Energy Efficiency and Climate Change

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Energy Efficiency and the Oil&Gas Industry in Latin America

1. **Historical Background**
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3. **Connection between energy efficiency and climate change**
4. **Trends**
5. **Concluding Remarks**

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Energy Efficiency and the Oil&Gas Industry in Latin America
Historical Background

- **In the beginning of the 70's oil was so cheap that for many countries, natural and refinery gases were only known as residual gases and were, in many cases, either vented or flared.**
- **The "Yom Kippur" war in the Middle East changed the face of the world with the shortage in the oil supply and very high prices at that time**
- **Countries that were net importers of oil had to implement alternative plans to replace and to save oil (Proalcool, EGTD, CNP 90, etc in Brazil).**
- **Countries that were either self-sufficient or net exporters could ignore the crisis and, in most cases, neither upgraded their oil industry nor their consuming equipment (e.g. fleets)**
- **The Oil&Gas industry technological level became also customized not only according to the country's availability of oil&gas, but also according to the vintage of the facilities**

Energy Efficiency and the Oil&Gas Industry in Latin America
Historical Background

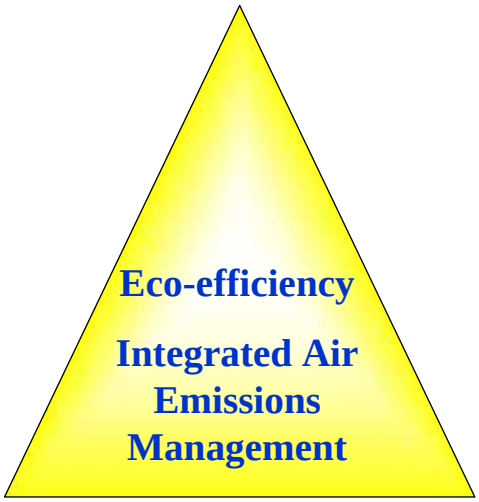
- **During the 90's, oil prices sharply decreased and energy efficiency projects or actions were abandoned**
- **Climate Change appeared in 1992 as a major challenge related to achieving a sustainable development. Energy efficiency was foreseen as one of the most effective actions to reduce greenhouse gas emissions**
- **The Kyoto Protocol (1997) came into force in 16 February 2005**
- **Prices of crude oil started to increase again in 2002 reaching for the sky in 2008.**
- **The combined effect of costs, regulatory constrains for GHG emissions in developed countries plus the Kyoto flexibility mechanisms (ETS, CDM and JI) introduced a new trend in the market – developing countries.**
- **The concerns about sustainability, oil costs and climate change added value to energy efficiency projects and programs in a new way**

Energy Efficiency and the Oil&Gas Industry in Latin America
Current Status

- **Current crude oil prices around US$40.00 per barrel can not be considered cheap. Oil Price keeps being a major driver to energy efficiency projects**
- **CDM has shown to be an effective means to finance GHG mitigation projects that are either directly or indirectly related to energy efficiency and fuel savings**
- **Sustainability and CSR also add value to any climate friendly project and are basic requirements for many international financial institutions**
- **Climate Change and CDM have introduced a new level of accuracy in tracking emissions and energy consumption. Emissions reduction (Savings) must be now measurable and verifiable.**
- **Oil&Gas companies are now tracking their energy consumption and emissions in a more detailed and accurate way moving from the top-down approach to the bottom-up approach**
- **Globalization also posed a new challenge to the sector, demanding standardization of Environmental, Health and Safety procedures within each company (on-going process)**

Connections and benefits between EE and CC

Energy Efficiency



Air Emissions "triple bottom line"

Environmental – GHG and pollutants mitigation

Social - Environmentally friendly projects contribute in many ways to sustainable development

Financial - revenues due carbon trading, pollutants quota trading and energy efficiency

Criteria Pollutants

Greenhouse Gases

Types of Mitigation Projects
Trends

- From the perspective of Climate Change one can not only focus on Energy Efficiency
- Projects, Programs and actions could be and are driven either by the public or the private sector
- Projects, Programs and actions could be split …in 4 categories:

1. Searching for alternative sources of energy or raw materials
2. Improving efficiency in processes that generate or consume energy
3. Destroying or recovering residues with significant global warming potential or significant heating value
4. Removing carbon from the atmosphere

1. Searching for alternative sources of energy or raw materials

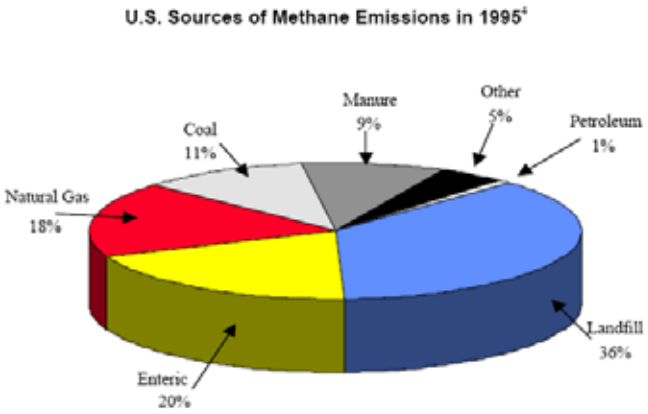
- Transportation sector in Brazil:
  - **Switching from fossil fuels to biofuels**
  - **Bioethanol (blends 0 – 100 %)**
    - **25% ethanol in gasoline is mandatory**
  - **Biodiesel (blends 0 – 20%)**
    - **3% biodiesel in diesel is mandatory**

- Industrial and energy sector:
  - **Switching from fossil fuels to biofuels**
  - **Bioethanol**
  - **Biodiesel**
  - **Biomass (sugar cane bagasse, rice husks, timber residues)**

2. Improving efficiency in processes that generate or consume energy

- Replacement of light bulbs by electronic lighting
- Improving efficiency of industrial equipment
  - **Operational (maintenance, combustion control)**
  - **New technologies (supercritical boilers)**
- Improving efficiency in the transportation sector
  - **Cleaner fuels**
    - **extra low sulphur fuels allow higher efficiencies**
  - **New technologies**
    - **(e.g. direct injection, hybrid vehicles)**
  - **Mobility management**
    - **Rotation**
  - **Carbon/Energy labelling**
    - **Efficiency level label**

3. Destroying or recovering residues with significant global warming potential or significant heating value



- Landfill gas recovery associated with electricity generation
- Recovery of gas that otherwise would be flared
- Natural gas pipelines and pneumatic bleeding systems
- Methane flashing recovery from associated gas in Oil fields
- Coal mine methane recovery or energy generation

4. Removing carbon from the atmosphere

- Afforestation and reforestation projects on degraded lands
- Carbon Capture and Storage (CO_2 removal from natural gas or combustion gases to be reinjected in abandoned wells)

Concluding Remarks

- **Governmental Action is still an important driver to promote efficiency and GHG mitigation through labeling programs, regulatory actions and subsidies to emerging technologies**
- **Globalization is demanding standardization of EHS procedures everywhere requiring investment and best practices and technologies adoption**
- **Market driven initiatives have become more and more important in promoting energy efficiency projects due to added value from climate change mitigation and sustainable development metrics**
- **Tracking energy consumption and GHG emissions in a measurable and verifiable way is providing a new and accurate means to manage energy efficiency levels and GHG emissions**
- **Costs for measuring are much lower nowadays and benefits from measurable and verifiable energy efficiency projects are more and more significant**

Gracias

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