Energy Efficiency in Buildings - Advanced District Heating

Energy efficiency technology landscape: district heating and cogeneration

GDF SUEZ

BY PEOPLE FOR PEOPLE

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Introduction

A global presence and N°1 in energy efficiency services in Europe

GDF SUEZ Energy Europe

- **26,000** employees.
- Energy management and trading.
- Power generation.
- Supply of natural gas to major clients in Europe.
- Marketing and sales.

GDF SUEZ Energy International

- **10,900** employees.
- **6** business areas: United Kingdom-Europe; North America; Latin America; Middle East, Turkey & Africa; Asia; Australia.
- Power production.
- Supply of natural gas and electricity.

GDF SUEZ Global Gas & LNG

- **1,900** employees.
- Exploration & production.
- Liquid natural gas portfolio management.

GDF SUEZ Infrastructures

- **18,000** employees.
- Natural-gas transmission network.
- LNG terminals in France.
- Storage activities in and outside France.
- Gas distribution networks in France.

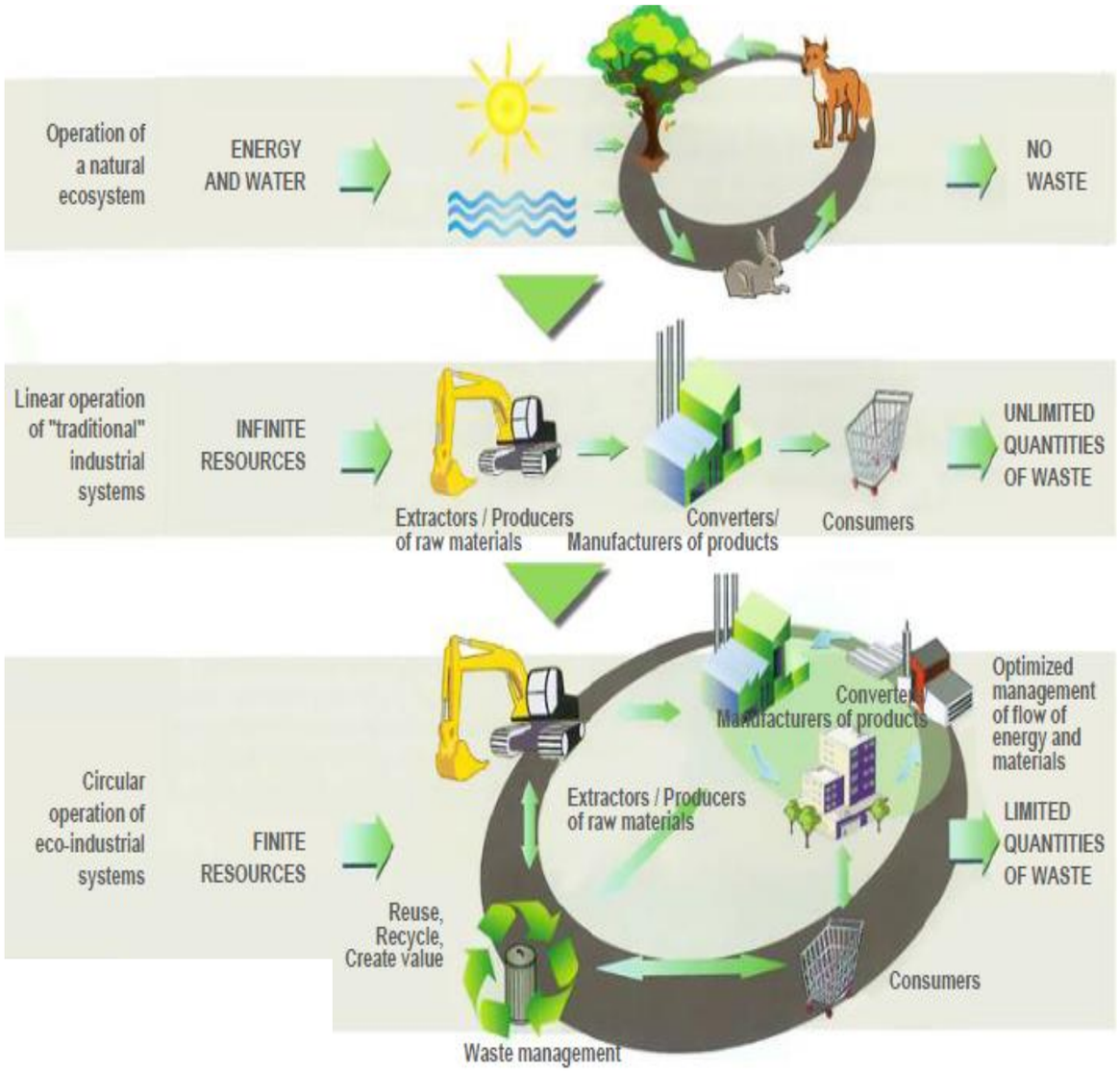
GDF SUEZ Energy Services

- **78,150** employees.
- Management of urban networks in and outside France.
- Management of industrial and tertiary electrical installations.
- Global multitechnical offers.

1. The need for a comprehensive expertise (1/2)

Delivering low-carbon sustainable energy solutions

- GDF SUEZ Energy Services serves users in public, commercial, industrial and residential sectors.
- GDF SUEZ meets the long-term energy needs of businesses and public authorities thanks to technological know-how that emphasizes
  - renewable energy such as biomass, geothermal energy, waste-to-energy
  - respect for the environment.



1. The need for a comprehensive expertise (2/2)

Providing a comprehensive turnkey service for District Energy

- With over 25 years experience, COFELY District Energy has the expertise to provide a comprehensive turnkey service for District Energy, encompassing:
  - Initial feasibility/financial viability studies
  - Provision of finance for projects
  - System design
  - Installation and commissioning
  - Project management of associated works
  - Ongoing operation and maintenance
  - Contract energy management
- In addition to our extensive experience of designing, installing and operating District Energy schemes, GDF SUEZ has key delivery capability and expertise in:
  - technical O&M service provisions
  - energy services
  - specialist technical solutions
  - project & engineering services
  - integrated facilities solutions, including facilities management.

2. International Experience (1/4)

International experience in EE projects for district heating

- Today, GDF SUEZ Energy Services teams design, build and operate district networks, the energy infrastructure adapted to local needs.

- COFELY operates over 110 district heating and cooling systems in Europe, including the cities of Amsterdam, Barcelona, Lisbon, Monaco and Paris (third heat grid in the world), many of which were also financed, designed and constructed by COFELY.

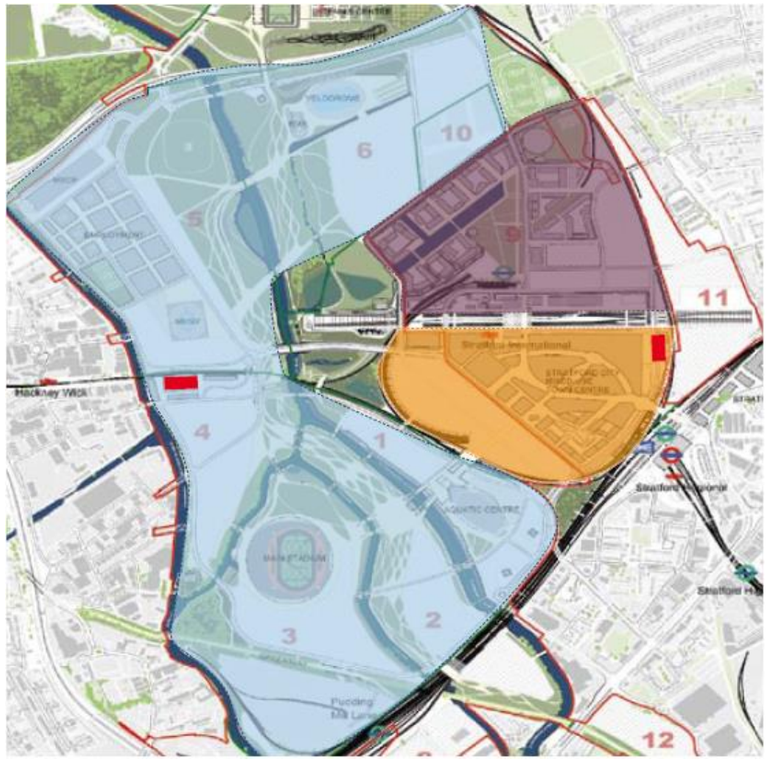
2. International Experience (2/4)

Olympic Park Energy Centre project outline

- The state-of-the-art Energy Centre in the Olympic Park was first unveiled in October 2010, by the Olympic Delivery Authority (ODA).
- The Olympic Park Energy Centre has been designed, financed and built by Cofely, along with approximately 16km of community energy networks.
- Sectors: Government, Retail
- Solutions: District Energy, Energy & Utility Services, Project Services
- Technologies: Bio-energy and gas
- The total cost of the projects is £113m (about 170m USD).

2. International Experience (3/4)
Olympic Park Energy Centre Key facts

- Technical facts
  - 9.5MW of CHP plant
  - 83.5MW of boiler plant
  - 57MW of chilled capacity
  - Over 16km of distribution pipework
  - The CCHP uses both gas and biomass boilers.
- Two integrated energy centres
  - The first energy centre provided heating and cooling to the 9 major competition venues within the Olympic Park and also the Athletes Village & International Broadcast & Media Centre.
  - The second energy centre provides similar services to Westfield's Stratford City Shopping Centre.



- Contract facts
  - Design, build, finance, operate and maintain contract
  - Key to London's Olympic legacy
- Advantages
  - 20% less CO2 emissions than conventional system
  - Plant housed in low energy building, making extensive use of recycled materials

2. International Experience (4/4)

Olympic Park Energy Centre is a legacy of sustainable energy

- The Energy Centre will provide an efficient low-carbon heating and cooling system across the site for the Games and for the new buildings and communities that will develop after 2012.

  - With a combined capacity of up to 200 MW heating, 64 MW cooling and 30 MW electricity, the district energy network will play a part in the legacy of the Games, by continuing to serve the remaining venues – as well as new homes and businesses to be built on the Queen Elizabeth Olympic Park in the coming years.

  - The Energy Centre began to help reduce the carbon emissions of the Olympic Park and deliver an early legacy of sustainable energy well before the Games began.

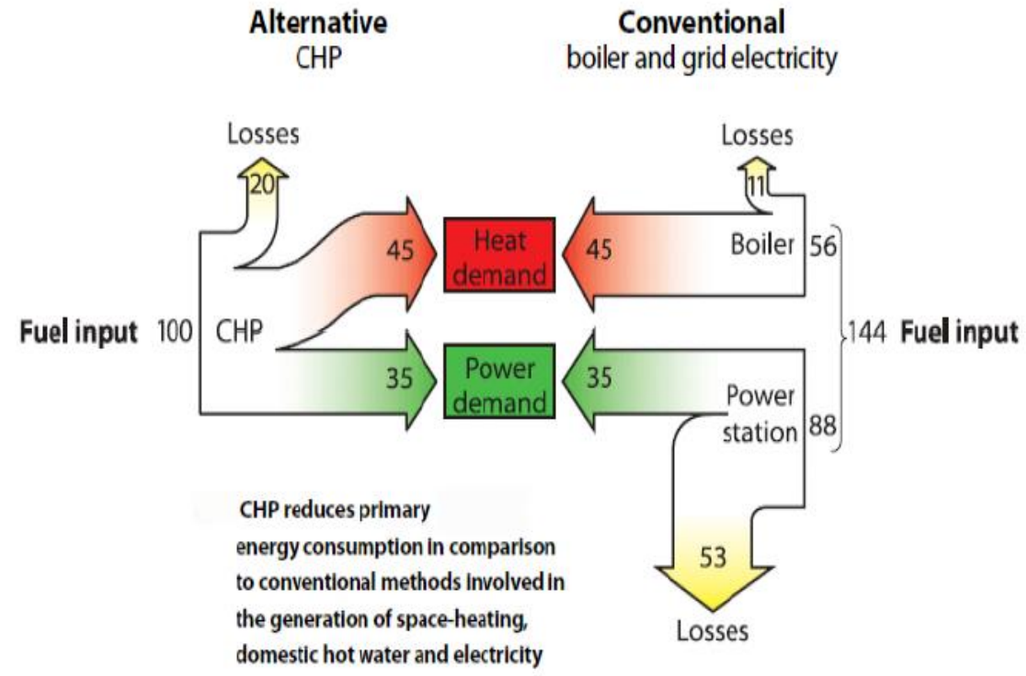
- COFELY District Energy will operate and maintain the facility for a period of 40 years.

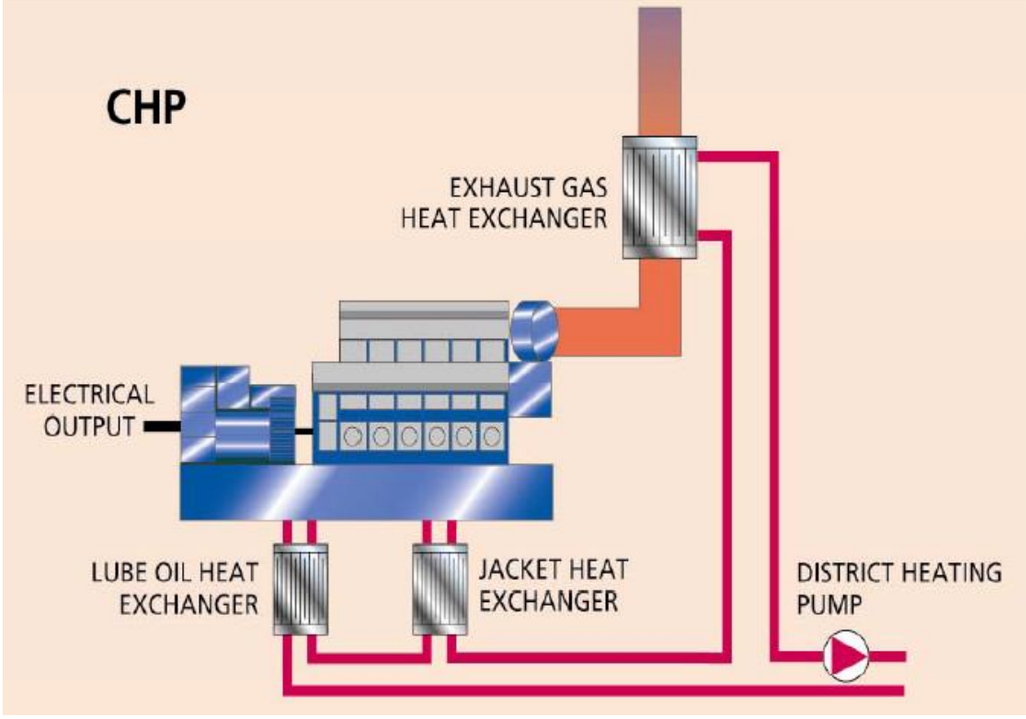
  - COFELY gives necessary flexibility to its offer: transformation into a university campus, dismantling of substations…

Conclusion (1/3)

Ukraine: a potential of modern district heating networks

- CHPs operate at 70-85% efficiency compared to typical power stations 25-35%. However, for energy security, people are moving back to or staying with coal
  - GDF SUEZ promotes gas CHP and the combined use of gas, coal and renewable energies to better the efficiency of the plant
  - Promote high performance gas thermal heat pumps.
- This long term goal will take some time and requires a stable political will in order to:
  - Identify priority projects
  - Integrate these projects in a global approach to the energy mix, energy costs and system flexibility





Conclusion (2/3)
District energy as the best practice approach

- District energy systems emerged as a best practice approach for providing a local, affordable and low-carbon energy supply.
  - District energy allows for a transition away from fossil fuel use and can result in a 30–50 per cent reduction in primary energy consumption.
  - District energy represents a significant opportunity for cities to move towards climate-resilient, resource-efficient and low-carbon pathways.
- The development of modern (i.e., energy-efficient and climate-resilient) and affordable district energy systems in cities is one of the least-cost and most-efficient solutions for reducing greenhouse gas emissions and primary energy demand, according to the UN Environment program.
  - A transition to such systems, combined with energy efficiency measures, could contribute as much as 58 per cent of the carbon dioxide (CO_2) emission reductions required in the energy sector by 2050 to keep global temperature rise to within 2–3 degrees Celsius.
  - These networks also reduce the primary energy consumption of cities up to 50%.

Conclusion (3/3)

Direct Heating Overview: efficient heating, cooling and power

What is District Energy?	What is an Energy Centre?	What are CHP & Tri-generation	Key benefits of district energy
District Energy is widely recognised as a sustainable, cost-effective solution to the provision of heating, cooling and power. District Energy scores highly in environmental assessments such as BREEAM and LEED. It also facilitates compliance with Building Regulations Part L requirements. Increased use of District Energy coupled with Combined Heat and Power (CHP) and other low and zero carbon energy generation is a cornerstone of strategies for reducing carbon emissions.	At the heart of every District Energy scheme is an Energy Centre serving a range of buildings through a network of underground pipes and cables. In most District Energy schemes the Energy Centre includes a CHP plant, which may be combined with an absorption chiller (tri-generation) where there is a cooling requirement. Schemes may also incorporate other low and zero carbon (LZC) technologies such as fuel cells, biomass, solar, thermal, heat pumps and high efficiency gas-fired boilers.	CHP plant simultaneously produces heat and electrical power. For much of the year the heat output is used for heating and hot water in the buildings served by the District Energy scheme, while the power meets local or national electrical requirements. In summer, when heating requirements are lower, the surplus heat may be used to drive an absorption chiller to generate chilled water for cooling in these buildings. Tri-generation delivers significant energy savings compared to conventional methods of providing heating, cooling and power.	- Makes more efficient use of plant than distributed systems - Lower capital expenditure - Competitive fuel purchasing - Lower running costs - Enhanced opportunities for LZC technologies - Reduced carbon emissions - Opportunity to sell power to the grid or direct to consumers - Building Regulation compliance - Future proof energy supplies

Thanks for your attention