ENDESA HELLAS

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"ENERGY & DEVELOPMENT '08"

An Energy Strategy for Accomplishing the New EU Targets

Large Scale Thermoelectrical Cogeneration

334 MW CHP

Its contribution to enhanced energy efficiency

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Climate and Energy Targets: A technology and social approach

- **Reduction of primary energy consumption and increase of Energy Efficiency**
- **Reduction of greenhouse gases by 20%** compared to 1990 levels (or 30% in case of adoption of a post-Kyoto international agreement)
- **Increase contribution of RES in electricity production by 20%** including a 10 % biofuels target

Climate Action

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Are there conventional technologies to reach the targets?

- **Long term new technologies are needed for large scale “clean” electricity generation**
- **Short term available**
  - **Wind turbines, reaching larger single capacity in future**
  - **Nuclear, but with social reservations**
  - **Gas CCGTs, reaching the limits of efficiency**
  - **Large scale Cogeneration, where heat demand exists, already highly efficient**
- CHP offers energy savings ranging between 15-40% when compared to the supply of electricity and heat from conventional power stations and boilers

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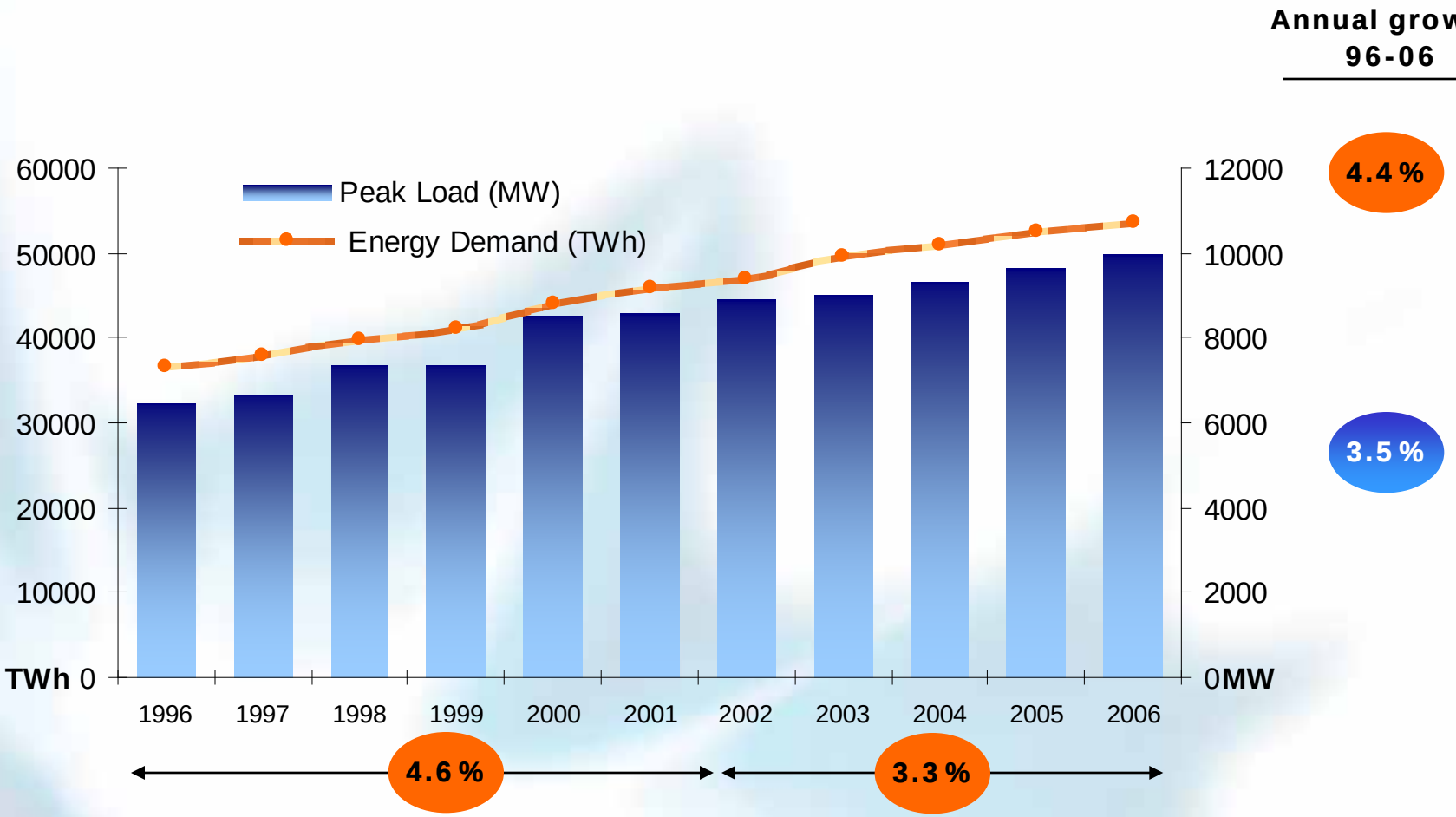
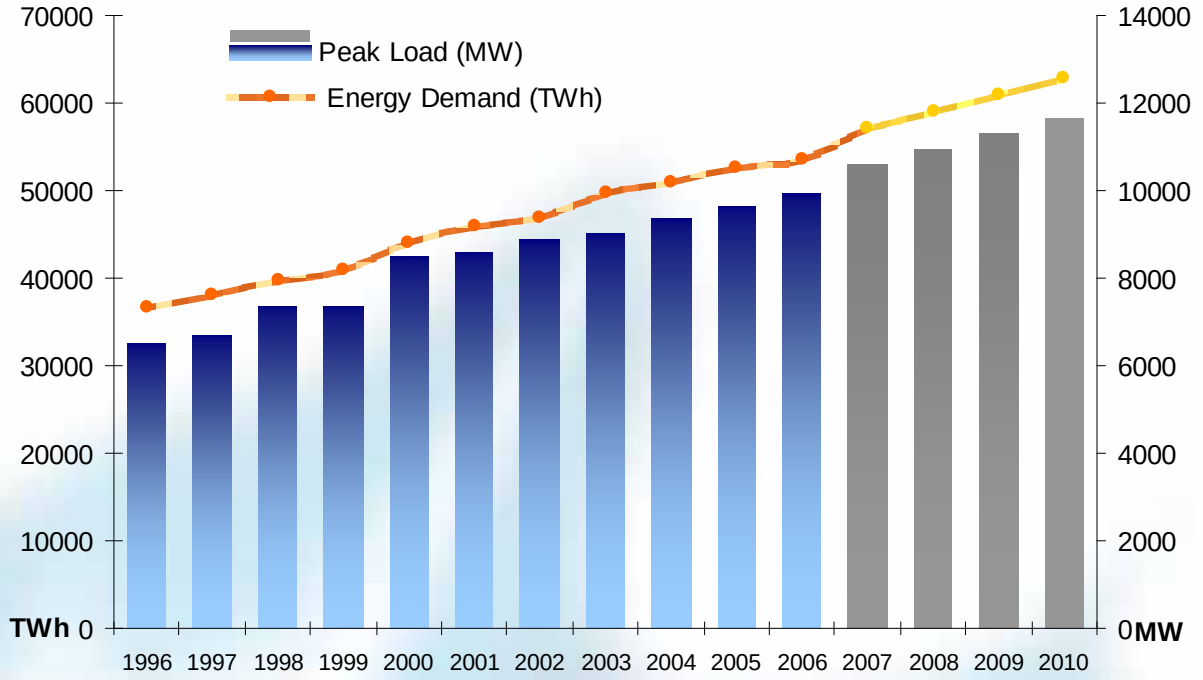
Historically, electricity demand has grown at ~ 4% per year



From 2007-2010, electricity demand is expected to continue to grow while insufficient capacity will be developed …

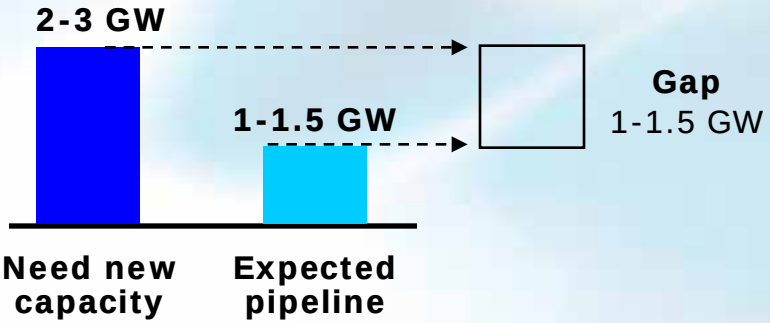
Demand



3.3 %

3.3 %

Supply



Gap
1-1.5 GW

Greece needs new capacity faster than planned by strategic players

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Cogeneration of Heat and Power

Typical Cogeneration Scheme:

Typical conventional power generation scheme:

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EC Policy and CHP Directive

- **EU target to double the electricity share of CHP by 18% until 2010 (COM/97/514) to emissions reduction of 65 Mt CO_2/year by 2010**
- **Directive 2004/8/EC , originally required complete transposition by 21 February 2006 (but delayed because of comitology**)
- Following January 2008 EU targets, Germany,Spain, UK announced enhancing measures for CHP electricity to the system

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CHP Development in Greece

- Cogeneration of heat and power in Greece has been relatively small
- Existing operating small CHP installations in the sugar and paper industry, oil refineries, fabrics industry etc.
- PPC is utilizing useful heat from conventional power plants for district heating purposes
- The total installed capacity of industrial CHP units in Greece was 232 MW in 2006 (1.8% of total national installed capacity)
- Power production of 1 TWh

The largest SEE Thermoelectrical CHP plant is in Greece:

334 MWe CHP Plant at St. Nicholas, Viotia

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334 MW CHP Plant, St. Nicholas

- Largest high-efficiency CHP plant in South Eastern Europe
- Investment of more than 200 million Euros by Aluminium S.A. under Mytilineos Holdings management
- EPC Contractor METKA S.A., high quality construction completed on time
- Ownership and operation by Endesa Hellas S.A.
- To supply all necessary steam for the alumina plant of Aluminium S.A. and replace fuel oil used for that purpose

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334 MW CHP Plant, St. Nicholas

- Two General Electric high-efficiency gas turbines / power generator units (9E/PG171E)
- One steam turbine / power generator unit, ALSTOM heat recovery systems
- The steam turbine and each gas turbine are connected to a local sub-station that will be connected to the grid (150 kV).
- Natural gas pipeline ready on time by DESFA, HV interconnection completed and tested
- Testing almost complete, target for commercial operation in Fall 2008

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334 MW CHP Plant: Fact sheet 1

- Full operation achieves primary energy savings of **12%-15%** when compared to the separate electrical and thermal processes.
- Reduction of the annual consumption of oil fuel by **160,000 tons** for the steam production process
- Reduction of CO_2 emissions by at least **1.25 million tons/year** at national level to the benefit of the country
- Continuous efficient energy supply on competitive terms, is expected to produce **2,719 GWhe** and **1,760 GWhth** annually with an annual NG consumption of **510 million Nm^3**

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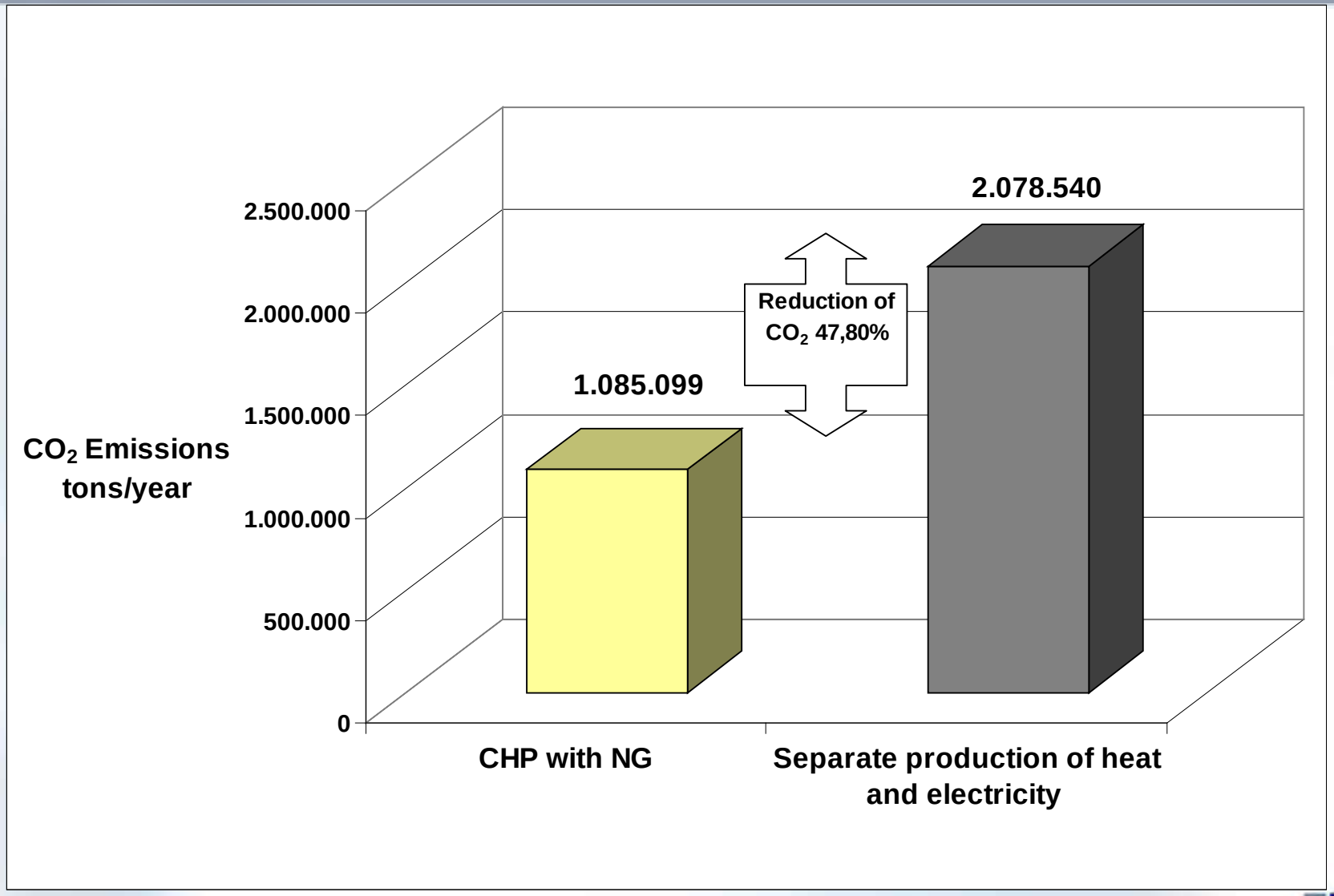
Reduction in CO_2 Emissions from the operation of the 334 MW CHP plant



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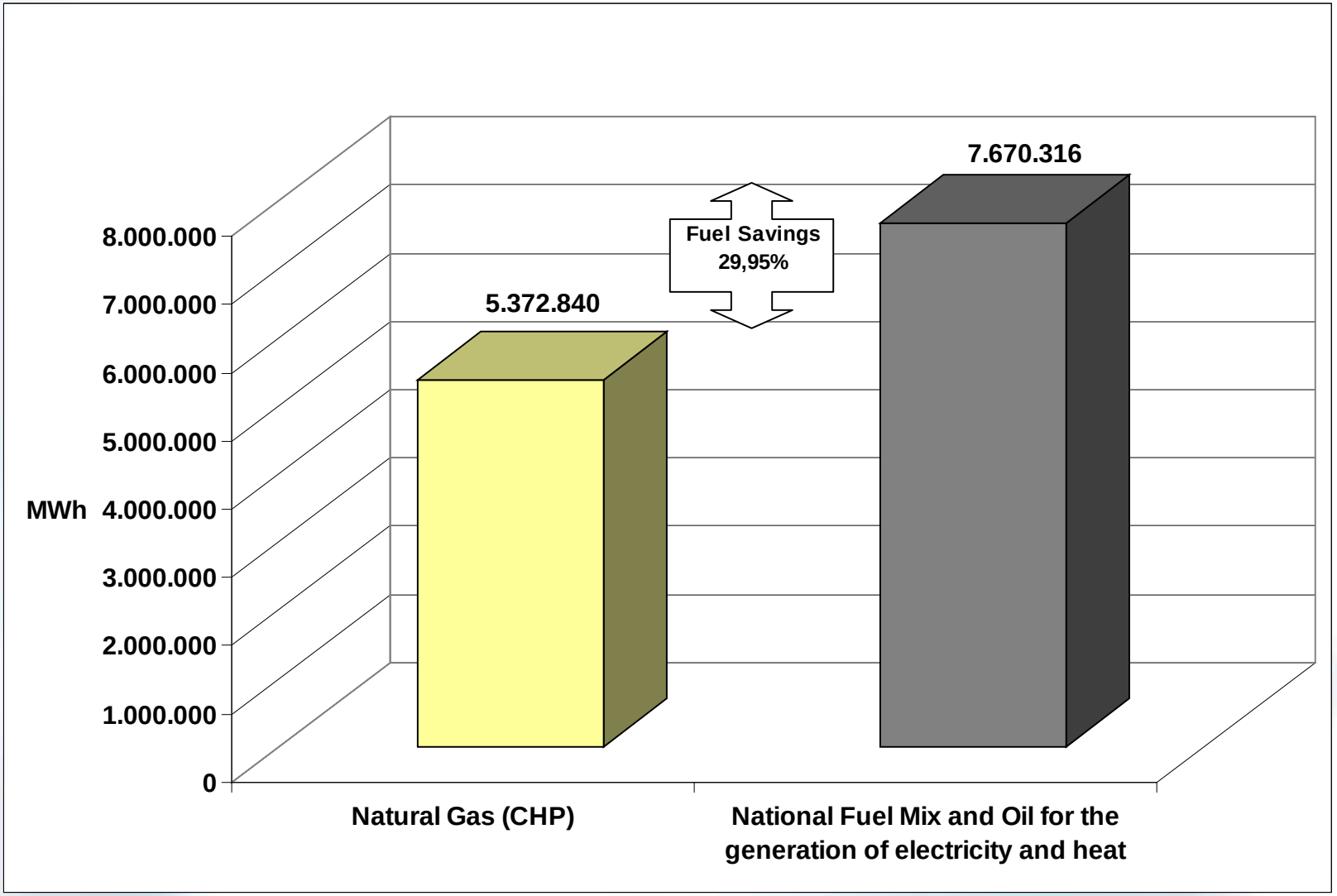
Fuel Savings from the Operation of the CHP Plant



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334 MW CHP Plant: Fact sheet 2

- Effective contribution to the System Marginal Price (SMP) resulting to significant economic savings to Utility –Supplier (PPC) as well as to the national economy
- Reliable support to HTSO needs, high availability due to technology
- Supplementary to imports, back up units and modern ancillary services

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334 MW CHP Plant: Fact sheet 3

- Contribution to the reduction of system losses, also alleviating congestion in the electrical power transmission network in the south system of Greece
- Effective contribution to the minimization of “blackouts” during the critical summer periods
- The Mavroneri-Antikyra gas pipeline will create new consumers for natural gas across all consumer categories

Barriers to cogeneration admitted by EU

EC Communication COM (97) 514

- “Many of the important barriers to the development of CHP in Europe result from the relationship between cogenerators and electricity production utilities.”
- “Market dominance of existing utilities act as a barrier to new market entrants by distorting the economics in such a way as to make CHP appear to be economically unattractive”

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Major Barriers to Cogeneration

Lack of Motivation for industrial investors

- Power production usually has no necessity and is rather unfamiliar

Utilities used to conventional power generation

- Utilities „reserved“ in enganging or investing in CHPs, therefore
  - Unfavourable conditions for supply of all, additional or stand-by power
  - Price Dumping to prevent CHP installation

New CHP-plants compete with depreciated generation capacity

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Major Barriers to Cogeneration

- High dependence on conventional heat and power generation forms
- Natural Gas
  - High prices
  - Necessity to further expand the supply network
- EC CO_2 policy (2013-2020)
  - Unfavourable projected policy towards CHP

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Major Barriers experienced

- Administrative Barriers (e.g. licensing, operational)
- Uniqueness of the project (no prior experience on large-scale CHP)
- Inadequacy of present Legal and Regulatory Framework to fully support large-scale CHP
  - No incentives to CHP units larger than 35 MW
  - Differentiation of large-scale CHP units
- The right to participate in the market under current rules
  - Dispatched unit in the electricity market
  - Directive 2004/8/EC has not yet been incorporated into national law
  - Resolution of the Greek Regulator on the promotion of CHP on the basis of useful heat demand

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The way forward…

- Complete transposition of Directive 2004/8/EC into national law
- Promotion of the Resolution of the Greek Regulator in support of large-scale CHP (“must run”)
- Overcome comitology and operational procedures
- Regulatory and Institutional development
- Further elaboration of support actions by the State towards CHP installations (incentives)
- Enhancement of energy efficiency operations

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The way forward…

- Favourable treatment of high efficiency CHP installations in the revised EU ETS from 2013-2020
- Support of investment initiatives for energy production from cogeneration of heat and power
- Improvement of the investment environment for the installation of CHP plants
- Equitable exploitation of the scientific potential for the development of commercially viable innovations in the field of efficient energy production.

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Thank you for your attention!

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