22e ÉDITION

DUNKERQUE
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3 jours d’ateliers, de débats et de plénières
The role of District Heating & Cooling in Accelerating Decarbonization and resiliency for Cities

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Cities are at the forefront of climate change

Highly exposed as well as heavy contributors

- Impacted more and more often by extreme weather events (heat waves, storms, floods...)
- Major sources of greenhouse gas emissions

> 50% of carbon emissions are produced within cities (1)

50% of the final energy consumption is due to Heating (2)

200% increase in global cooling demand from air conditioning between 2016 et 2050 (3)

70% of the population is expected to live in Cities by 2050 (4)

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1) UNHabitat, Global report on human settlement 2011, figures based on production of CO2
2) Heat Roadmap Europe, 2015
3) IEA, The Future of Cooling, 2018
4) Bloomberg NEF - Air Conditioning Heats up Electricity Demand
# Heating & cooling: what is at stake for Cities?

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Bridging attractiveness & zero-carbon for Cities via Heating & Cooling networks...

Consuming less resources
- Reducing energy, water, chemicals consumption
- Reducing operating and maintenance costs thanks to pooled equipment versus individual systems
- Reducing energy bills
- Reducing peak demand and thus constraint on the grid
- Financing projects within budgetary constraints

Shifting to green energy
- Being assured of a reliable low carbon energy supply
- Favoureding local and renewable energies
- Promoting circular economy
- Coupling energy sector (heat, cold, power)

Contributing to better urban spaces
- Ensuring safety of operations
- Maximizing availability and resiliency
- Satisfying end users
- Improving air quality
- Reducing visual pollution caused by individual systems
- Integrating installations in the architectural landscape
- Vegetalized streets and buildings
- Embarking stakeholders (schools, citizens...)
...a wide range of solutions that can be applied to heating and cooling networks

**Consuming less resources**
- Best available technologies for boilers, chillers, heat pumps, energy transfer stations, storage, distribution...
- Energy management system, digital monitoring and intelligence optimizing consumptions
- Reduction of energy losses (LTHW Low Temperature Hot Water)
- Reduction of water leakages
- Guaranteed energy performance and savings

**Shifting to green energy**
- On-site energy production: combined heat & power, cogeneration, biomass, biogas, solar thermal, geothermal, hydrogen...
- Green Power Purchase Agreement including blockchain certification
- Use of Free Cooling when Doable,
- Re-use of local excess heat (industry, data centers...)
- Waste recycling to energy
- Energy storage

**Contributing to better urban spaces**
- Urban planning
- Green roofs, greenery urban islands
- Protection of biodiversity
- Guaranteed availability
- Safety of installations, security for people
- Reduction of the number of points of emissions and better control
- End-users’ satisfaction surveys
- Visitors centers
Integrated solutions for zero-carbon transition and quality of life

**The Copenhagen energy system**

- **Renewable Energy**
  - Solar and wind power
  - CO₂ neutral electricity
- **Efficient Buildings**
  - Electric and gas-powered busses
  - Electric cars
- **Distributed Energy**
  - Offshore wind farms
  - CO₂ neutral electricity
- **Public Lighting**
- **Green Mobility**
  - Green town gas
  - Biogas production
  - Organic waste
- **Green Gases**
  - Waste incineration
  - Residual waste
  - Biogas production
  - Wastewater treatment and purification plants
- **District Heating & Cooling**
  - Power stations supplying CO₂ neutral electricity and district heating
  - District cooling - climate friendly cooling of large buildings

**Copenhagen targets carbon neutrality in 2025**

**Our customers’ needs**

- To improve **Security and Resilience**
- To benefit from **Fluid & Green mobility**
- To ensure an **Enjoyable environment**
- To develop the **Local attractiveness**
- To allow to **Reduce costs**

**Copenhagen**

- Copenhagen targets carbon neutrality in 2025

**DÜNKERQUE**

20th January 2021
The Energy Center for the Olympic Park & Stratford City, built and operated by ENGIE UK, includes a 3 MW wood chip biomass boiler and Combined Cooling, Heat and Power (CCHP) plant to generate heating, cooling and electricity. Hot and chilled water are distributed through a district energy network to the Olympic Park.

**CLIENT STAKES**

**Client identity and activities**
- Queen Elizabeth Olympic Park in London is a sporting complex in Stratford. It was built for the 2012 Summer Olympics and the Paralympics.
- The Energy Centers provide an efficient low-carbon heating and cooling system across the site for the Games and for the new buildings and communities that form part of the wider Olympic Legacy Project.

**Client needs**
- 75% of area electricity needs covered
- Expected growth for heating: 78 up to 165 GWh in 2030
- Expected growth for Cooling: 44 up to 51 GWh in 2030

**PROJECT VALUE PROPOSAL**

**People**
- Eco-friendly environment
- Energy Center with a flexible modular design for future expansions
- Heat trust signatory (customer protection body)

**Planet**
- 24% reduction in CO2 emissions
- Efficient use of raw materials & Avoidance

**Profits**
- 40% savings in energy consumed equivalent to a reduction of 2,900 metric tons of CO2 emitted, compared with conventional CO2 facilities

**TECHNICAL ASPECTS**

**Technical aspects**
- 2 integrated Tri generation energy (including CHP, Biomass boilers & Absorption Chillers)
- Distribution: 16 km of pipeline
- Cooling & heating capacity:
- 57 MW: Cooling capacity
- 92 MW: Heating capacity
- Thermal Storage
- Connected residents: 3,000 housing connected

**Contractual aspects**
- Design, build, finance, operate & maintain contract
Districlima was Spain’s first urban heating and cooling district network. The project was initially located in an urbanistic remodeled area of Barcelona that includes the Cultures Forum 2004 (Besos seafront). The project encompasses the design, construction and later use, over a 25 years concession of the Forum’s production station and energy distribution network.

CLIENT STAKES

Client identity and activities

- Districlima located in Barcelona was formed in 2002 to perform, for the first time in Spain, an urban network of distribution of heat and cold for use in heating, cooling and sanitary hot water

Client needs

- In the case of Barcelona, the first catalyst of change was the celebration of the Barcelona’92 Olympic Games,
- With the “DHC” project a long-term urban, economic and social transformation of more than 200 Ha is undertaken, attracting “20th century industries” that should replace the old factories of the 19th century

PROJECT VALUE PROPOSAL

People

- More space available for business or other uses
- Interoperability of local system

Planet

- Reduction of greenhouse effect gas emission
- -63% Fossil fuel consumption reduction
- Significant reduction of leakages and refrigerant discharged into atmosphere
- Sea Water as cooling system of chillers.

TECHNICAL ASPECTS

Technical aspects

- 2 Districts Heating & Cooling
- Distribution : 18 km network length
- Waste to energy system that feeds both heating and Cooling network
- Cooling & heating capacity :
  - 93 MW : Cooling capacity
  - 62 MW : Heating capacity
- 40Mwh chilled water storage tank and 120MWh ice storage tanks
- Absorption Chillers
  - 1 seawater collection station of 5.000 m3/h
- Connected buildings: 94 Buildings

Contractual aspects

- Design, build, finance, operate & maintain contract
Main Recommendations to unlock the DHC Potential

• **Establish national and local potentials and plans for district heating and cooling:** Establishing the tools and having firm processes in place to properly assess the potential for district heating and cooling systems (DHC as part of the urban planification).

• **Increase investments in energy efficiency improvements all along the value chain including in-buildings**

• **Set commitments to deploy actions in liaise with the local level:** Heating and Cooling are local energy demand, and it is important to enable coordination between the national and local levels.

• **Start investigating the potential and role of district cooling:** As cooling is one of the fastest growing of the thermal sectors, the potential to explore the role of using free cooling and higher levels of cold water thermal storage requires investigations to be able to fully understand the potential and role that district solutions for cooling could play on the wider energy system.

• **Ensure a level playing field for a decarbonized energy system:** Markets, investments, regulation, taxes and tariffs need to be adjusted to promote low-carbon technologies and energy efficiency (new business models are needed to take into account, throughout the asset lifetime, the benefits brought by the DC system).

• **Take a systemic approach:** There is a need to assess the energy transition from an energy system perspective to utilize synergies between sectors and enable the energy value chain effects.
DHC to be deemed as essential infrastructure such as gas, electricity or water distribution lines in dense areas