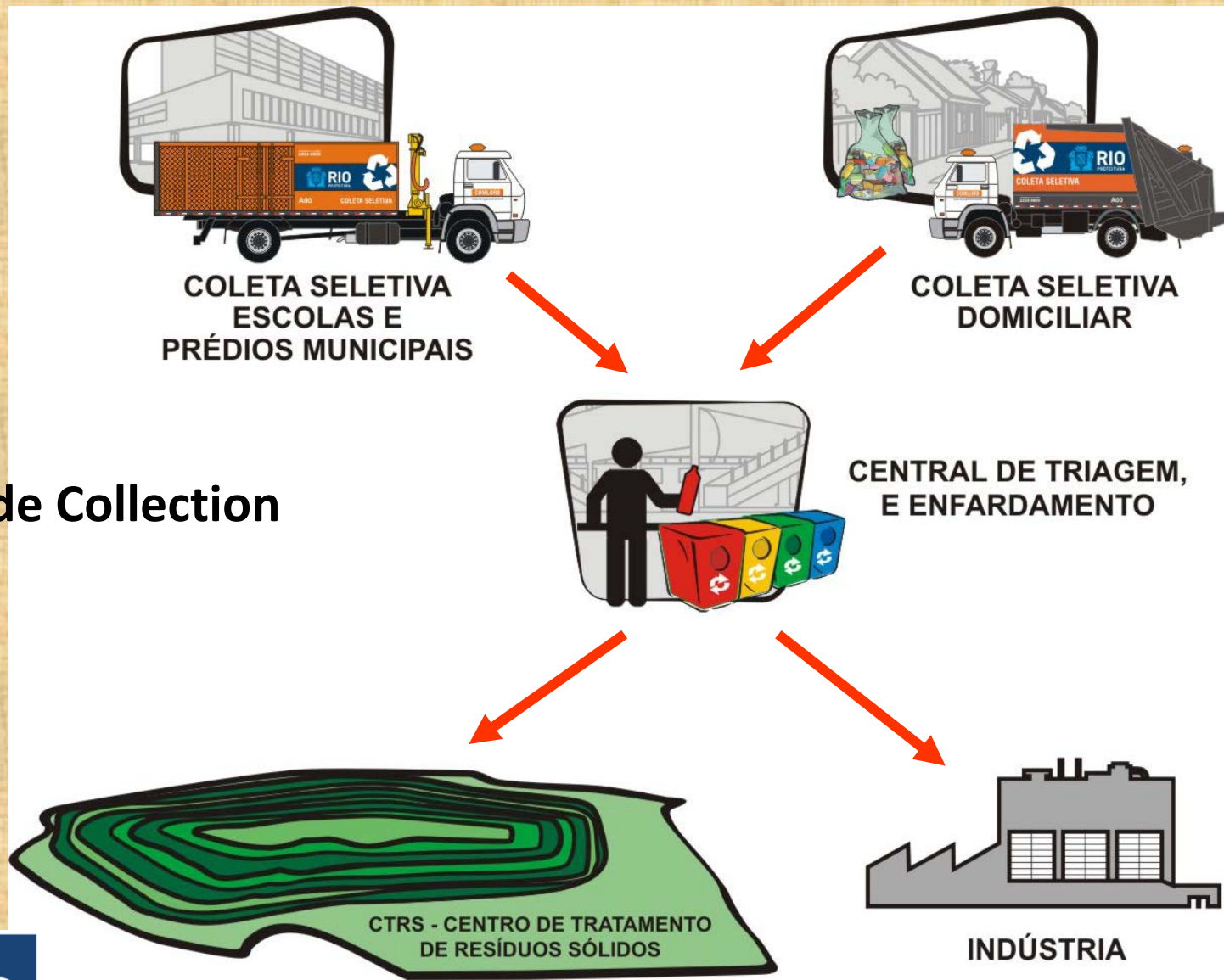
Awareness Campaigns



COMLURB

Rio Ambiente 2011

Curbside Collection



RECYCLING CENTERS



PAPER BINS AND CARTS MADE OUT OF COCONUT FIBER



For the manufacturing of this cart, 100 coconut shells were used.

Street cleansing carts made from coconut fiber





**BROOMS MADE OF
CANULATED PET AND
COCONUT FIBER**



**MECHANICAL SWEEPERS
MADE OF PET**

EMISSION REDUCTIONS AND FLEET OPTIMIZATION MEASURES

(In collaboration with Clinton Foundation)

- **Alternative Fuels (10% minimum renewable fuels)**
 - Biodiesel
 - Sugar Cane Diesel
 - Ethanol
 - Natural Gas
- **Non Power Train Measures**
 - Euro V compliance
 - Hybrid Hydraulic
 - Eco-driving
 - Green Tires
 - Optimization
 - Routes Optimization (weight on time and fleet control)

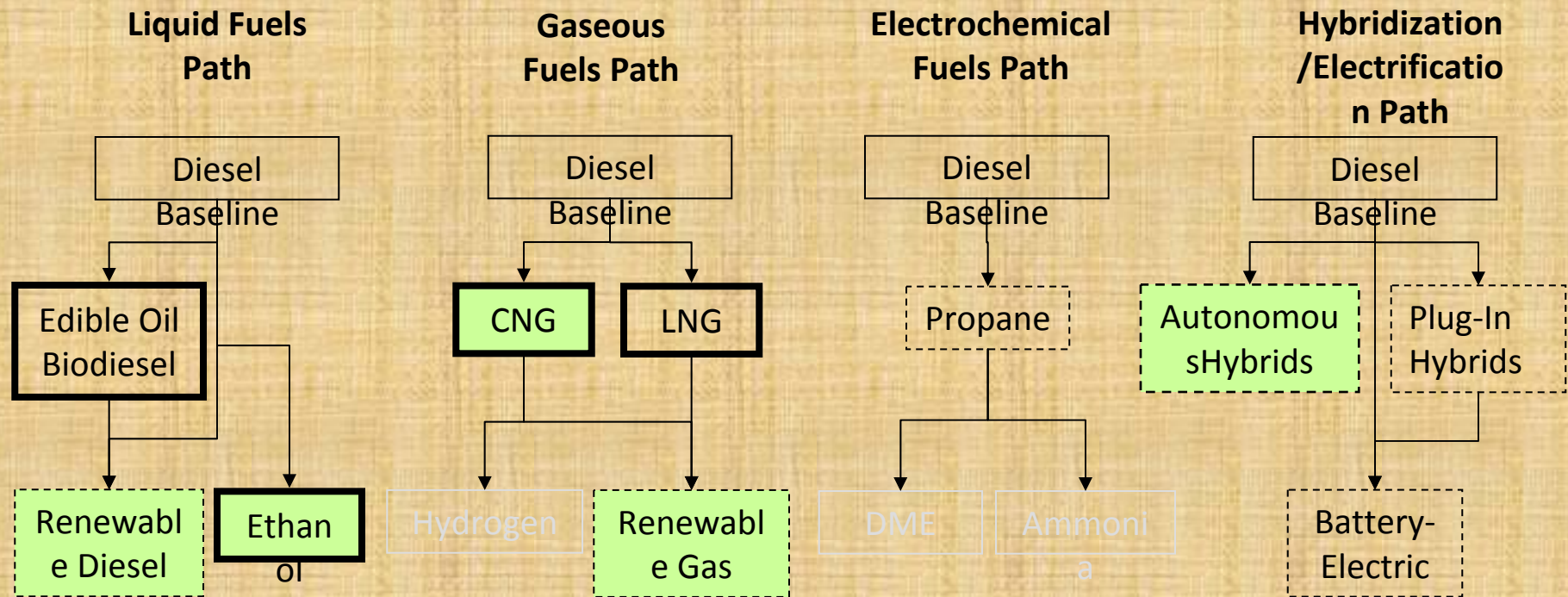
Emission Reductions through Biodiesel B20 from used cooking oil



Near-Term Fuel Options

- **Renewable diesel from sugar cane (“cane diesel”)**
- **Biodiesel – B20**
- **Ethanol**
- **Methane (compressed natural gas)**

Waste Truck Option Map



Commercial Availability Key:

Full

Early

None

Analyzed Option

Hybrid Refuse Truck on the Trail

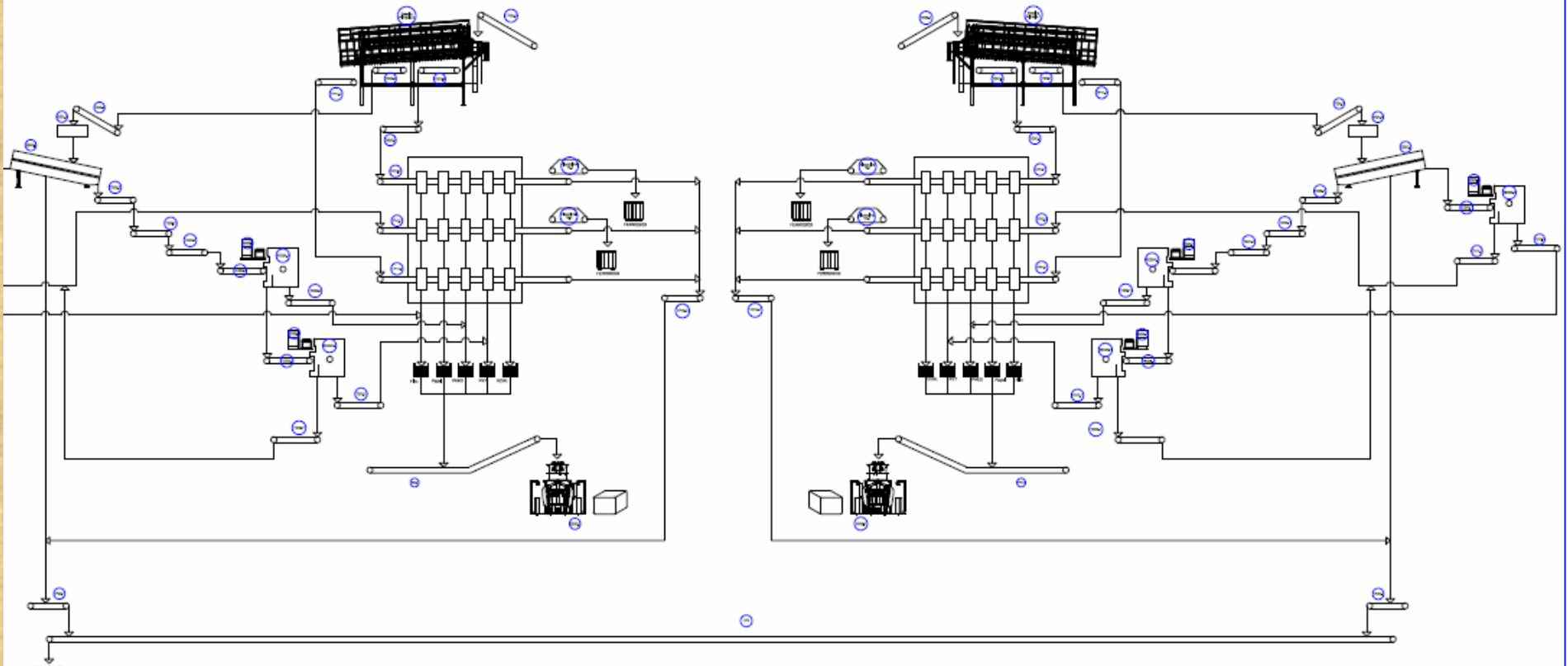


TECHNOLOGICAL PARK AT CAJU RECYCLING PLANT



MAXIMIZING HOUSEHOLD RECYCLING – ONE BIN CURBSIDE COLLECTION COMMINGLED WASTE

PID



COLECTION OF ORGANIC WASTE IN SELECTED GENERATORS FOR COMPOSTING



USE OF COMPOST IN THE CITY FORESTATION PROGRAM

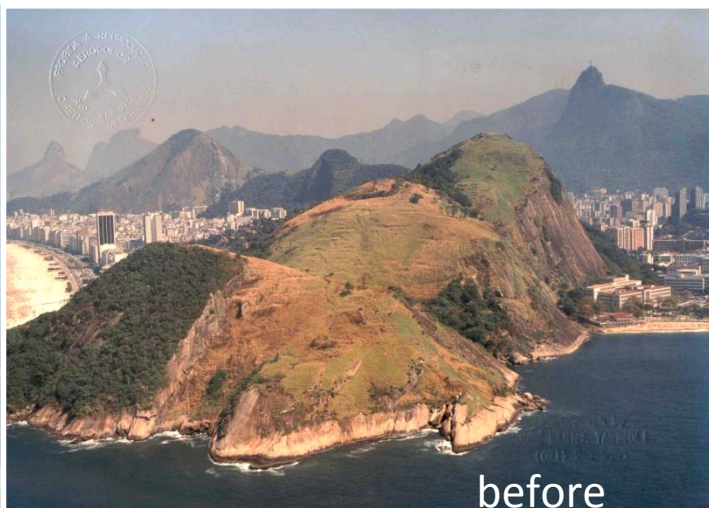


USE OF COMPOST IN THE CITY FORESTATION PROGRAM





after



before



Urubu / Babilônia - 23,4 ha / 74.200 young plants

Methar TMO®

Tecnologia Nacional



- 1 – Galpão de armazenamento
- 2 – Alimentação dos digestores
- 3 – Túneis de Metanização
- 4 – Reator de líquidos
- 5 – Sistema de desarenação
- 6 – Condicionamento do biogás
- 7 – Gasômetro
- 8 – Unidade de cogeração
- 9 – Galpão de pós-tratamento

METHANIZATION TUNNELS



Allendorf, Germany
Bioferm Plant
February, 2011.

RDF PRODUCTION FOR A PILOT WTE PLANT





Plasma Reactor

The plasma reactor degrades the waste turning it into a gas less pollutant than those obtained in usual processing of waste, such as landfill or incineration.



The Plasma Reactor would allow the reuse of leftovers in the manufacturing of recyclable and generating gas synthesis (generating energy).



In addition, the high temperatures of the process hinders the formation of dioxins, usually generated in the thermal process for treating waste, mainly incineration. The advantage of this method is the merging and inactivating of inorganic materials in the trash without generating ashes.



Biogas in the network

Project Novo Gramacho

First purification plant in South America

Green Gas

J

Biogás





NOVO GRAMACHO & GÁS VERDE

Gramacho landfill

- Landfill area: aprox. 200 hectares;
- Operation Period: from 1978 until 2012 ;
- 9,000 mil tons per day;
- 70 millions tons
- Income: CER + sale of BIOGAS to Petrobras / REDUC (contract take or pay de 20 anos).

GRAMACHO Landfill - 1980

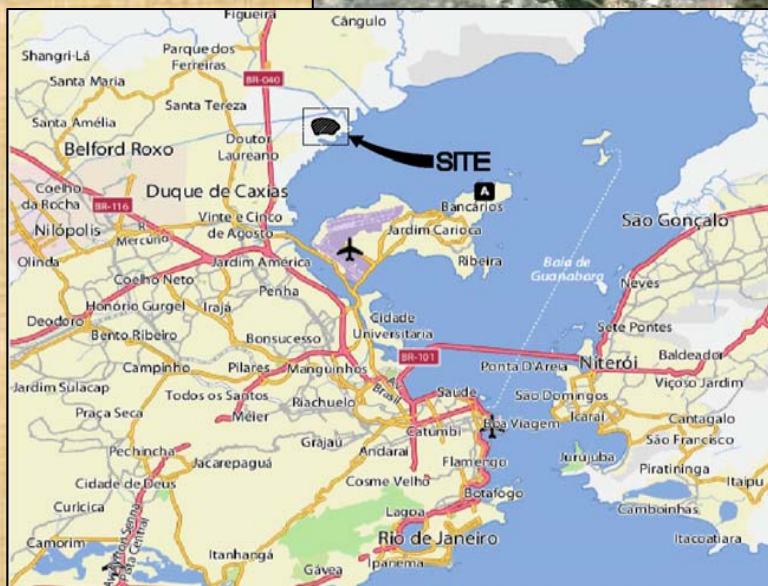
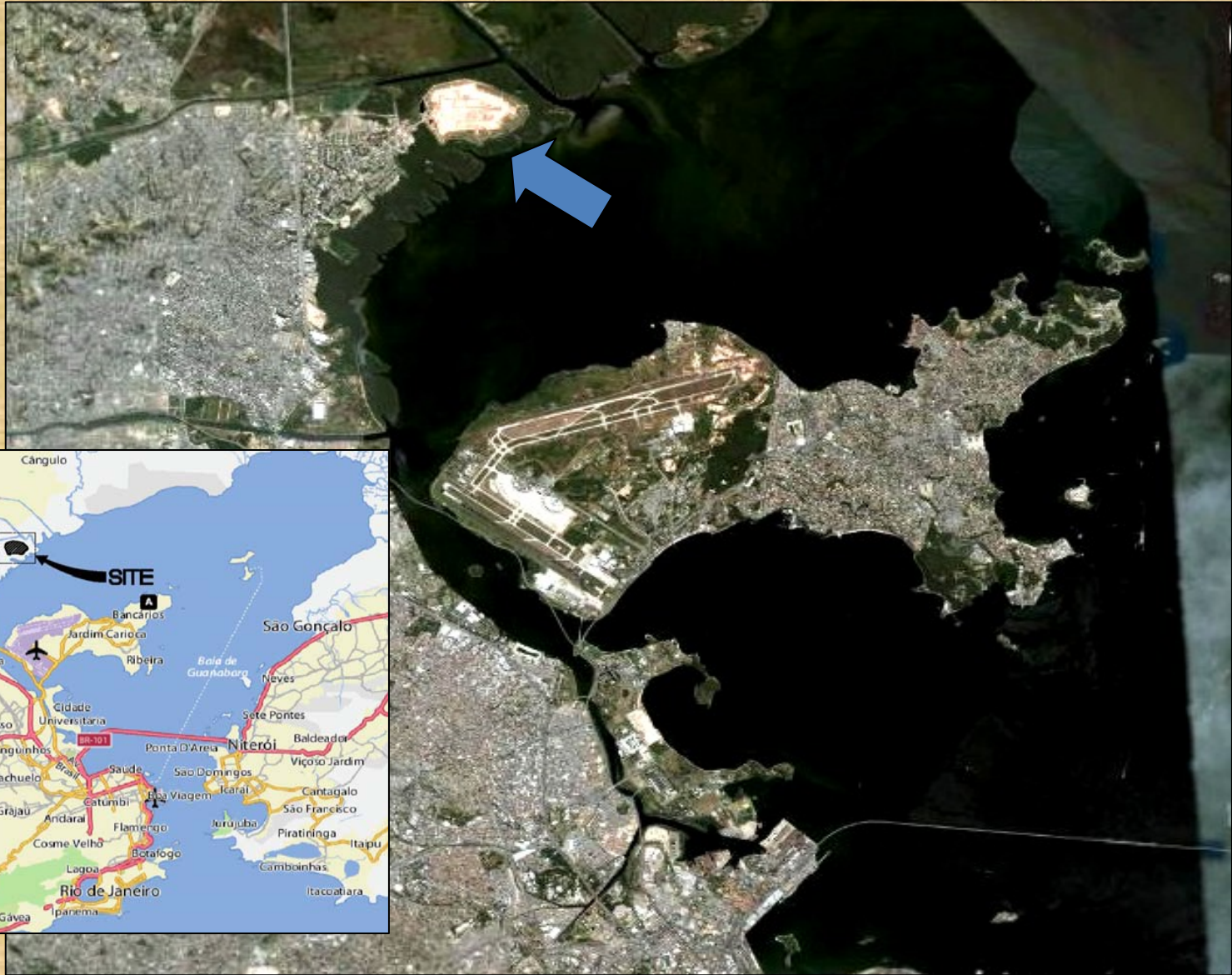


Gramacho Landfill (View January 2012)

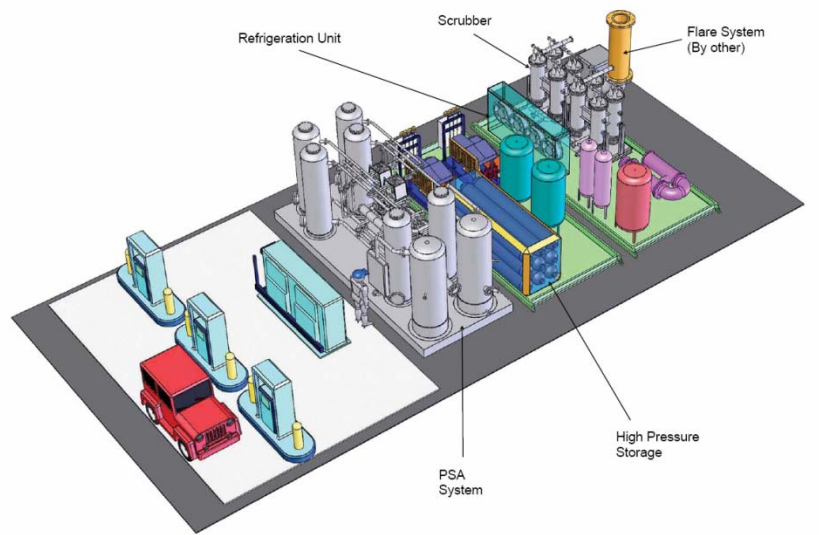




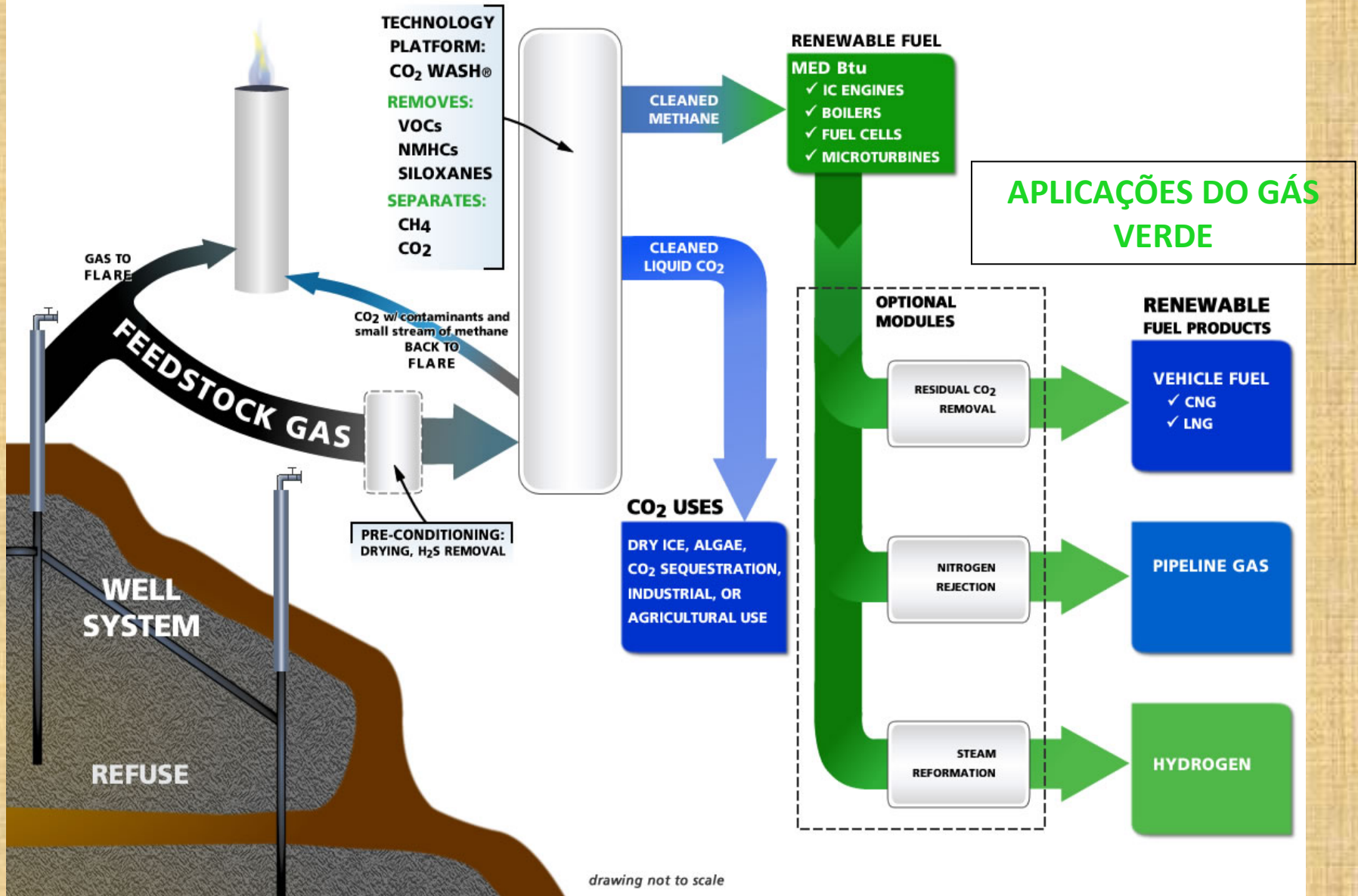
LOCAL



GRAMACHO LANDFILL



Changing the Natural Gas to Green Gas (purified biogas to 95% CH₄)



BIOGAS RECOVER AND PURIFICATION GRAMACHO LANDFILL



BIOGAS RECOVER AND PURIFICATION - GRAMACHO LANDFILL



BIOGAS RECOVER AND PURIFICATION GRAMACHO LANDFILL



Sale of 100,000 to 200,000 m³ /day of purified gas (>92% CH₄) to Petrobras/REDUC

© 2010 MapLink/Tele Atlas

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Pointer 22°44'11.04" S 43°15'25.25" W elev 6 m Streaming ||||| 100%

Eye alt 4.93 km

100 HECTARS OF RECOVERED MANGROVE



NEW SANITARY LANDFILL

- **Environmental protection**
- **Recovery of biogas**
- **Recycling of the C&D**
- **Utilization of waste from trimming**
- **Power generation - 30MW**

NEW SANITARY LANDFILL



NEW SANITARY LANDFILL



RECOVER OF RAIN WATER FOR CLEANING SERVICES



UTILIZATION OF TREATED WASTEWATER IN THE STREET CLEANING



ALTERNATIVE EQUIPMENT FOR COLLECTION IN LOW-INCOME COMMUNITIES



ALTERNATIVE EQUIPMENT FOR COLLECTION IN LOW-INCOME COMMUNITIES



ELECTRIC CARS COLLECTION OF WASTE FROM CLEANSING STREETS



50,000 GREEN MADE (BIOPLASTIC) CONTAINERS FOR HOUSEHOLD COLLECTION



URBAN EQUIPMENT MADE OUT OF PLASTIC WOOD



URBAN EQUIPMENT MADE OUT OF PLASTIC WOOD



WASTE IS ALSO CULTURE





Comurb

PREFEITURA

Galpão
de Artes

Recicladas
Helio G. Pellegrino

Prefeitura
da Cidade
RIO
COMLURB

Relações

Prefeitura
da Cidade
RIO
COMLURB

For more information on
Environment and Solid Waste Management:
<http://www.rio.rj.gov.br/web/comlurb/>

[_www.web-resol.org](http://www.web-resol.org)

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