

## District urban network of heat and cold in Barcelona and Sant Adria de Besos

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**Address 1 - street** : Av del Ca SANT ADRIÀ DE BESÒS, España

**Gross density** : 124.59 alojamiento/ha

**Number of jobs** : 28 empleos

**Starting year of the project** : 2002

**Delivery year of the project** : 2004

**Key words** : DHC, Smart City, Reusing waste, saving CO2 emissions,



300 ha



55 000 000 €

### ID CARD

Districtclima 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. At the beginning the project was located in an area of Barcelona urbanistically remodeled to host the Forum of Cultures 2004 (Front Litoral Besòs). The project includes the design, construction and subsequent operation, through a 25-year concession, of the main production central in Forum and the energy distribution network. In 2005 and following the award of a public competition, a second stage starts with the extension of the network to the 22@ technology district. With a concession of 27 years, the network is extending its layout based on the urban development of the area and the needs of connecting new users. Districtclima is the greatest exponent of energy efficiency in the 22@ area Besos, providing through its urban network of heat and cold thermal energy useful to more than 90 buildings, saving more than 17,500 annual tons of CO<sub>2</sub> and this about 60% by reducing the consumption of fossil energies. It is an intelligent solution in a country highly dependent on foreign energy. Urban networks of heat and cold (district heating & cooling) is a centralized production and distribution of thermal energy that achieves greater energy efficiency system with less environmental impact, in addition to offer its users and other multiple economic security and quality of supply benefits. The buildings connected to the network do not have their own machinery, they reduce their electrical contracting, maintenance costs, reinvestment ... plus have more space and greater energy rating. They are innovative and sustainable buildings of XXI century. In short, the system is based on centralized production of energy (heat and / or cold), preferably taking advantage of residual energy, energy products or cooling systems (with seawater or river) and distribution to buildings through a network of pipes formed by four pipes that run underground in the streets or arranged in service galleries. Nowadays over 870,000 m<sup>2</sup> of roof, are heated with contracted power over 55 MW to 80 MW heat and cold, from a Central highly efficient located in the Forum area, as well as from the second Central, near the Plaza de les Glories, which has a central function of peaks and backup energy. The high efficiency of Districtclima derived from the use of the steam generated by the neighboring treatment plant municipal solid waste (MSW) to produce almost all the hot water and much of the cold water. In addition, production equipment cooled by sea water, allowing to obtain yields in these machines to 4 times higher than conventional substituted equipment.

### Programme

- Housing
- Offices
- Businesses and services
- Public facilities and infrastructure

### CO<sub>2</sub> Impact

## Method used to calculate CO2 impact

El ahorro de emisiones de CO2 se calcula mediante la diferencia entre las emisiones estimadas según producción convencional y las emisiones reales del sistema.

Las emisiones convencionales proceden de la aplicación de un rendimiento de caldera doméstica y un coeficiente COP para la producción de frío doméstico. Aplicando seguidamente los coeficientes de emisión de CO2 sobre energía primaria del Manual Técnico CALENER 2009.

[http://www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos\\_CALENER\\_03\\_GT\\_Manual\\_Tecnico\\_A2009\\_A\\_f23fc148.pdf](http://www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos_CALENER_03_GT_Manual_Tecnico_A2009_A_f23fc148.pdf)

Las emisiones reales, proceden de aplicar dichos coeficientes sobre el consumo real de energía primaria, que en el caso de Districlima SA, vapor, electricidad y GN.

El hecho que se produzca calor y parte de frío, a partir del vapor residual de baja presión procedente de una planta de Revalorización de Residuos Urbanos, hace que el ahorro de emisiones sea notablemente mayor que el de otro proceso sin esta singularidad.

## Project progress

- Operational phase

## Procedure type

- Urban développement permit
- 

## Key points

- Governance
- Quality of life
- Smart city
- Energy /Climate

## Approaches used

- Agenda 21
- Local charter

## More info

<http://www.redesurbanascaloryfrio.com> <http://www.districtlima.com>

## Data reliability

Self-declared

## TERRITORY

### Type of territory

Cities must change and evolve to be alive. In the case of Barcelona, the first catalyst for change was the celebration of the Barcelona '92 Olympic Games, which enabled to undertake a profound urban transformation of the coastline. The second opportunity came with the celebration of the Forum of Cultures 2004, a controversial event that allowed transformation the east of the city. With 22@ an urban, economic and social transformation in the long term of more than 200 hectares, attracting " XXI century industries" that should replace the old factories of the nineteenth century it is undertaken.

### Climate zone

[Csb] Coastal Mediterranean - Mild with cool, dry summer.

## KEY FIGURES

## Office floor area

Office floor area : 455 000 m<sup>2</sup>

## Commercial floor area

Commercial floor area : 183 000 m<sup>2</sup>

## Public facilities floor area

Public facilities floor area : 128 000 m<sup>2</sup>

## Housing floor area

Housing floor area : 277 000 m<sup>2</sup>

## Total investment costs (before tax)

Total investment costs (before tax) : 55 000 000 € HT

# GOVERNANCE

## Project holder

Name : Districlima, SA

Type :

General description :

Districlima 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. At the beginning the project was located in an area of Barcelona urbanistically remodeled to host the Forum of Cultures 2004 (Front Litoral Besòs). The project includes the design, construction and subsequent operation, through a 25-year concession, of the main production central in Forum and the energy distribution network. In 2005 and following the award of a public competition, a second stage starts with the extension of the network to the 22@ technology district.

## Project management

Description :

With a concession of 27 years, the network is extending its layout based on the urban development of the area and the needs of connecting new users. Districlima is the greatest exponent of energy efficiency in the 22@ area Besòs, providing through its urban network of heat and cold thermal energy useful to more than 90 buildings, saving more than 17,500 annual tons of CO<sub>2</sub> and this about 60% by reducing the consumption of fossil energies. It is an intelligent solution in a country highly dependent on foreign energy. Urban networks of heat and cold (district heating & cooling) is a centralized production and distribution of thermal energy that achieves greater energy efficiency system with less environmental impact, in addition to offer its users and other multiple economic security and quality of supply benefits. The buildings connected to the network do not have their own machinery, they reduce their electrical contracting, maintenance costs, reinvestment ... plus have more space and greater energy rating. They are innovative and sustainable buildings of XXI century. In short, the system is based on centralized production of energy (heat and / or cold), preferably taking advantage of residual energy, energy products or cooling systems (with seawater or river) and distribution to buildings through a network of pipes formed by four pipes that run underground in the streets or arranged in service galleries. Nowadays over 870,000 m<sup>2</sup> of roof, are heated with contracted power over 55 MW to 80 MW heat and cold, from a Central highly efficient located in the Forum area, as well as from the second Central, near the Plaza de les Glories, which has a central function of peaks and backup energy. The high efficiency of Districlima derived from the use of the steam generated by the neighboring treatment plant municipal solid waste (MSW) to produce almost all the hot water and much of the cold water. In addition, production equipment cooled by sea water, allowing to obtain yields in these machines to 4 times higher than conventional substituted equipment.

## Project stakeholders

Engie, Tersa, Aguas de Barcelona, Catalan Energy Institute, IDEA

Function : Other

Districlima shareholder structure, SA: Engie: 50.8% Tersa: 20% Agbar: 19.2% ICAEN: 5% IDAE: 5%

[Construction21 company page](#) :

## SOLUTIONS

Description :

**Central Forum:**

Heat and cold is produced **taking advantage of the steam generated in the combustion of municipal solid waste** **TERSA**

Production equipment **are cooled by sea water, resulting in high yields**, without the use of cooling towers.

The energy management is optimized using an ice water accumulator 5,000 m<sup>3</sup> tank.



The Central has the following equipment:

**Production of cold:**

- o 2 teams Broad absorption of 4.5 MW c / u.
- o 1 storage tank of cold water of 5,000 m<sup>3</sup> (5,000,000 liters)
- o 2 electric chillers Mc Quay 4 MW c / u.
- o 2 electric chillers Johnson Controls 7 MW c / u

Refrigeration system:

- o 3 exchangers seawater / water cooling machines 12.5 MW
- o 1 station pickup seawater 5,000 m<sup>3</sup> / h

**Heat Production:**

- o 4 steam / water exchangers 5MW c / u
- o 1 gas boiler 20 MW (backup service only if there is no steam availability)

**Central Tànger:**

Conceived as "peaks central" or pick up, ensures supply in peak periods or for any eventuality.

It has an advanced ice accumulation system, enabling the production of energy during periods of low demand and storing it until, in periods of peak demand, its distribution is necessary.

The flue gas from boilers are expelled through the historical chimney of the old factory of Ca l'Arenyó.

It opened in April 2012 and, in a first phase, it has the following equipment:

**Production of cold:**

- o 1 compression equipment of 6.7 MW for the production of glycol water
- o 1 compression equipment of 6.7 MW for the production of glycol water (commissioning phase)

**Heat Production:**

- o 2 boilers of 13.4 MW natural gas for hot water production

In second phase is planned to install the following additional equipment:

**Production of cold:**

- o 1 compression equipment of 6.7 MW for the production of cold water

**Heat Production:**

- o 1 natural gas boiler of 13.4 MW for the production of hot water

## QUALITY OF LIFE

### Quality of life / density

The Districlima solution helps to improve the quality of life of neighborhoods by extending its network for several reasons:

- o The lack of machinery for air conditioning in buildings connected to Districlima translates, among others, in the absence of noise and vibration in buildings and thus improving the acoustic quality of the city.
- o Similarly, there is also an environmental temperature improvement in the neighborhood, being drastically reduced the number of equipment that cool the interior of the buildings, at the cost of emitting heat to the outside.

o Reduction of overall consumption of water and chemicals: removal of cooling towers and other water consuming equipment and chemical additives (biocides, water treatment, etc.)

o And of course reducing CO2 emissions and reducing fossil energies (explained in another section).

In addition to these overall benefits to the city, users of the buildings connected to the network, enjoy the following advantages:

o Guarantee of energy supply: the network of heat and cold have redundancies in both production plants and thermal production equipment

o Outsourcing service of thermal production and associated risks (regulatory, commitment to quality service ...).

o Elimination of replacement cost of machinery.

o Reduced maintenance costs.

o Trouble Shooting.

o Reducing costs of supply of conventional energy (gas and electricity). Minor powers to hire

o Flexibility and adaptability. Facility to have more power, simply expanding energy exchangers, with little need for more space.

## Culture and heritage

**The buildings connected to the network Districlima contribute to the enhancement of the architectural environment:** their facades and roofs are completely clear and free of machinery, fireplaces (tufted) and facilities. This translates into a differentiated real estate with innovative, unique and iconic buildings, unrestricted architectural creativity.

Moreover, Districlima also integrates the historical heritage of the neighborhood and in their own facilities: the Central Tànger leads the combustion gases from boilers through an underground conduit that expels **the 36 meters brick chimney of the former textile factory "Ca l'Aranyó", built in 1872 by Claudi Arañó i Arañó similar to the textile industries of Manchester.**

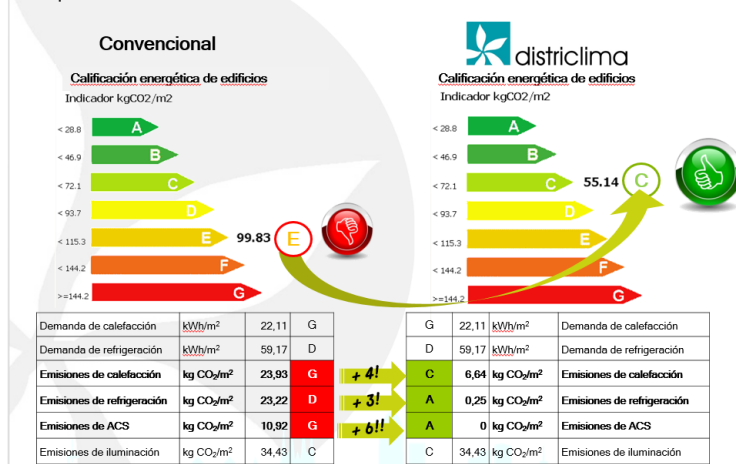
Both stations, Forum and Tànger have been designed to integrate harmoniously into the environment: the first under a covered dune vegetation and the second, built in the heart of the 22@ technology district, following the adjacent building and also vegetated on its facade.

## Ambient air quality and health

Districlima is a very efficient solution from an environmental point of view: all heat and part of the cold are produced from the steam generated in the neighboring plant of waste recovery (RSU) of Tèrsa, which means that **only in the year 2015 Districlima has avoided the emission into the atmosphere of 17,678 tonnes of CO2**, with a reduction in the use of consumption of fossil energy of 59%.

Being a centralized system, any improvement in the Central energy production or the production system itself resulting immediately in buildings connected to the network, also obviously the sustainability of Districlima solution: **the buildings connected to the Districlima network are sustainable and with high energy rating buildings**, in line with growing market awareness and administrations, stepping forward to meeting next mandatory European standards. These buildings can improve energy certification up to 2 letters (and up to 6 letters in paragraph HVAC and ACS).

### La red urbana de calor y frío del Fórum y 22@ Comprometidos con la sostenibilidad



In addition, the buildings connected to the network Districlima enjoy the **elimination of health risks**, the removal of cooling towers and other potential sources of legionellosis elements. Districlima network of Barcelona has **avoided the installation of up to 120 cooling towers in the city.**

## SOLUTIONS

Company :

- o Promotion of cultural/ historical identity
- o Proximity services

- Air quality
- Noise exposure

## ECONOMIC DEVELOPMENT

### Local development

Local job creation: the commitment to the territory of networks heat and cold as Districlima contributes to the economic revitalization of the areas where implanted and job creation

#### % of office area

15

#### % of commercial area

6

## SMART CITY

### Smart City strategy

Districlima is the best performing Smart City in the city of Barcelona and Sant Adria de Besos for 10 years through a system of data collection that uses its own private fiber optic network, which allows continuous monitoring of production, adapting at every moment to the availability of the territory and decision making in real time by transforming big data through the sensing information in active configuration tools and decision-making.

## RESOURCES

## ENERGY/CLIMATE

### Climate adaptation, resources conservation, GHG emissions

The environmental benefits of Districlima for the city are obvious: reducing CO2 emissions (17,678 tons in 2015), refrigerant leakage reduction (-> ↓ CO2), waste revaluation, higher energy efficiency (-> CO2 ↓) reducing the number of cooling towers, lower overall consumption of water and water treatment products ...

### Energy sobriety

In the present times with rates of energy importation hovering 70% in Spain, it is very important to make an intelligent search of ways of generating energy taking into account the territory. This is not something new, and in historic Pompeii geothermal sources was resorted to the hot springs, and Paris has for 100 years a network of heat and a network of cold for 30 years. We must start from two premises. On the one hand there is no universal false solutions and the other is essential to have a sense of scale. Search in each territory of possible energy sources to assemble a network of heat and cold in each case will be different: incinerators, sewage treatment plants, rivers, sea, etc. In the case of Districlima the power source is in the heat produced by the incineration of municipal solid waste (at the nearby plant waste recovery - Tersa) integrated in the landscape under a green mountain plant that uses water the sea for cooling their equipment.

## BUILDINGS

### Buildings

The Districlima network is over 15 km in length and more than 90 buildings of all types are connected to it: offices, hotels, schools, housing, technology and production centers, municipal facilities, museums ... and within very little (in 2017) it will also be connected to the Hospital del Mar, a reference Hospital rushing a large comprehensive reform that also includes the migration of the conventional air conditioning with own machines and fossil energies to air conditioning

Districlima efficient.

Some of the buildings connected to the network Districlima also participate in the Green Building Solutions & City Awards, such as: Twentytú Hi-Tech Hostel, housing street Roc Boronat CEIP Sant Martí or the Leitat Technology Centre

## [Link to Buildings of the area in Construction21 database](#)

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### Contest

#### Building candidate in the category



Gran Premio : Ciudad Sostenible

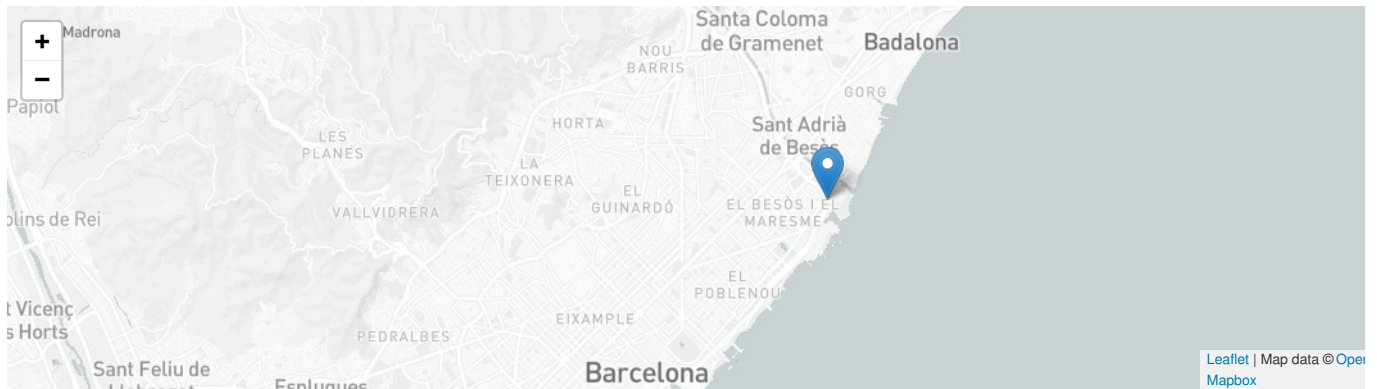


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