



# Energy Efficiency

Siemens

Mr. Alan Rodriguez

# Broad Energy Efficient Portfolio

SIEMENS

High-efficiency turbines



Wind energy



CO<sub>2</sub>-free power plant (CCS)



Energy-efficient buildings



Enhanced rail transport



Hydrogen injection for fuel-efficient vehicles



Hybrid engines



Highly efficient industrial drives



Energy-saving lighting



High-voltage DC Transmission Systems



# Combined Cycle Power Plants

Due to the particular advantages of the combined cycle process, this technology will be used in the future not only for natural gas, but also for fuels such as coal, which is abundantly available worldwide, biomass, and residues from refineries. The greatest success is promised by combined cycle power plants with integrated gasification systems.

## Development of efficiency: Fossil-fired power plant types at the world market level

Hard coal-fired steam power plant



Reference STPP >600 Mw

	Efficiency	CO <sub>2</sub> emissions
1992:	42%	Basis
2007:	47%	- 11%
2020 target:	> 50%	> - 16%

Combined cycle power plant, H-class



Irsching 4 plant 530 Mw

	Efficiency	CO <sub>2</sub> emissions
1992:	52%	Basis
2009:	> 60%	- 13%
2020 target:	> 63%	> - 16%

IGCC with and without CO<sub>2</sub> capture



IGCC > 400Mw with CO<sub>2</sub> capture

	Efficiency	CO <sub>2</sub> emissions
1992:	42%	Basis
2007:	47%	- 11%
2020 target:	> 50%	> - 16%
IGCC with CCS	> 43%	> - 90%

# Efficiency in Power Transmission and Distribution

Thanks to high-voltage direct current (HVDC) transmission technology, electricity can be transmitted over distances of up to 2,000 kilometers with minimum loss.

An HVDC transmission link will connect the tourist island of Mallorca for the first time ever to the power supply system on the Spanish mainland. Beginning in May 2011, the 250-kilometer (155-mile) submarine cable link will supply the island with electricity from the European grid, especially during the hot summer months.

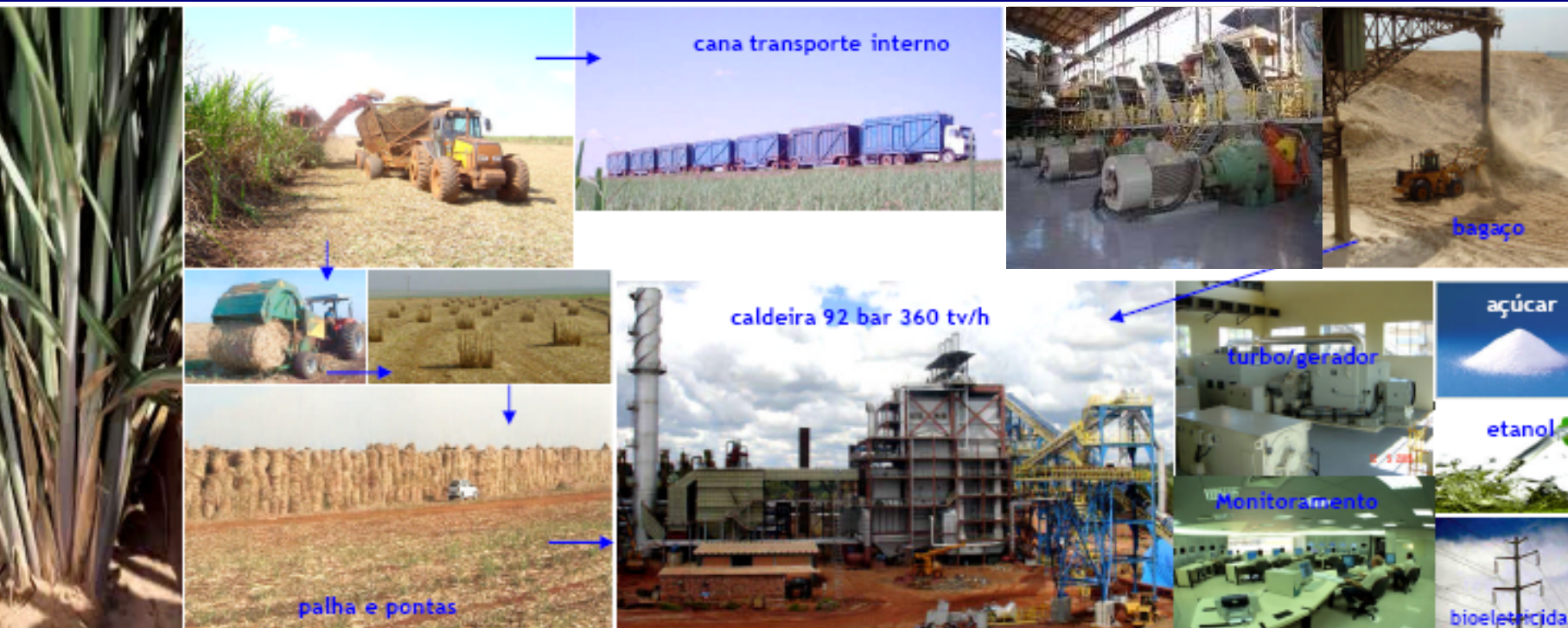


# Sugar Industry – Technological and Business Evolution

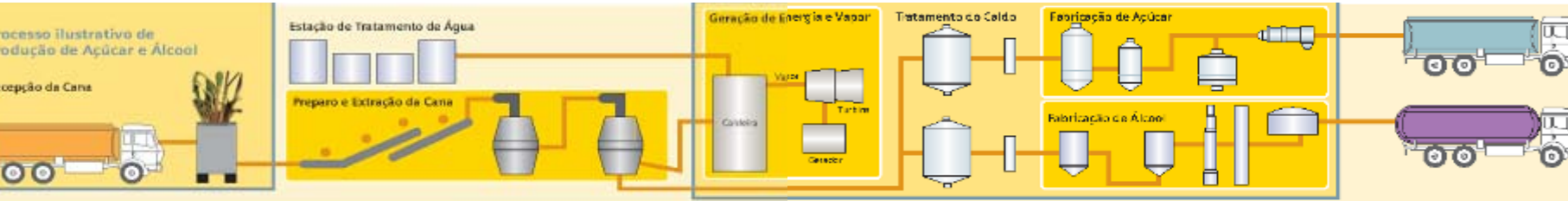
## Old Bagasse Technology



## Technology of Efficiency and Sustainability – Ethanol, Bioelectricity, Sugar and CO2



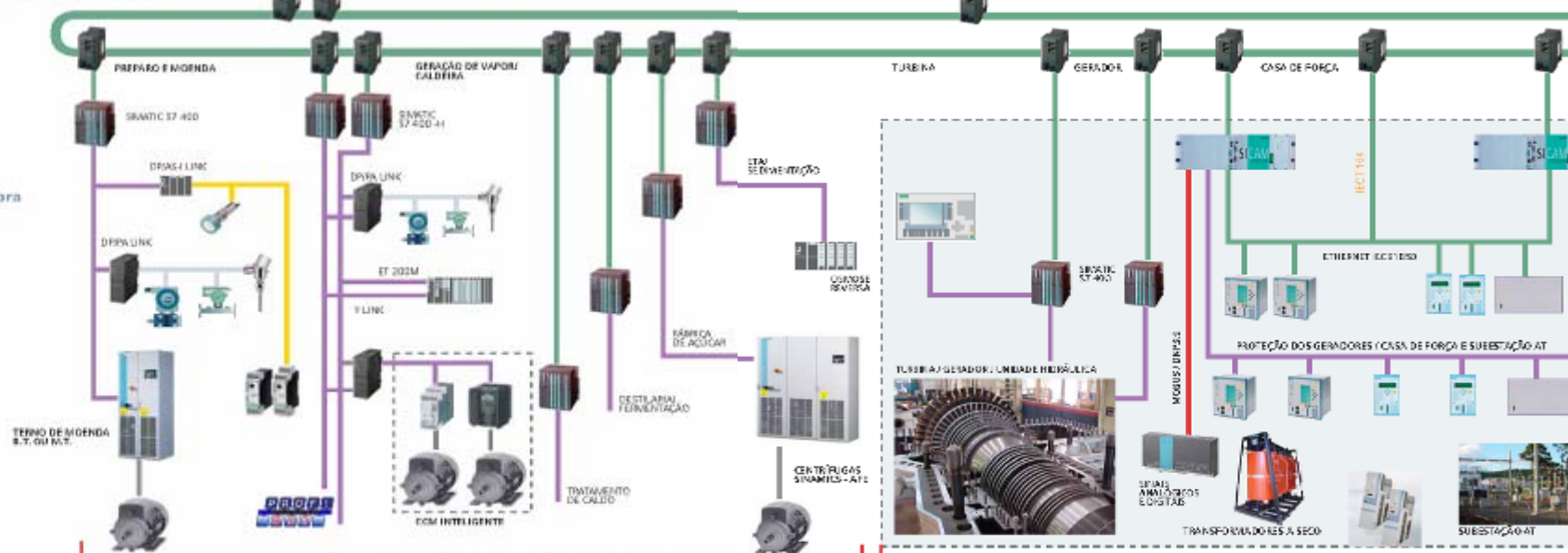
# Integrated Solutions for Sugar & Ethanol plants **SIEMENS**



## Supervisão, Controle de Processo e Comunicação



## Automação e Comunicação



Manejo, Manobra e Proteção

Operamento, Manobras e Instrumentação de Campo

# Co-generation evolution

Basic Motivation

Main Generation Equipment

Relationship with the grid

	<b>TRADITIONAL Co-generation</b>	<b>MODERN Co-generation</b>
Basic Motivation	Electrical Energy Self-sufficiency	Sell of energy excess and Reduction of CO2 emissions
Main Generation Equipment	Steam turbines	Steam Turbines and Combined Cycle Generation
Relationship with the grid	Independent Operations	Linked Operations



Traditional Sugar plant



Modern Co-generation plant

# Co-generation Turbines

**SIEMENS**



Market Segment		Power
Pulp and Paper		1.400 MW
Chemical & Petrochemicals		469 MW
Sugar and Ethanol		1.460 MW
Oil and Gas (On Shore)		192 MW
Metals and Mining		355 MW
Others		296 MW
Total (Multiple Stages)	279 Turbines	4.172 MW
Total (Simple Stages)	692 Turbines	681 MW
<b>Total</b>	<b>971 Turbines</b>	<b>4.853 MW</b>

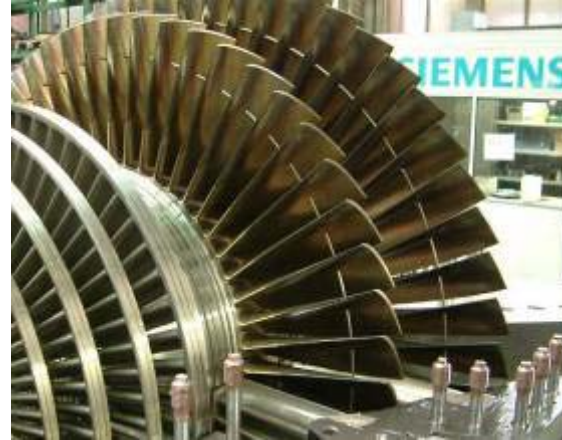
# Power Generation

## Co-generation Solutions

**SIEMENS**



**Gas Turbines**



**Steam Turbines**



**Generators**



**Instrumentation & Control**



**Services**



**O&M**

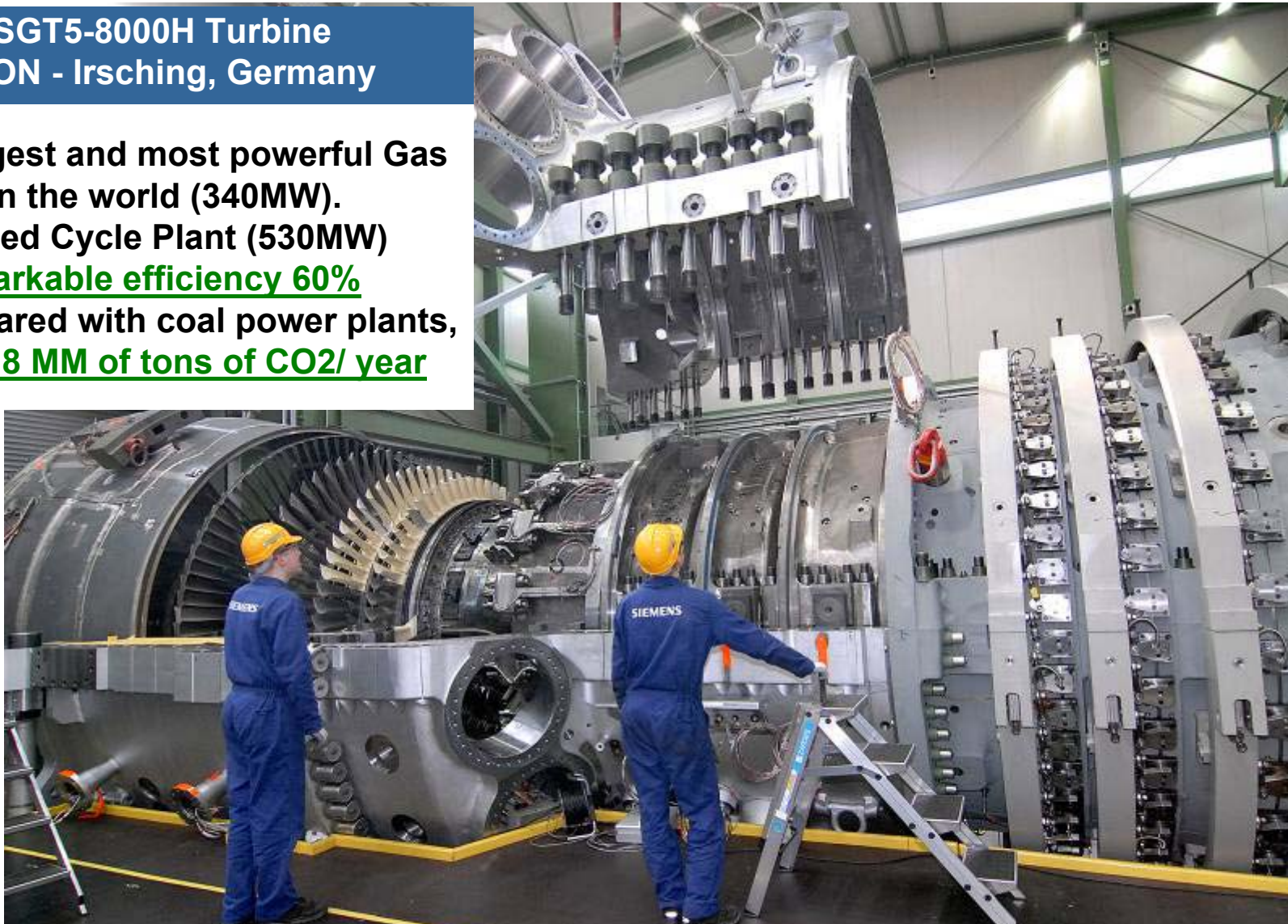
# Best-Cases

## Power Generation

SIEMENS

### SGT5-8000H Turbine E.ON - Irsching, Germany

- The largest and most powerful Gas Turbine in the world (340MW).
- Combined Cycle Plant (530MW) with remarkable efficiency 60%
- If compared with coal power plants, reduce 2,8 MM of tons of CO2/ year



# Best-Cases

## Power Transmission and Distribution

SIEMENS



HVDC route (High Voltage Direct Current) New Delhi, India

- High Efficiency Energetic Transmission throughout 780 km between Ballia-Rajasthan
- If compared with a conventional transmission system reduce 688.000 tons of CO2

# Siemens Energy Recent Contributions

SIEMENS



## Biomass Co-generation

### Sugar and Ethanol

- Zilo (120 MW)
- Colorado (43 MW)
- Santa Cruz (75 MW)

### Pulp and Paper

- Klabin (72 MW)
- Bahia sul (62 MW)
- Ripasa (16 MW)

## FURNAS Total Transformer Repair



- Total Modernization of a older Transformer

## COPEL Voltage Regulator



- Increasing reliability of energy distribution grid

## Transmission and Distribution other Contributions

- Furnas- FSC Rio Verde I (serie compensator)
- CPFL – Modernization in 5 substations
- RGE - Modernization in 5 substations

**Thank you**