



ITA Bioenergy



# Biogas Development in Brazil

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GREEN GAS RESEARCH OUTLOOK SWEDEN - 2015

# Biogas Development in Brazil

## 1 - BACKGROUND

- **70's – Start with “modern agriculture”. Protein conversion.**  
Chinese and Indian biogas model.
- **90's - To CDM / Carbon credit.**  
Canadian biogas model
- **2012 – The new edge – As an energy and mobility source**
  - Reactors – Biogas 2nd Generation

# Biogas Development in Brazil

## 2 - KEY ISSUES

### Dificulties

- Energy systems (electric & combustible) focused in energy demand
- Natural Gas pipeline – restricted
- Territory size
- Economics
- No Regulations to biogas
- Potential producers absence
- Cultural issues

### - **Competitive advantages**

- Tropical conditions
  - Climate
  - Biodiversity

# Biogas Development in Brazil

## 2 - KEY ISSUES

### - Residual Biomass to produce Biogas/Biomethane:

- 220 million inhabitants - 80% Urban areas
- Food Production, Biofuels/Ethanol and other commodities
  - Agribusiness sector: 40% GDP
  - 37% Total Energy Consumption
  - Poultry – 1,032 Million
  - Swine - 38,7 Million
  - Livestock feedlot – 180 Million
  - Sugar cane area: 908 M ha



## 2 - STRATEGY –

### “Lights on Biogas” - Concepts

Because biogas was an invisible source in Brasil

Paradigmatic transition – In parallel

- Offered Energy - Brazilian Conventional System - big scale, to  
Systemic Energy - Brazilian non conventional - small scale, synchronized

- Territory energy sources to productive systems  
Avoiding costs - Transmission and distribution grids

- Energy Efficiency – Energy Systems

- Tropicalizing technologies (assuming advantages)

- Biogas Producer's Cadastre

- REGULATORY AGENDA - Biogas Qualifying – Biogas = crude gas  
Offer - steady

- Capacity Building

# Biogas Development in Brazil

## - 3 - REGULATORY AGENDA

### - ANP – National Agency of Gas and Petroleum

- Resolution 8/2015- Biogas and Biomethane definitions

ANP - QUALITY OF BIOMETHANE					
PARAMETERS	UN	LIMIT	MÉTODOS		
			NBR	ASTM	ISO
Methane, mín	% mol.	96,5	14903	D1945	6974
Oxigen, máx.	% mol.	0,5	14903	D1945	6974
CO <sub>2</sub> , máx.	% mol.	3,0	14903	D1945	6974
CO <sub>2</sub> +O <sub>2</sub> +N <sub>2</sub> , máx.		3,5	14903	D1945	6974
Sulfur Total, máx.(3)	mg/n <sup>3</sup>	70	15631	D5504	6326-3 6326-5 19739
Sulfídric Gas (H <sub>2</sub> S), máx.	mg/m <sup>3</sup>	10	15631	D5504 D6228	6326-3 19739
Water dew point T <sub>amb</sub> , máx.	°C	-45	15765	D5454	6327 10101-2 10101-3 11541(4)

## Consumption

Diesel	Biodiesel	Biometano	CNG	Etanol
(litros/10 km)	(litros/10 km)	(Nm3/10 km)	(Nm3/10 km)	(litros/10 km)
4,50	4,70	5,00	5,00	1,67*diesel
				7,52

### CO2 emition at 10km (grams/10 km)

Diesel	Biodiesel	Biometano	CNG	Etanol
1341	794	214	1032	406

### CO2 per passangers (grams/pax-km)

Diesel	Biodiesel	Biometano	CNG	Etanol
9	5	1	7	3

### Emission Reduction of CO2 Diesel Reference

Diesel	Biodiesel	Biometano	CNG	Etanol
0%	-41%	-85%	-23%	-70%

# Biogas Development in Brazil

## 3 - REGULATORY AGENDA

- **ANEEL - National Agency for Electric Energy**
  - Resolution 482/12 – Mini and small generation in grid connections
  - Energy Efficiency Handbook/ 2013 – Consider 1MW as limit to self-supplying
  - Reserved Energy Auction to 2017 (A-3) – Biogas Generation Included
- **EPE – Planning Energy Company**
  - Technical Note 13/2014 – Part of the Brasil Energy Plan – Scenario 2023  
Decentralized Energy Production – Distributed Generation of Energy
    - Decentralized Generation of combustible

# Biogas Development in Brazil

## 3 - REGULATORY AGENDA

- **Federal Government - Ministry of Mines and Energy**

- Portaria 44/2015 – Public call to mini and micro generators in backup already installed - 3,2 GW

- Articulating the Biogas and Biomethane National Program

# BIOGAS & BIOMETHANE PROGRAM – MME (under discussion)

## MAIN SOURCES OF RESIDUAL BIOMASS

### BIOGAS POTENTIAL

**AGRIBUSINESS**

**URBAN SOLID WASTES**  
Landfills  
3 MM m<sup>3</sup>/year

**WASTEWATER**  
Sanitation, sewage

## APPLICATIONS

**ELECTRICITY**

**THERMAL**

**MOBILITY**

**BIOGAS UPGRADE TO BIOMETHANE**

**BIOFERTILIZER**  
Soil conditioner

**CARBON CERTIFICATION**

**1 MW**

Netmetering  
(ANEEL 487/12)  
Energy Efficiency

Direct use as fuel to heat  
Co-Generation;  
Diesel, GLP, firewood  
substituting.

ANP Resolutions  
Diesel & gasoline subst  
Buses, Trucks, Cars, Tractors  
GNV PIPELINE

Phosphates &  
Nitrogenates  
Mineral fertilizers subst

GHG Emission  
Reduction  
1 Billion CO<sub>2</sub>Tons/2020



## 4 - PROCESS PRODUCT DEVELOPMENT



**PRODUCT DEVELOPMENT**  
Focused on decentralized and  
collective production  
of Biogas  
and  
Upgrading to  
Biomethane



# Biogas Development in Brazil

## 4 - PROCESS PRODUCT DEVELOPMENT

- **Biomethane applications**
- **Distributed Generation of Power**

### Decentralized Production of Combustible





# BIOMETHANE DEVELOPMENT IN BRASIL

- Biomethane: The Itaipu/Scania Case



# Itaipu – Scania case

## Results

	Km	Km/m <sup>3</sup> or/l	PRICE R\$	Consum. m <sup>3</sup> or l	Cost R\$	Km Cost R\$
Biomethane	1500	2,02	0,90	743	668,00	0,44
Diesel		2,20	2,60	682	1.773,00	1,18

37,2 %

# Biogas Development in Brazil

- **COMMUNITY AGENDA**

- **ABIOGAS – Brasilien Biogas Association**
- **EMBRAPA – Agricultural Research Company**
- **CIBIOGAS – International Center of Renewable Energy - Biogas**
- **SENAI – Industry Federation Service**

# Biogas Development in Brazil

**THANK YOU**

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