



An  
integrated  
energy  
company



**Eni Case Study**

**Fugitive Emissions Monitoring**

**in Eni upstream**

**Oil/Gas treatment Plants**

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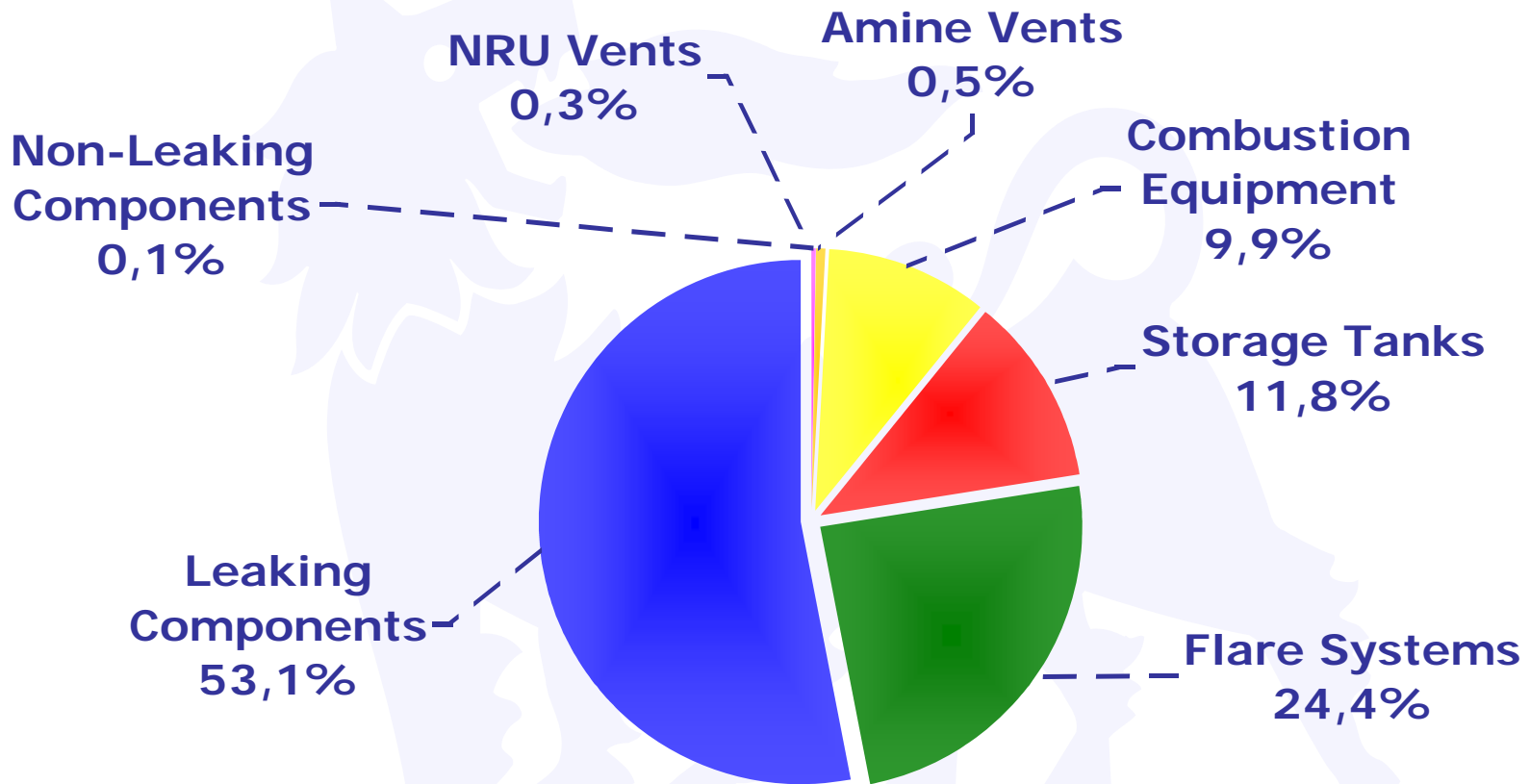


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# Oil/Gas Upstream Sector

## Methane Emissions by sources in Gas Processing



In gas processing plants fugitive equipment leaks are the dominant source of CH<sub>4</sub> emissions



Source: "Directed Inspection and Maintenance (DI&M) at Gas Processing Plants"

EPA Presentation, Gas Star Workshop, July 2006



# Methane Fugitive Reporting needs

- ▶ Improve the Eni fugitive environmental reporting method for the upstream sector
- ▶ Provide data with more accuracy in order to respond to the Regulations and Communications requirements (attention on diffuse sources: IPPC, PRTR\*)
- ▶ Define fugitive monitoring plan for Air Quality Management and Leak Detection and Repair (LDAR)

# Fugitive Calculation Approaches

Eni adopts its own "GHG Accounting & Reporting Protocol\*" which provides three approaches for estimating Fugitive Emissions



<b>A</b>	<b>FACILITY LEVEL</b>	Calculation based on facility production data and standard emission factors (for each facility type)
<b>B</b>	<b>EQUIPMENT LEVEL</b>	Calculation based on equipment number and standard emission factors (for each equipment type). This method requires equipment counts
<b>C</b>	<b>COMPONENT LEVEL</b>	Calculation based on connections number and emission factors. The emission factors for each component can be derived from literature or measures.

\* Based on "The API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry", American Petroleum Institute (API)



# Eni Monitoring Activities

## Monitoring Campaigns EPA 21 Method

9 Monitoring Campaigns carried out by using standard detector in accordance with "US EPA Method 21", on:

- ✓n.2 Oil/Gas processing plants
- ✓n.4 Gas processing plants
- ✓n.3 Offshore gas compression platforms

Time: 2005-2006

...moreover gas wellheads measures are carried out and the emissions resulted much lower than the estimated ones



# Eni Monitoring Activities

## Monitoring Campaigns Activity phases

1. Plant components counting and classification from P&ID
2. Statistical component sample definition
3. In-situ measurements by FID (Flame Ionization Detector\*)
4. Experimental data elaboration using empirical correlation (software FRIEDA\*\*)

Corporate Guideline on fugitive monitoring and accounting methodology was performed

\* Standard: UNI EN 13526 (2002)

\*\* Calculation tool developed by *Eni Research Centre of Monterotondo*



# Eni Monitoring Activities

## Monitoring Campaigns

### Critical points:

- High cost and time
- Dangerous operations required (i.e.: offshore installation and piping)

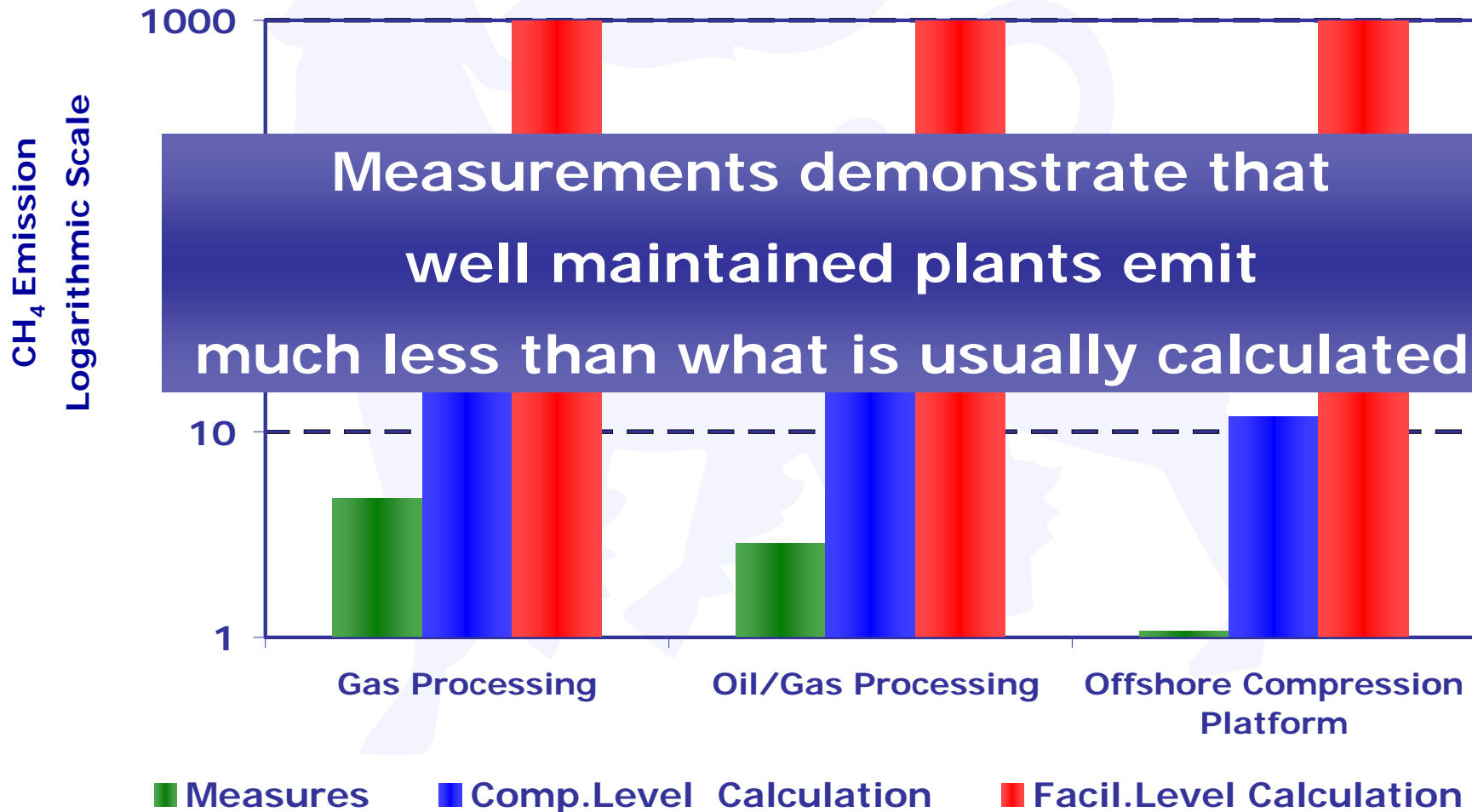
*...from a more technical point of view...*

- Agreement between P&ID components mapping and their relative positioning on the installation
- Uniform components' classification
- Monitored points labeling and leaking points communication



# Eni Monitoring Activities

## Data Comparison FID Measures vs. Standard Factors



# Eni Monitoring Activities

## Remote Sensing

Detection and quantification of leaks have demonstrated a very effective gas reduction opportunity



A research and development initiative is ongoing in order to make monitoring activities cheaper and faster



Remote Sensing Technology testing on upstream operations

# Eni Monitoring Activities

## Field Testing

### Infrared Gas Imaging and Quantification Camera

- ▶ Monitoring of a representative components sample in a Eni Oil/Gas Treatment Plant with the Videocamera Sherlock®
- ▶ This Technology was developed and patented by *Pacific Advanced Technology* for the *US Defense Department*
- ▶ Comparison with the simultaneous FID measures



# Eni Monitoring Activities

## Field Testing

### Infrared Gas Imaging and Quantification Camera

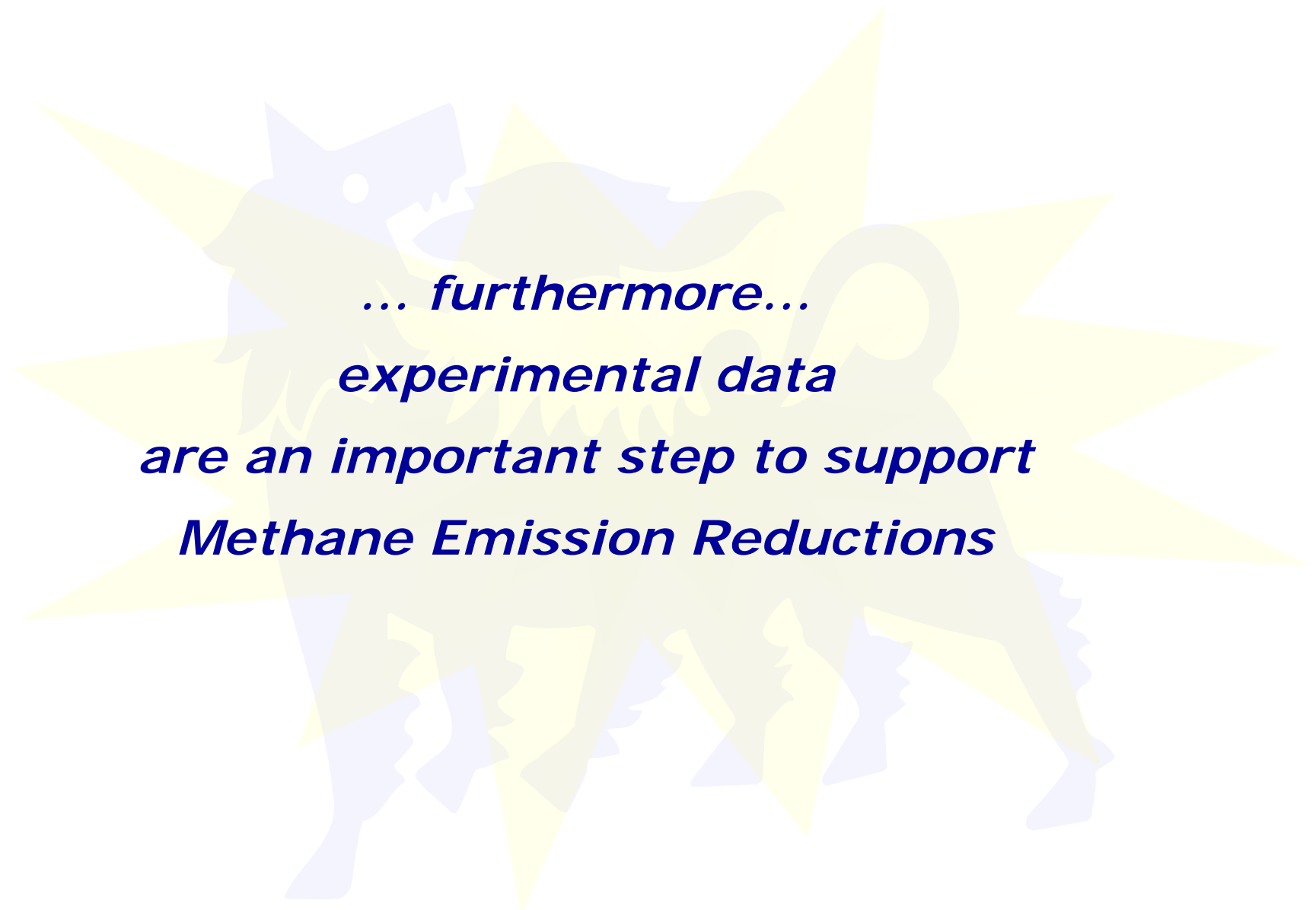
#### Sherlock's Capabilities:

- ▶ Leak Detection (also high distance and unattainable position )
- ▶ Quantification (within 2-5 m) over 10.000 ppm
- ▶ The methane is the most difficult substance to detect due to water interference in the atmosphere with IR
- ▶ Man portable (9.5 kg) and user friendly application



# Opportunities

- ▶ Video-imaging can be applied as an alternative or in combination with standard measurement methods (40 CFR Part 60, Proposed Rule)
- ▶ Participate/promote in Joint Industrial Project for R&D video-imaging Tools development
- ▶ Validate fugitive estimation method and assure the data “quality” for the upstream sector



*... furthermore...  
experimental data  
are an important step to support  
Methane Emission Reductions*

# Thanks for Your Attention



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