

DISTRICT HEATING AND COOLING FROM RENEWABLE & WASTE ENERGY IN BARCELONA

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 17th „Building Services, Mechanical and Building Industry Days”, 13-14 October 2011, Debrecen, Hungary

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Objectives

Urban level: High quality multifunctional urban spaces (through urban revitalisation of post-industrial areas)

Building level: High thermal comfort with minimum ecological footprint, security in supply, easy maintenance at competitive prices




- Demand reduction: Energy efficient building design
- Low carbon resources: RE and waste energy
- Optimum supply: DHC

Examples from Barcelona

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Case 1: Districlima
Case 2: Ecoenergies

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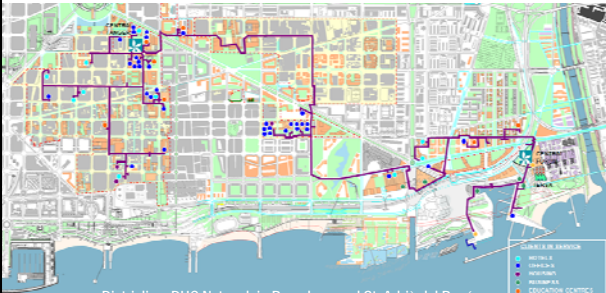
Case 1: Innovation District 22@

Transformation of the “Manchester of Catalonia” industrial area into the Innovation District 22@

- Recovery of waste heat from an urban waste-to-energy plant for heating
- Sea water cooled machines for cold production
- Absorption machines to produce cooling from steam

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Districlima DHC Network in Barcelona and St. Adrià del Besós

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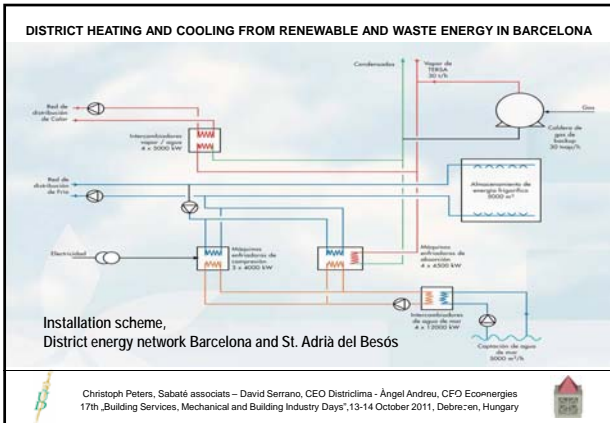
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- Steam / water exchangers (4 x 5,000 kW)
- Gas boiler back-up (20,000 kW)
- Absorption machines (Broad) (2 x 4,500 kW)
- Compression chillers (McQuay) (2 x 4,000 kW)
- Compression chillers (Johnson Control) (2 x 7,000 kW)
- Sea water / cooling water exchangers (3 x 12,500 kW)
- Cold water storage tank (5,000 m³)

Installed equipment in the Districlima DHC Network in Barcelona and St. Adrià del Besós

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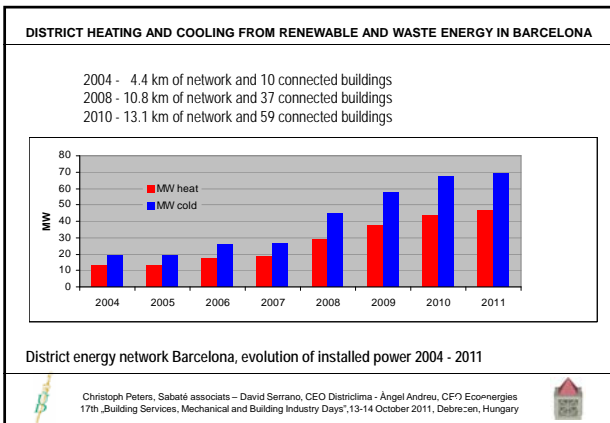
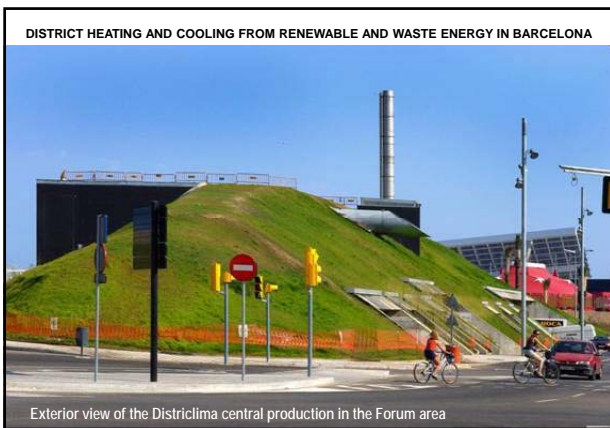


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4 parallel tubes network

- 2 for DH - forward 90°C, return 60°C
- 2 for DC - forward 05°C, return 14°C
- variable flow, constant volume
- treated drinkable water, with a permanent PH and conductivity control,
 - corrosion inhibitors in the heating network
 - biocide in the cooling network.
- leakage detection system

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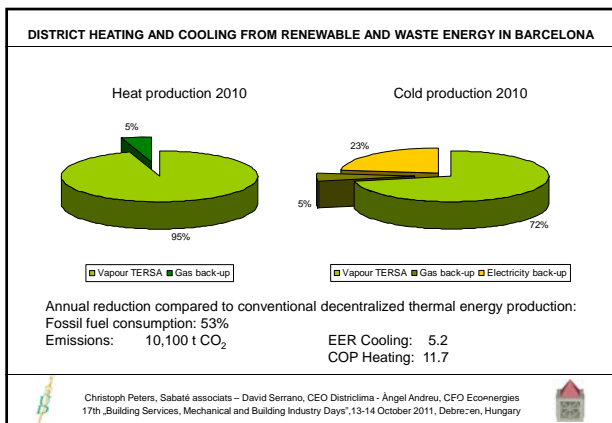
2011 - inauguration of a second production plant to ensure supply in periods of higher demand and in case of any eventually.

First phase equipment:

- Natural gas boilers (2 x 13,400 kW)
- Compression chiller (6,700 kW)
- Ice storage (2 x 40,000 kWh)

Inauguration of a new production plant, Tanger street, Innovation District 22@

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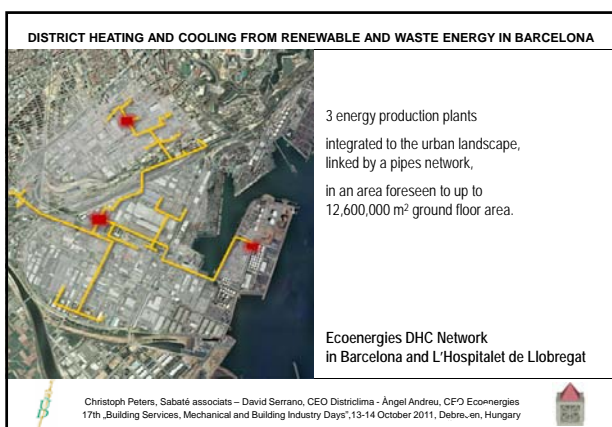
Case 2: Innovation District Zona Franca

Transformation of an industrial area into a Tertiary Sector and Residential area Zona Franca

Valorization of waste cold from depressurizing liquid gas

Biomass from maintenance of city parks for heat production

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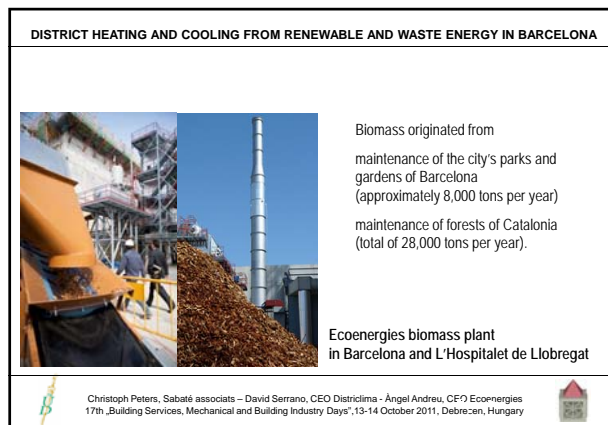
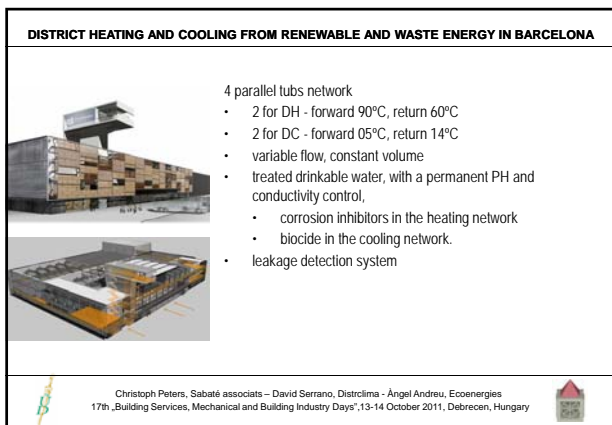


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• Biomass - heat	(10,000 kW)
• Gas boiler	(120,000 kW)
• Cold recovered from Enagas plant	(30,000 kW)
• Compression chillers	(68,500 kW)
• Industrial cooling	(12,000 kW)
• Cold water storage tank	(5,000 m ³)
• Biomass - electricity	(2,000 kWe)


Installed equipment in the Ecoenergies DHC Network in Barcelona and L'Hospitalet de Llobregat

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Annual reduction compared to conventional decentralized thermal energy production:
Emissions: 13,400 t CO₂



Recovery of the residual cooling originated from the industrial depressurisation process of the Enagas plant (30MW) originated from the liquid gas maritime transportation

Cooling recovery plant in Barcelona and L'Hospitalet de Llobregat

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Demand side reduction


95 Social housing apartment block
EPBD "A" Classification
3.8 kgCO₂/m²·a

Low U-values
Ventilated façade
Movable wooden blinds
Natural cross ventilation

Connected to DHC 22@
Effective management through ESCO

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95 Social housing apartment block
to be inaugurated in October 2011

Connection to the DHC network in the building's basement

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Postgraduate professional training: Energy and Urbanism

INTELLIGENT ENERGY EUROPE
UP-RES Urban Planners with Renewable Energy Skills


Escola Sert SaAS

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10 Modules with a total of 150 hours face to face – october 2011- june 2012

- M1 An integrated vision. Sustainability in regional and urban planning
- M2 Energy. The existing energy model and market outlook
- M3 Buildings. Energy demand reduction strategies in new buildings and refurbishment
- M4 Mobility. Energy consumption reduction strategies in urban and interurban mobility
- M5 Urban planning. Energy demand reduction strategies in the urban metabolism
- M6 Energy resources. Renewable energy technologies in the urban scale
- M7 Energy distribution: District heating and cooling
- M8 New management concepts in the energy market
- M9 Energy management. New models in contracting and management
- M10 Workshop. the right scale for every energy concept



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Thank you for your attention !

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