

Advances toward WTE in Brazil in 2010-2012

WTERT 2012 Bi-Annual Conference at Columbia University

Sergio Guerreiro Ribeiro

President

WTERT-BRASIL

10-18-2012



**LEGAL /POLITICAL ASPECTS
AND PUBLIC INFORMATION**

**NEW BRAZILIAN LAW -2010
+ 1,000,000 WASTE PICKERS
LANDFILL STRONG LOBBY**



WASTE -TO- ENERGY IN BRAZIL

ECONOMICS

**LOW TIPPING FEE
HIGH ENERGY PRICE
HIGH TAXES ON
ENERGY**

TECHNOLOGY

**MB, RDF, MBT
COMB X GASIF
TECH SUPPLIER
HIGHER EFFICIENCY
WITH LOWER COSTS**

LEGAL/ POLITICAL ASPECTS AND PUBLIC INFORMATION

BRAZILIAN POLICY ON SOLID WASTE MANAGEMENT (LAW 12305 → PNRS)

TOOK 20 YEARS TO PASS - WRITTEN BY CONGRESSMAN ARNALDO JARDIM

NO FINAL DESTINATION HIERARCHY. **LANDFILLS ENVIRONMENTALLY ADEQUATE SOLUTION** MAKING NO DISTINCTION BETWEEN BIOWASTE, COMBUSTIBLE WASTE AND INERTS. NO LANDFILL WASTE REDUCTION TARGET

VERY LITTLE LANDFILL REGULATION IN BRAZIL BUT WTE MUST ADOPT EUROPEAN DIRECTIVE ON WI 2000/76/EC WHICH IS CORRECT



ORGANIZED A TWO HOUR MEETING WITH REP. JARDIM TO EXPLAIN EUROPEAN SOLID WASTE AND LANDFILL DIRECTIVES 2008/98/EC AND 1999/31/EC

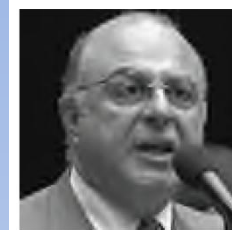
REP. JARDIM WAS IMPRESSED AND ASKED FOR WTERT-BRASIL COOPERATION TO IMPROVE THE LAW



LEGAL/ POLITICAL ASPECTS AND PUBLIC INFORMATION



The screenshot shows the HIRIA website with a navigation bar at the top containing links: Home, Sobre nós, Agenda de Eventos, Central de Downloads, Parceiros, and Contato. The main banner features a night image of an industrial facility with the text: "Energy Waste Brazil 2012", "Biogás e Tratamento Térmico de Resíduos", and "05 e 06 de novembro". A green circular badge on the right says "São Paulo novembro 2012". Below the banner, it states: "Encontro nacional sobre transformação de lixo em energia - waste to energy. Local: Staybridge Suítes São Paulo". Two buttons are visible: "Faça sua inscrição" and "Recomendar esse evento".



Dep. Arnaldo
Jardim
Câmara dos
Deputados



Dep. Pedro Bigardi
Assembléia
Legislativa de São
Paulo



THIS IS A SÃO PAULO COMUNIST PARTY REP.
PROPOSING A LAW TO BAN WTE IN THE STATE.

AFTER THE EVENT WTERT-BRASIL
WILL OFFER ONE DAY COURSE ON
WASTE-TO-ENERGY FUNDAMENTALS

COURSE ON ENERGY RECOVERY FROM MSW

MSW AS FUEL

LHV, HHV

PRINCIPLES OF COMBUSTION

FLUE GAS TREATMENT

MASS BURNING X RDF

COMBUSTION, GASIFICATION, AD

EUROPEAN DIRECTIVES FOR MSW

WTE PLANTS – MB MOVING GRATES

BASIC THERMODYNAMICS, HEAT

TRANSFER, BOILER DESIGN

WTE EFFICIENCY X CORROSION

CONVENTIONAL WTE PLANTS

HIGH EFFICIENCY WTE PLANTS

AMSTERDAM

RUDERSDORF

HERINGEN

ARHUS

BILBAO

SAKAI

VANTA

COMBINED CICLES WASTE/NG

NAT GAS

LANDFILL GAS

SYNGAS

ECONOMIC FEASIBILTY IN BRAZIL

METHODOLOGY, TF, TAXES

CASE STUDIES

Curso – Recuperação Energética do Lixo

14h00 – 20h00 – Curso – Recuperação Energética do Lixo – Uma abordagem científica

Instrutor: Professor Sergio Guerreiro, **WTERT – Waste to Energy Council Brasil**

Parte 01 – 14h00 – 17h00

1. Introdução
2. Caracterização do lixo como combustível
3. Poder calorífico superior (PCS) e inferior (PCI)
4. Combustão – Tratamento dos gases
5. Queima Direta ("Mass Burning") x CDR (combustível derivado de resíduos)
6. Comparação entre Combustão, Gaseificação e Digestão Anaeróbia na geração de energia
7. Aspectos legais – Normas Européias x Normas Brasileiras (PNRS)

Parte 02 – 17h00 – 20h00

8. Usinas Lixo-Energia (WTE) com Queima Direta com grelha móvel
 - 8.1 – Noções básicas de termodinâmica
 - 8.2 – Eficiência das usinas - Corrosão
 - 8.3 - Usinas Convencionais (40 bar / 400oC)
 - 8.4 – Usinas Avançadas de alta eficiência
 - 8.4.1 – Amsterdam
 - 8.4.2 – Rudersdorf
 - 8.4.3 – Heringen
 - 8.4.4 – Arhus
 - 8.4.5 – Bilbao (Zabalgardi)
 - 8.4.6 – Sakai
 - 8.5 – Ciclo Combinado Otimizado (CCO) – Superaquecimento externo
 - 8.5.1 - CCO com Gás natural
 - 8.5.2 – CCO com biogás
 - 8.5.3 – CCO com syngas (gás de síntese)
9. Viabilidade Econômica
 - 9.1 – Metodologia – Financiamento, Tributos, Taxa de Disposição Final, Venda da Energia
 - 9.2 – Estudo de caso 1 - Usina Convencional
 - 9.3 - Estudo de caso 2 - Usina com CCO

20h00 – Encerramento do curso e entrega de certificados.



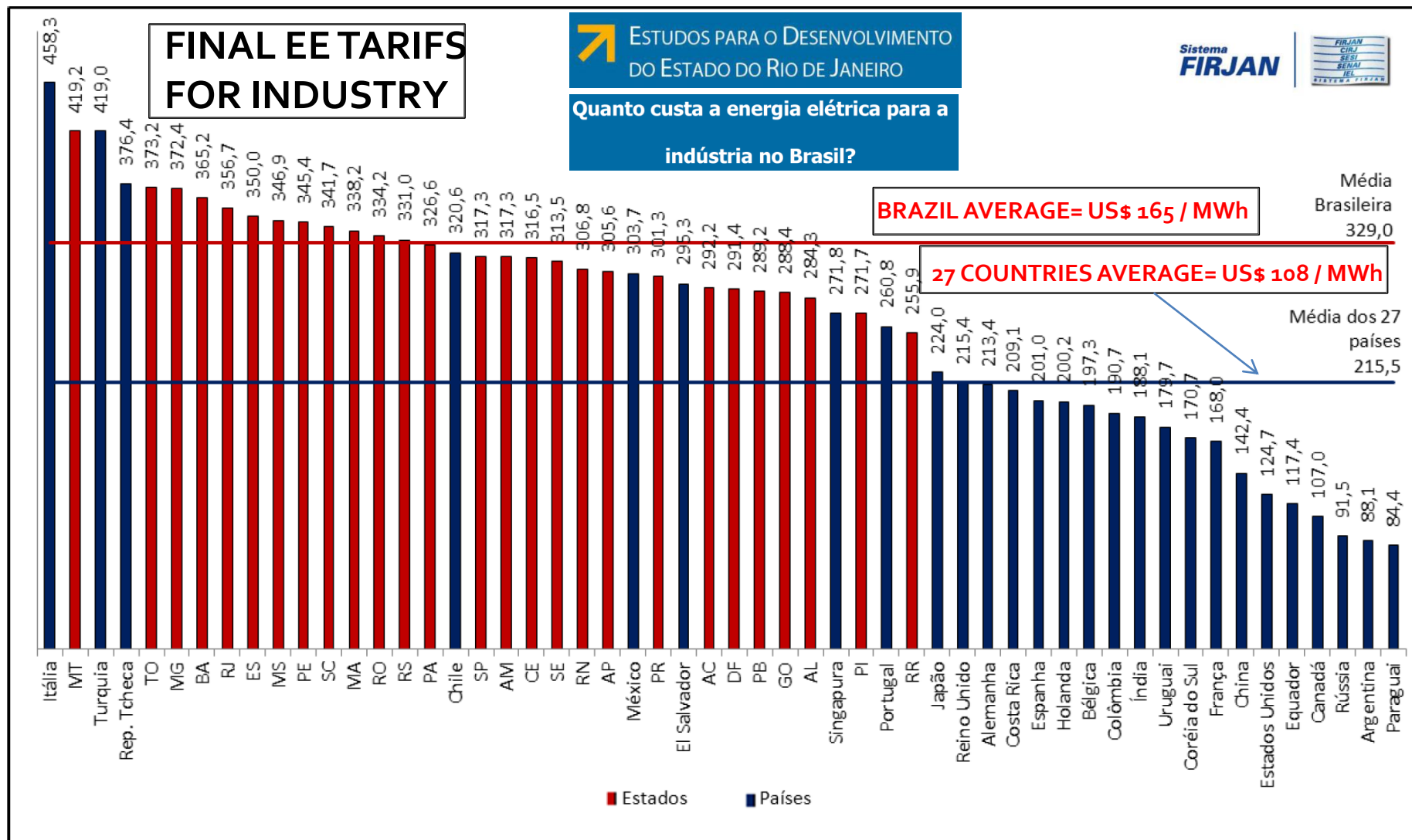
ECONOMICS

- **TIPPING FEES VARY FROM US\$ 20 (RIO DE JANEIRO) TO US\$ 40 (SOME CITIES IN SÃO PAULO)**
- **ELECTRICITY PRICES HIGH DUE TO HEAVY TAXES**
- **FIRJAN (INDUSTRY FEDERATION OF RIO DE JANEIRO) PREPARED REPORT ABOUT INDUSTRY ELECTRIC ENERGY PRICES FOR DIFFERENT COUNTRIES AND COMPARED WITH BRAZIL BEFORE AND AFTER TAXES**

Gráfico 1 – Tarifa industrial de consumo de energia elétrica – estados brasileiros e países selecionados

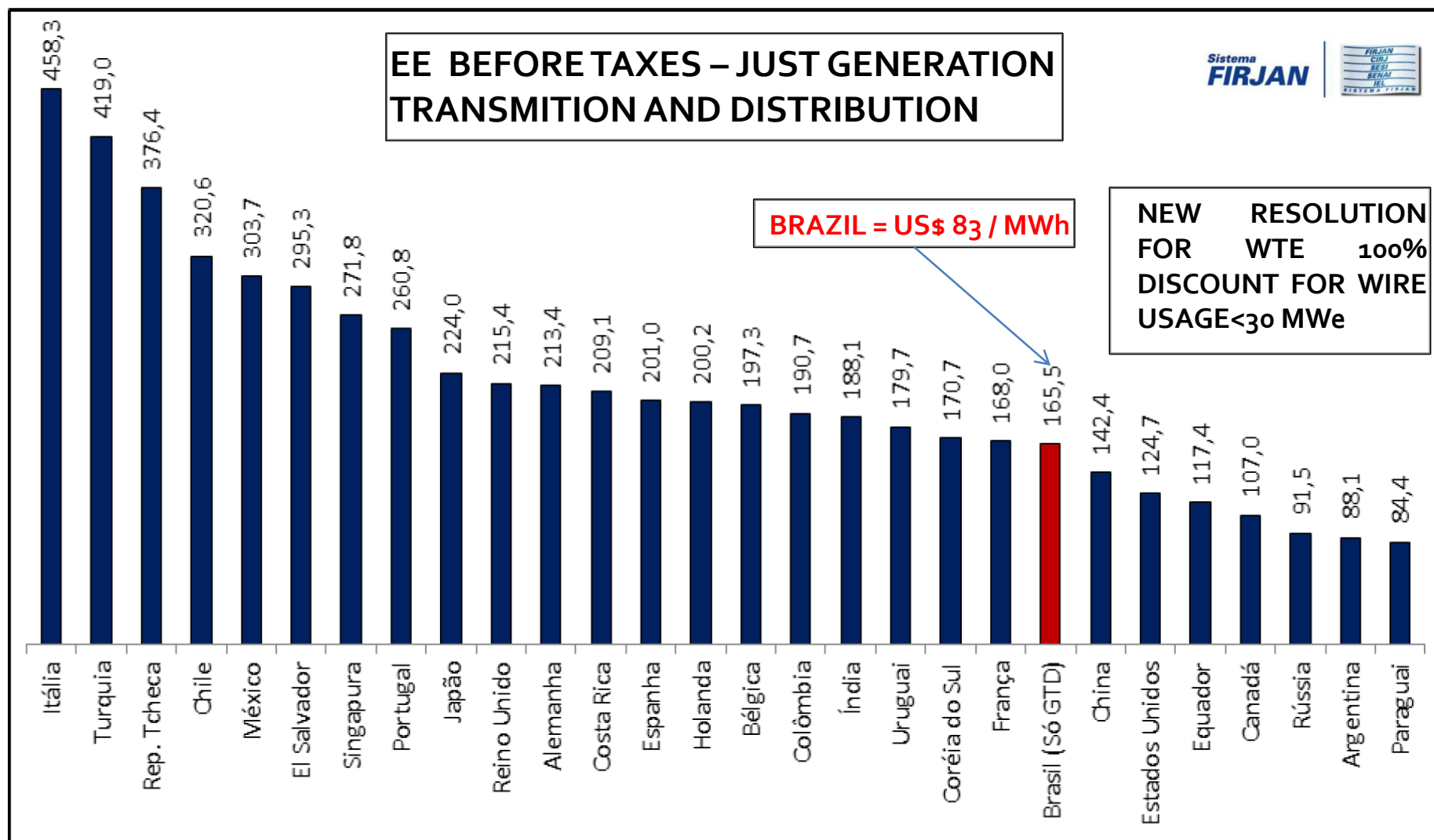
(R\$/MWh)

(1 US\$ ~ R\$ 2)



Fonte: Elaboração própria a partir de dados da Aneel (2011) e da Agência Internacional de Energia (2011).

Gráfico 2 – Custo de GTD do Brasil e tarifas internacionais finais de energia elétrica industrial (R\$/MWh)



Fonte: Elaboração própria a partir de dados da Aneel (2011) e da Agência Internacional de Energia (2011).

ECONOMICS

- BRAZILIAN WTE PLANTS SHOULD RELY MORE ON ELECTRICITY SALES THAN TIPPING FEES BECAUSE THE MUNICIPALITIES ARE SUPPORTED BY THE LAW SAYING LANDFILLS ARE ADEQUATE
- WITH LITTLE REGULATION LANDFILLS ARE CHEAPER
- NIMBY WORKS IN FAVOR OF WTE BECAUSE LANDFILL SPACES ARE HARD TO FIND AND MSW TRANSPORT IS EXPENSIVE (RIO'S LANDFILL 80 KM FROM DOWNTOWN)
- HIGH EFFICIENCY MUST BE CONSIDERED BUT EUROPEAN SOLUTIONS ARE VERY EXPENSIVE

•FIRST BRAZILIAN WTE PLANT BEING BUILT IN SÃO PAULO (BARUERI)



NEW WM COMPANY
SÃO PAULO



EPC



GRATE TECHNOLOGY
EXPERIENCE WITH LOW BTU WASTE

TECHNICAL DATA → 825 TON/D
LHV = 6,700 KJ/Kg (64 MWth)
STEAM 61 bar / 400 °C CONDENSER 0.1 bar
GROSS POWER = 16.5 MWe



IS BUYING



(20,000 TPD OF MSW INCLUDING RIO)

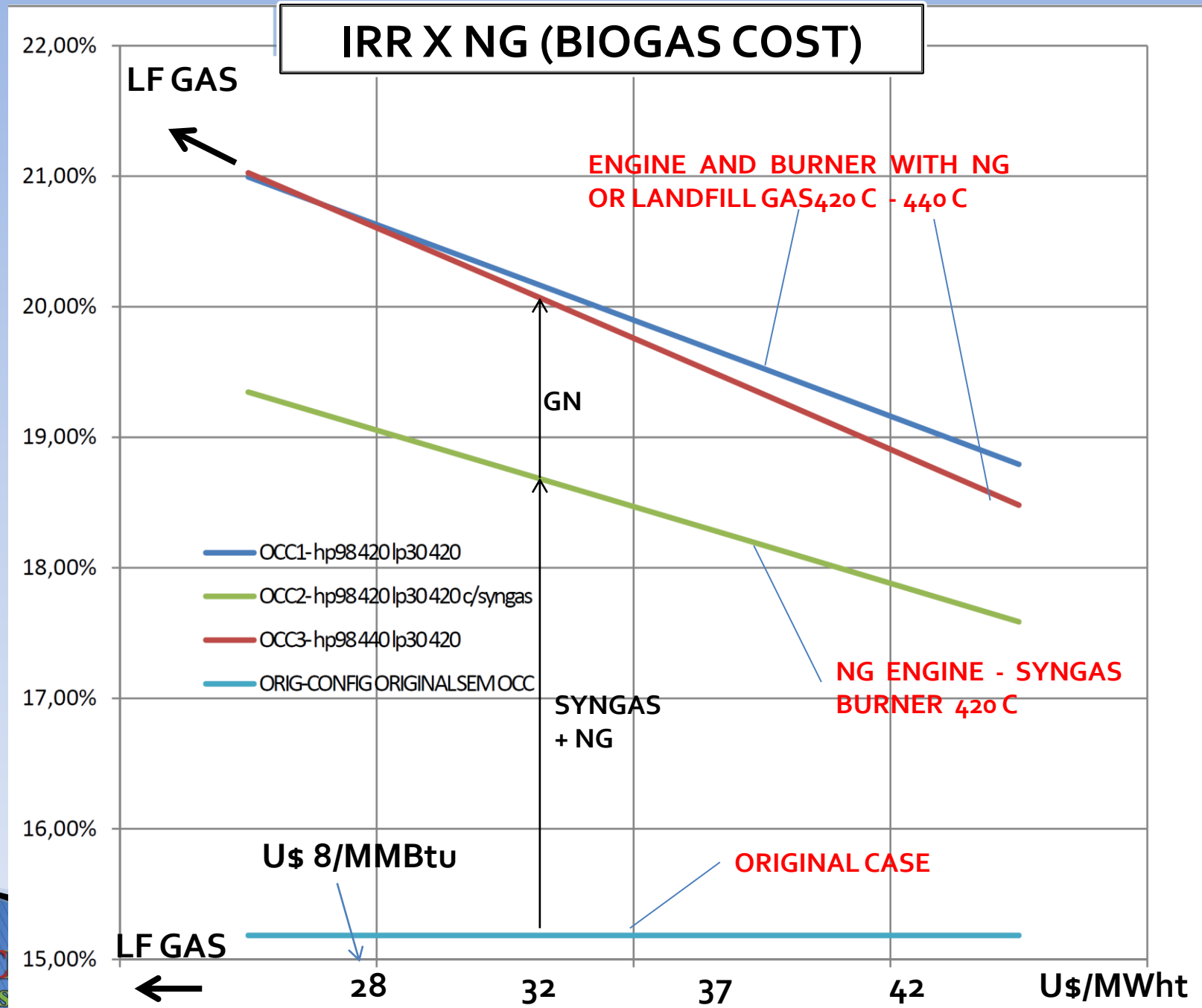
WTERT BRASIL IS PARTICIPATING IN DUE DILIGENCE TO CHECK
FEASIBILITY. IDEA IS TO BUILD 16 WTE PLANTS AROUND THE
COUNTRY

TECHNOLOGY

- **WTERT BRASIL** CANNOT BE LIMITED TO POLITICAL AND ECONOMIC ISSUES
- ENVIRONMENTAL IMPACTS AND TECHNOLOGICAL SOLUTIONS MUST BE CONSIDERED
- BRASKEM, ONE THE BIGGEST PLASTIC RESINS MANUFACTURERS IN THE WORLD, STABLISHED A PARTNERSHIP WITH **WTERT BRASIL** TO STUDY CHEMICAL RECYCLING OF PLASTIC WASTE
- ALSO THE ESPECIAL COMBINED CICLE NG/MSW IS BEING SERIOUSLY CONSIDERED BY FOXX TO IMPROVE FEASIBILITY WHERE TIPPING FEES ARE LOW LIKE RIO DE JANEIRO
- WE HAVE PROPOSED A VERY SIMPLE APPROACH USING A GAS ENGINE INSTEAD OF GAS TURBINE AND SINCE THE NG CONSUMPTION IS VERY LOW IT CAN BE REPLACED BY LANDFILL GAS (IN CASE THE PLANT IS NEAR THE LANDFILL – HAZTEC HAS MANY)
- OR NG CAN BE REPLACED WITH SYNGAS FROM NON RECYCLABLE PLASTICS/ BIOMASS GASIFICATION
- THIS IS A GOOD APPROACH TO ATTRACT LANDFILL PEOPLE TO WTE BECAUSE FEASIBILITY OF COMBINED CICLE USING LANDFILL GAS IS VERY HIGH

MSW eff = 31% NG eff = 51.6% NG share = 12%

FEASIBILITY(TIP=U\$44;U\$87/MWhe; 30% EQUITY; INTEREST RATE 8,25%)



THANK YOU VERY MUCH



www.wtert.com.br

SERGIO GUERREIRO RIBEIRO