KUALA LUMPUR 2012 WORLD GAS CONFERENCE

25th world gas conference

"Gas: Sustaining Future Global Growth"

Energy Saving By High Efficiency CHP
A New Natural Gas Value

eni's experience

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Agenda - Items

- Background - Energy Efficiency Certificate Mechanism
- Aims - Case study effectiveness
- Method - Case study
- Results
- Summary conclusions

Background
Energy Efficiency Certificate Mechanism

- In Italy **White Certificate Mechanism** is the main system to support and promote energy efficiency

- This mechanism has been created in 2004 by Ministerial Decrees and defines **energy saving obligations in final use of energy**, for the biggest Italian electricity and natural gas distribution system operators (DSO)

- Savings can be obtained by approved projects by DSO themselves or by **Energy Service Companies (ESCOs)** or Energy Managers

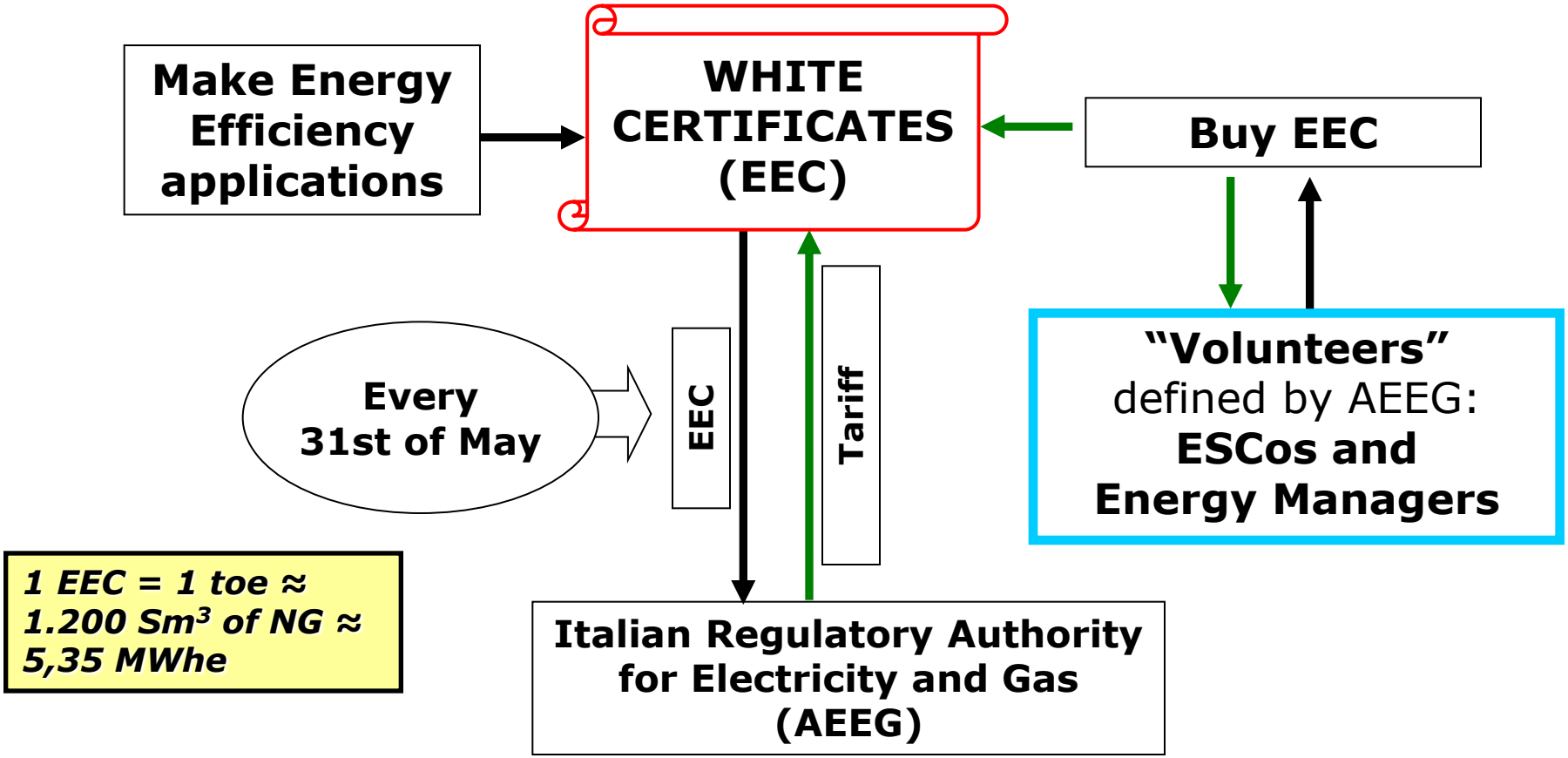
- **White Certificates are Energy Efficiency Certificates proving primary energy savings** amount obtained in terms of TOE. They can be obtained from specific projects (at maximum 5 years each) and exchanged on a dedicated market, giving the possibility to DSO to comply with their obligations

- From the beginning of the mechanism until December 2010, **more than 9.6 Million TOE have been saved**, with respect to available technologies (Source: Italian Regulatory Authority for Electricity and Gas)

Background
Energy Efficiency Certificate Mechanism

Primary energy saving national targets [Mtoe/year]

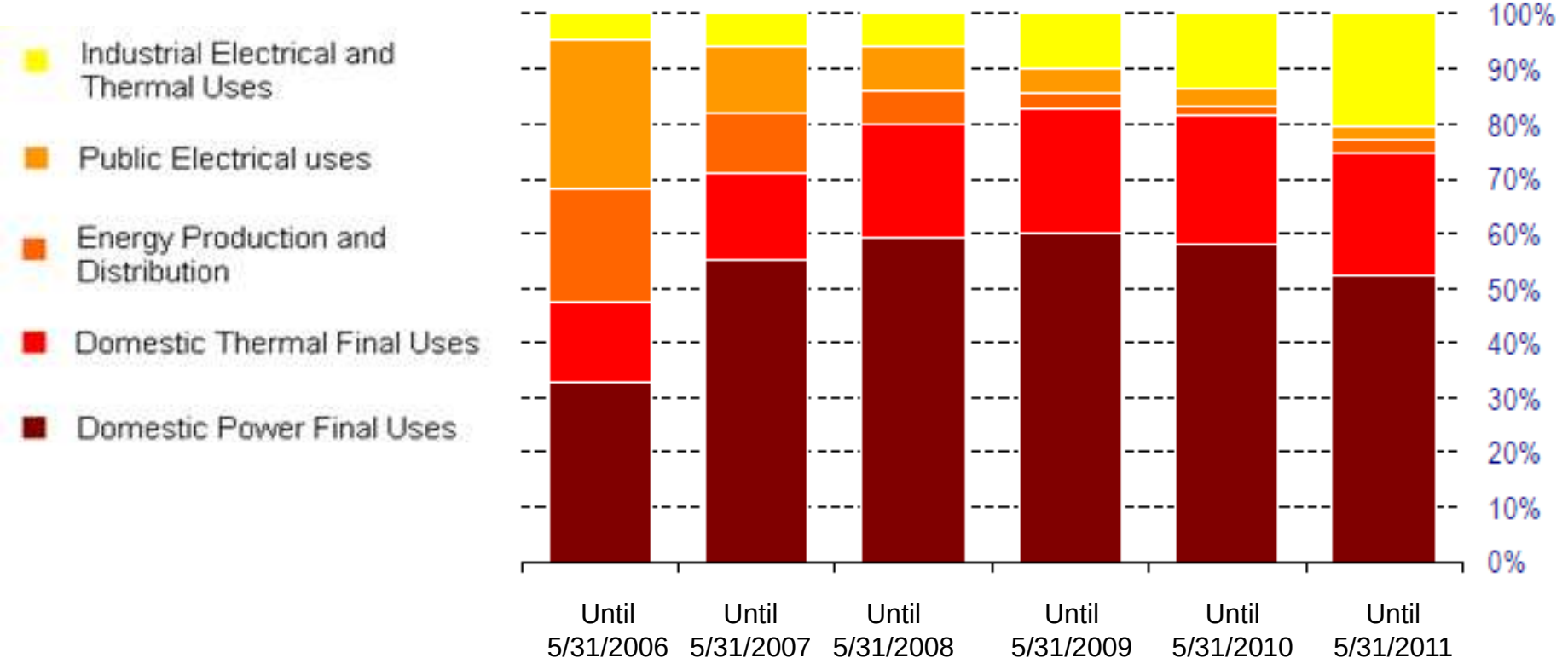
Obliged subjects
(Natural Gas and power distributors with more than 50.000 clients connected)



1 EEC = 1 toe ≈ 1.200 Sm³ of NG ≈ 5,35 MWhe

Background
Energy Efficiency Certificate Mechanism

Main Areas and Applications from 2006 to 2011



Source: Italian Authority for Electricity and Gas (AEEG)

Aims – Case study effectiveness

In the followings, a real case-study on High Efficiency natural gas CHP in the ceramic sector will be presented as a successful case history of the application of White Certificates Mechanism in Italy.

To this extent, **eni** has analyzed its customer's project in order to:

1. find the projects that could bring a reduction of energy consumption and evaluate the eligibility to White Certificates mechanism

2. define and send to the Italian Regulatory Authority the energy saving measurement program

3. manage the White Certificates obtained

Method – case study

In industrial sector, in order to access Energy Efficiency Certificates, Energy saving project are normally customized and not standard.

This results in **specific measurement method** to **demonstrate energy savings achieved:**

- **check the eligibility** of the project to White Certificates mechanism;
- clear **definition of time sheet** (build-in, start time, reference period to calculate savings – e.g. 1 year);
- the **algorithm used** to calculate energy saving with reference to previous conditions and reference conditions (i.e. baseline)
- **baseline,** i.e. reference consumption to calculate additional savings;
- **parameters to be measured**;
- **measurement instruments** used;
- calculation formulas;
- documents, datasheet and data to be saved

Method - The project

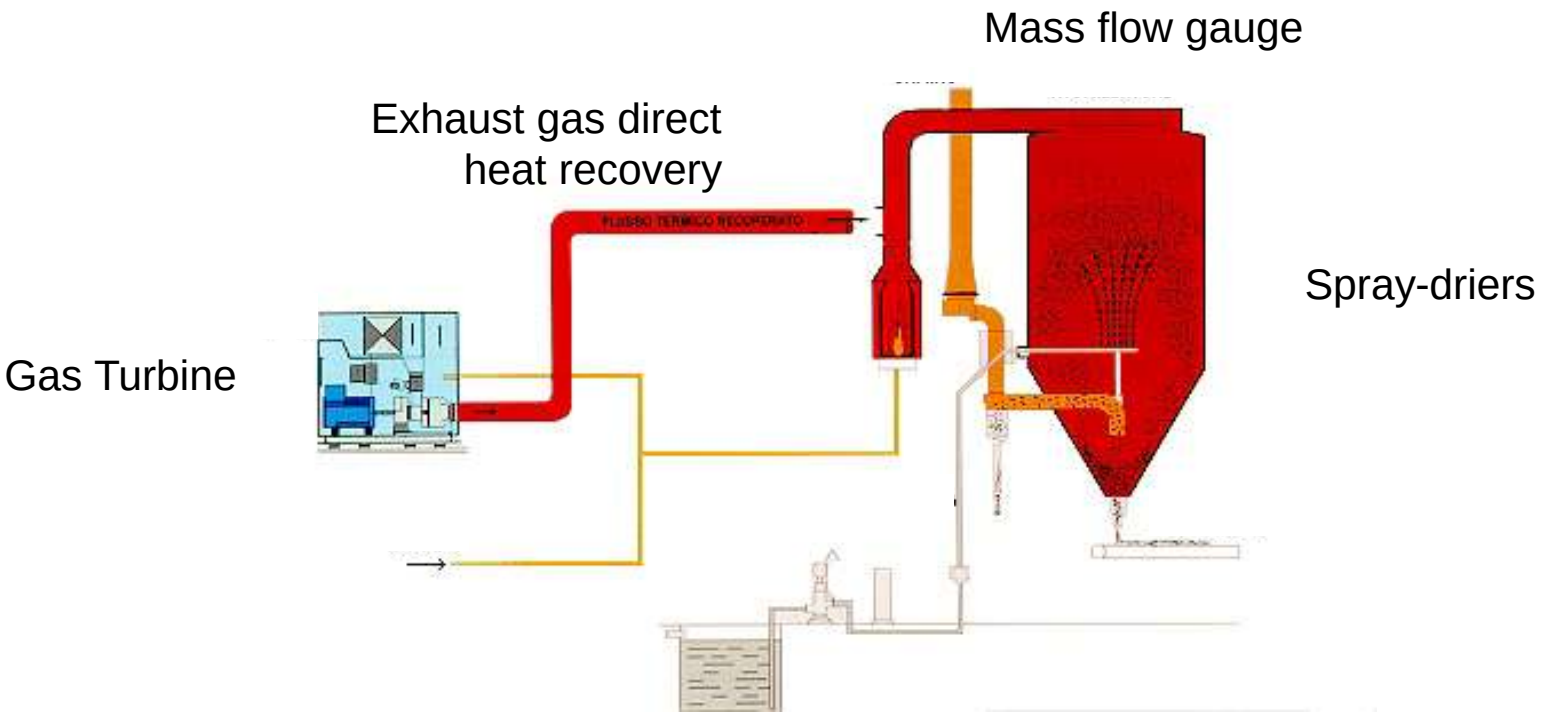
The Energy saving project is based on a **High Efficiency natural gas CHP plant.**

Data sheet:

- Technology: **GAS TURBINE**, year 2009
- Industrial sector: **Ceramic tiles**, Casalgrande Padana Spa, ITALY
- Electric Power: **5.580 MWe**
- Thermal Power available: **9.884 MWt**
- Gas consumption: **1.864 Sm3/h**

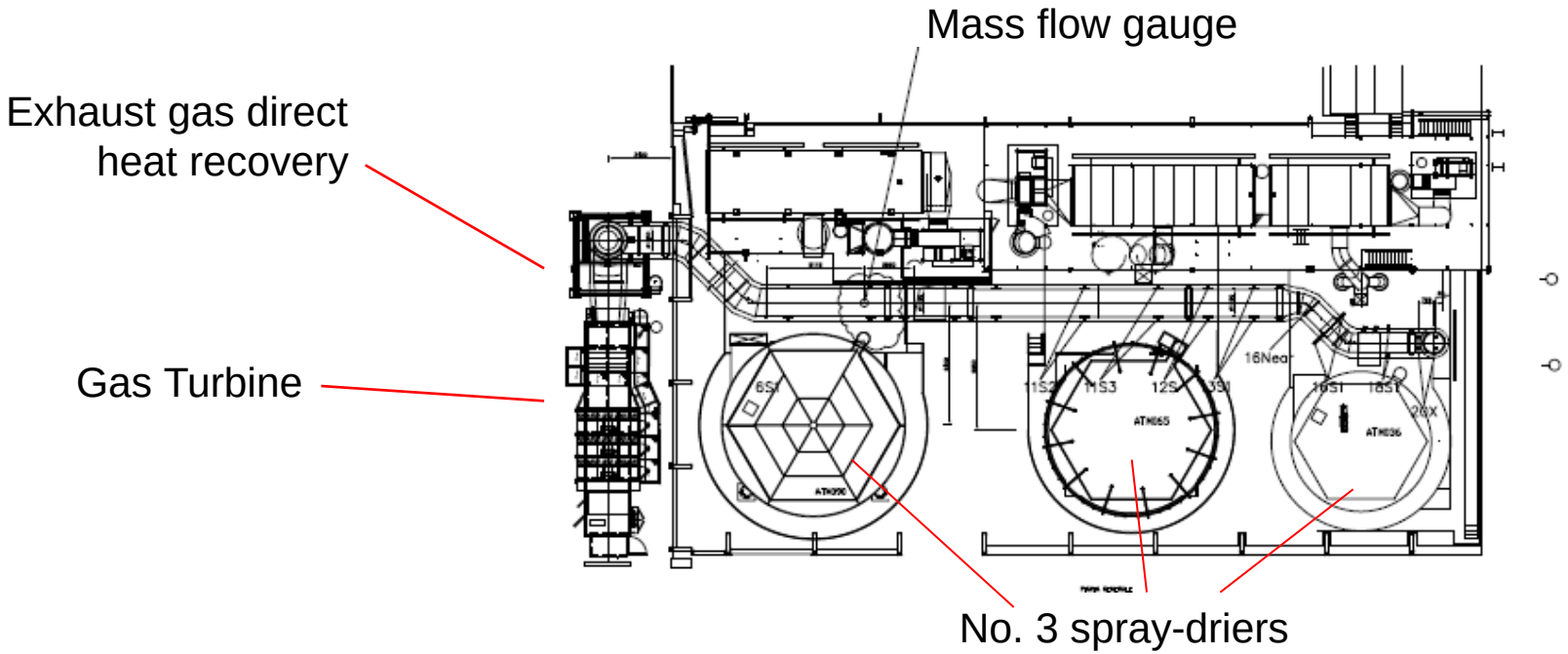
Method - The project

- Gas turbine produces the electricity needed by the factory,
- Exhaust gas from of GT at 550 °C are completely used to dry basic product of ceramic tiles (a water- clay mixture with 30% water) which flows in 3 counter-flow spray-driers
- Normally, natural gas burners are used to produce hot gases; in this case hot gases come from GT and they can eventually be post-fired by burners.
- Thanks to high heat exchange, water evaporates suddenly, so generating fine powder products, which is basic products for ceramic tiles



Method
Scheme & measurement system

- Energy measurement: exhaust gas mass flow and temperature
- The measurement instrumentation of exhaust gas flow is placed along the pipe conveying exhaust gas to the spray-dryers, in such a way to avoid measurement error due to curves and turbulences.
- All data are collected and managed by PLC system normally used for plant management.



Results

- Technical and energy results after the **first two year running**

Year	Electricity produced	Heat recovery	Gas consumption	Electricity saving	Natural Gas saving	Energy saving
-	MWh	MWh	MWh	TOE	TOE	TOE
estimation				1050	750	1.800
2010	29,515	49,505	90,612	1,065	852	1,917
2011	31,201	54,766	98,808	**1,148**	**946**	2,094

TOTAL ENERGY SAVING:

4,011 TOE, equivalent to

4,838 Energy Efficiency Certificates

Summary Conclusions

- White Certificates Mechanism, developed in Italy since 2004, is an effective way to promote energy efficiency basing on a market process.
- At the end of 2011, specific rules have been introduced to support CHP in Italy with specific Ministerial decrees, based on white certificates. For this reason, AEEG is going to modify the mechanism in coherence with the new decrees.
- **eni** supports the exchange of experiences of the energy saving schemes based on market mechanisms (e.g. White Certificates) as a way to achieve energy efficiency reducing at the same time countries overall costs.
- High efficiency natural gas cogeneration, based on heat recovery, is one of the best solutions to improve energy savings. If well applied, it accesses incentive mechanism, as shown in this paper.
- This case history is an example of how **eni**, according to its customers' needs, has found specific applications to improve the efficient use of natural gas on its costumer's sites. This intervention is obtaining significant primary energy saving, over 1.800 Toe/year, and thanks to incentive program it is gaining a real extra value.

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Thank you for your attention!

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