District Energy in Chile

Unlocking investments in sustainable heating & cooling for cities

SANTIAGO

April 4th, 2018

Sebastien UGONA

ENGIE LATAM

INDEX

District Energy @ENGIE
General presentation

ENGIE presentation
Strong leadership positions

POWER

#1 Independent Power Producer in the world

6th provider in Europe .

115,3 GW installed power production capacity

10,5 GW production capacity under construction**

Operations in ~ 70 countries
152,900 employees

GAS

3rd seller of natural gas in Europe

3rd largest LNG supply portfolio worldwide .

#1 distribution, # transmission network in Europe.

Supply portfolio of **1.296 TWh**

#1 in storage capacity in Europe

SERVICES

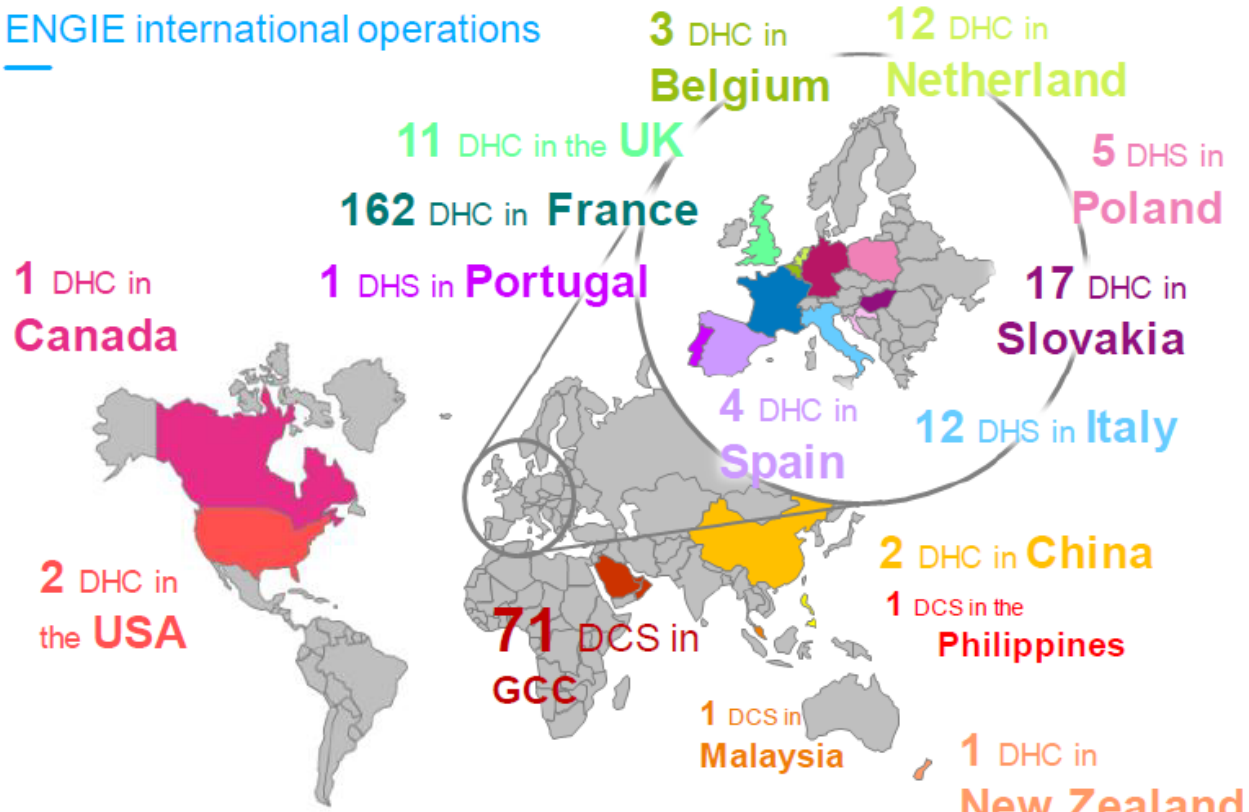
#1 supplier of B2B energy efficiency services in the world

250 urban heating and cooling networks operated worldwide

140 millions of m^2 managed in the tertiary sector

DISTRICT ENERGY SYSTEM

ENGIE international operations



CPCU : DISTRICT HEATING OF PARIS

Paris, France

CPCU (compagnie Parisienne de Chauffage Urbain) the first district heating in France is operated by Engie, since 1927.

Key Figures

8 DHS PLANTS

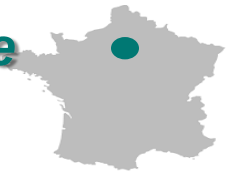
Installed capacity	4000 MW
Energy Mix	Biomass, ULS fuel oil, gas and gas-fired cogeneration, energy recovery from household waste, hard coal
Distribution	450 km of interconnected networks
Connected customers	460,000 housing-units equivalents heated (equivalent of 200 000 m²)

CPCU
Concrete Achievements

- Growing energy efficiency
- ENR&R > 50 % → decrease of the VAT of 15 %
- A responsible commitment from the public utilities sector

CLIMESPACE: DISTRICT COOLING OF PARIS

Paris, France



CLIMESPACE operation & development of one of the biggest cooling networks in the world.

KEYS FIGURES

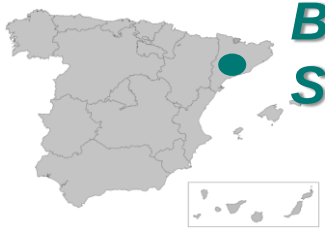
- **5 million m² of cooling**
- **700 clients**
- **73 km of network**
- **440 GWh/year**

100% Green Energy for cool production

Free Cooling with River Seine

Signature of the charter for "Paris Action Clima" shows commitment towards the city to face environmental issues

Barcelona District Heating and Cooling
General Presentation



Identity sheet

Location	Barcelona
District/ Country	Barcelona, Spain
Entity name	DISTRICLIMA
Group membership	50,8%
Production	Heating and Cooling
Contract type	Concession
In ENGIE since	2002
Contract end	2032

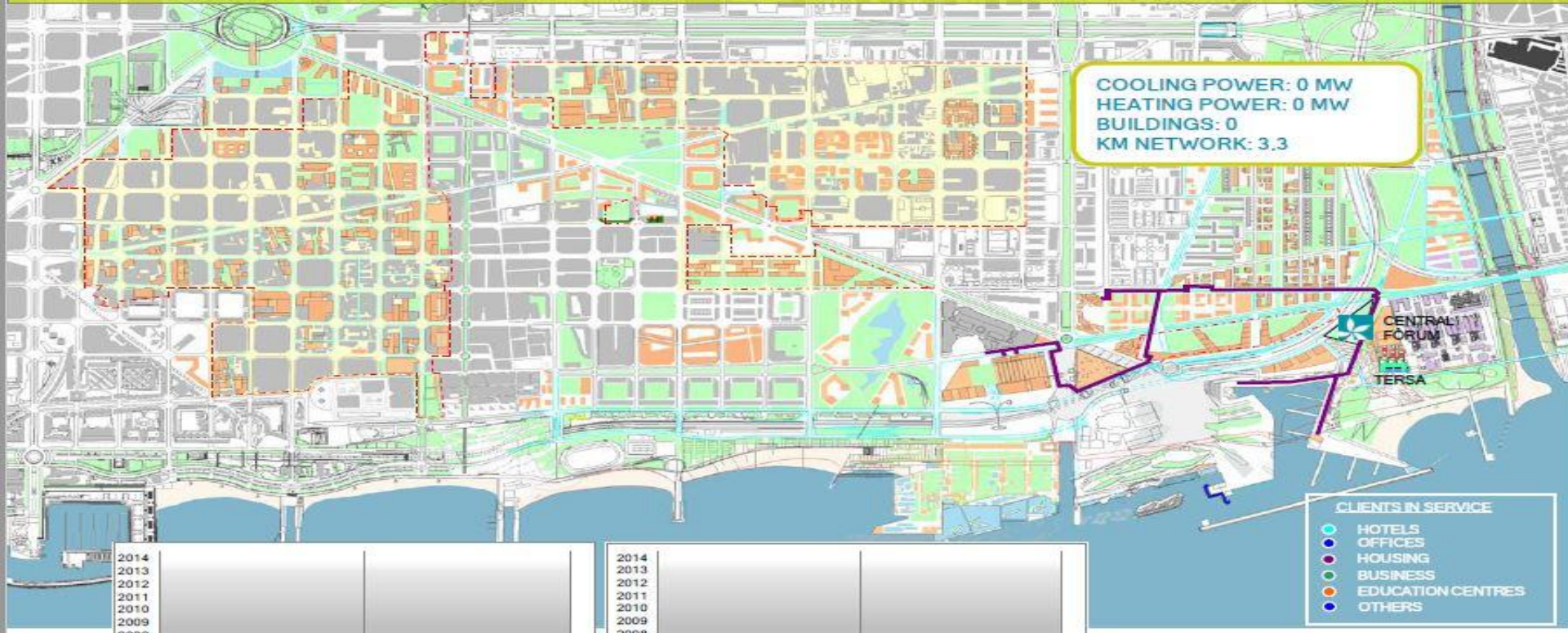
Key figures

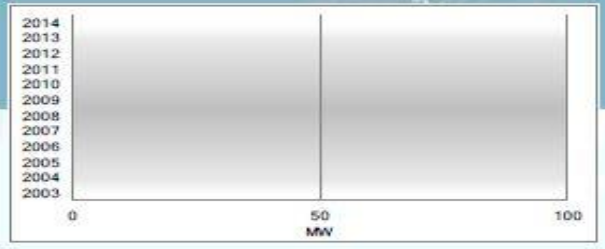
84
Number of Clients
15 km
Network length
78 mw
Contracted cooling power
78
Number of substations
17425 t/year
CO_2 emission savings

Fòrum / 22@ DHC Network

A growing project

2003>2004>2005>2006>2007>2008>2009>2010>2011>2012>2013>2014





districlima

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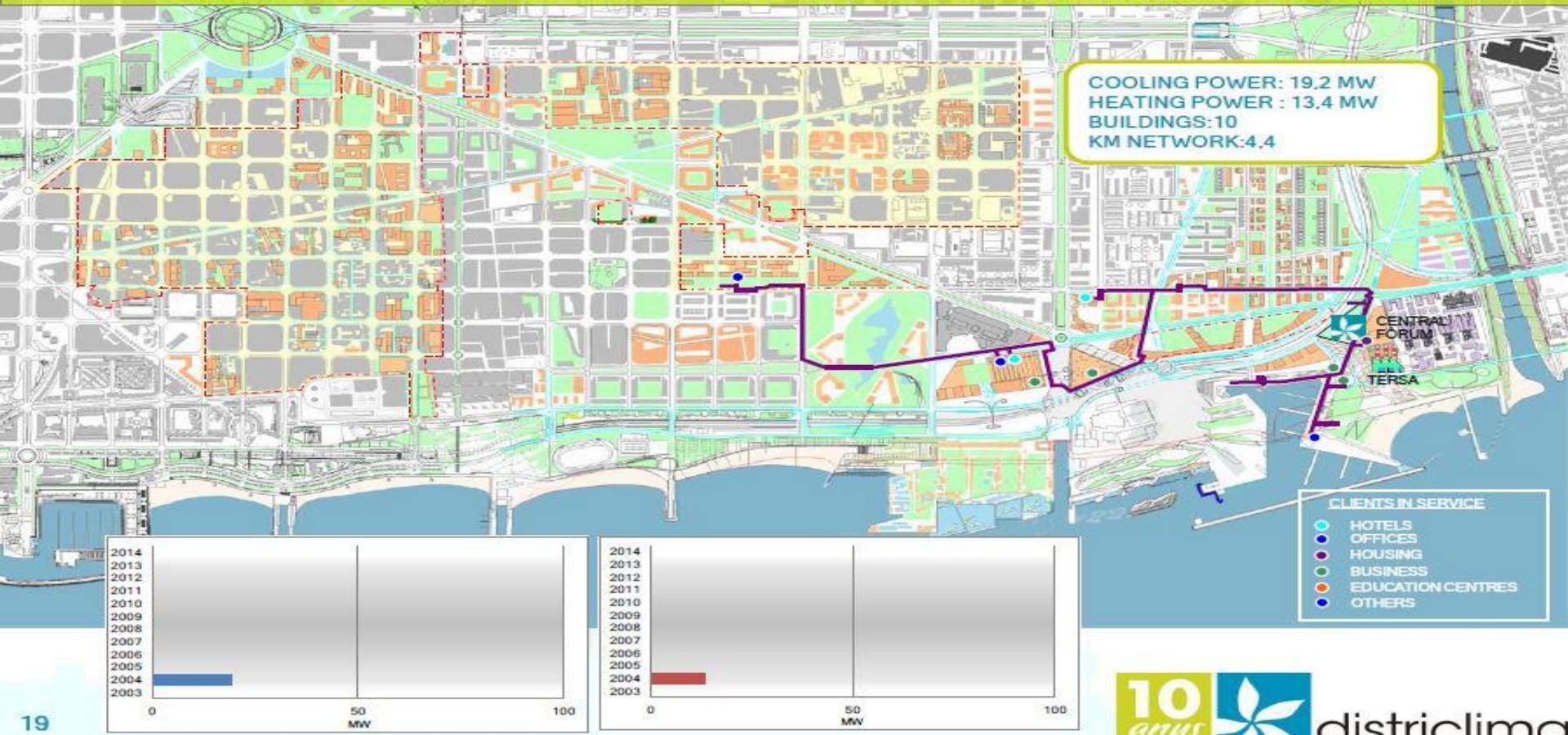

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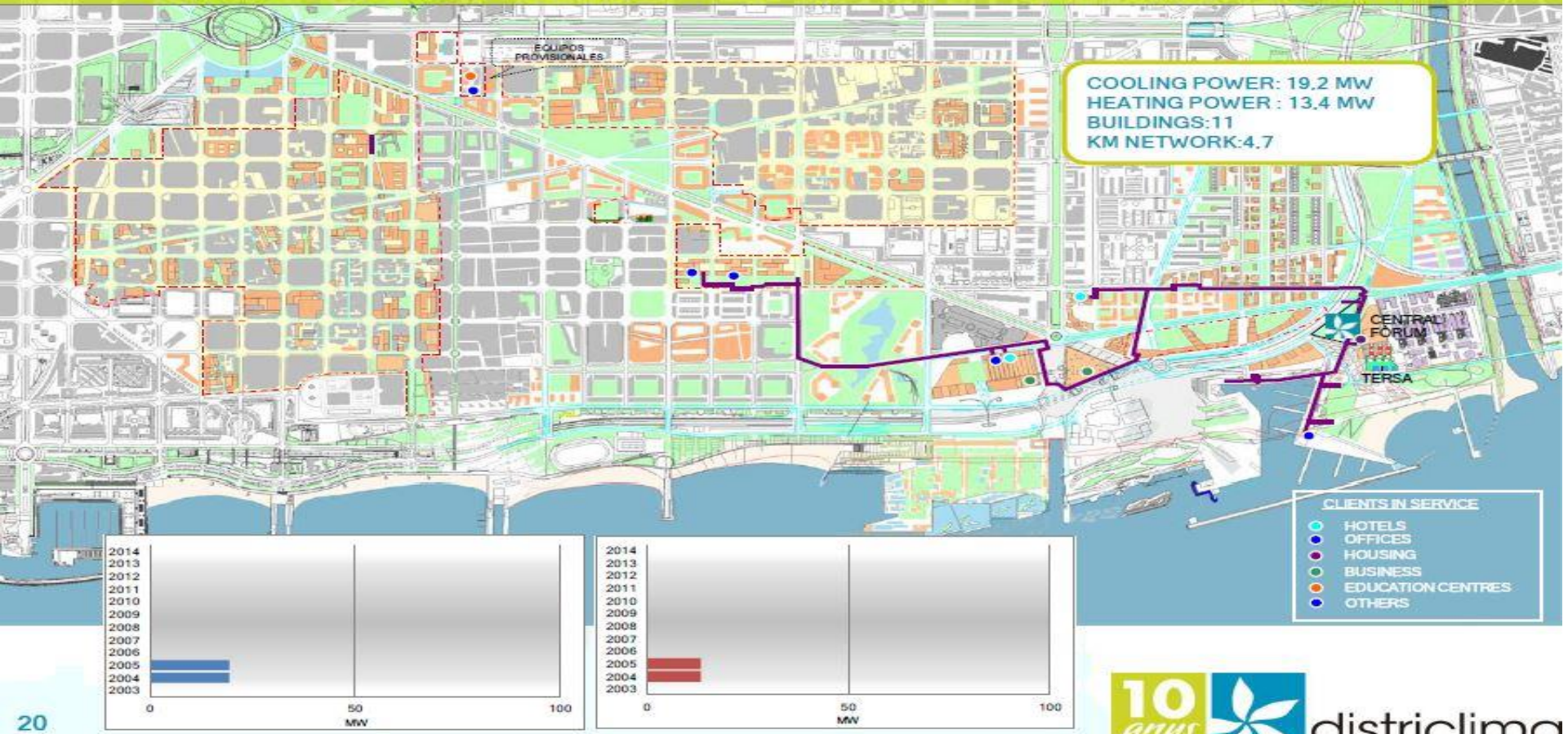

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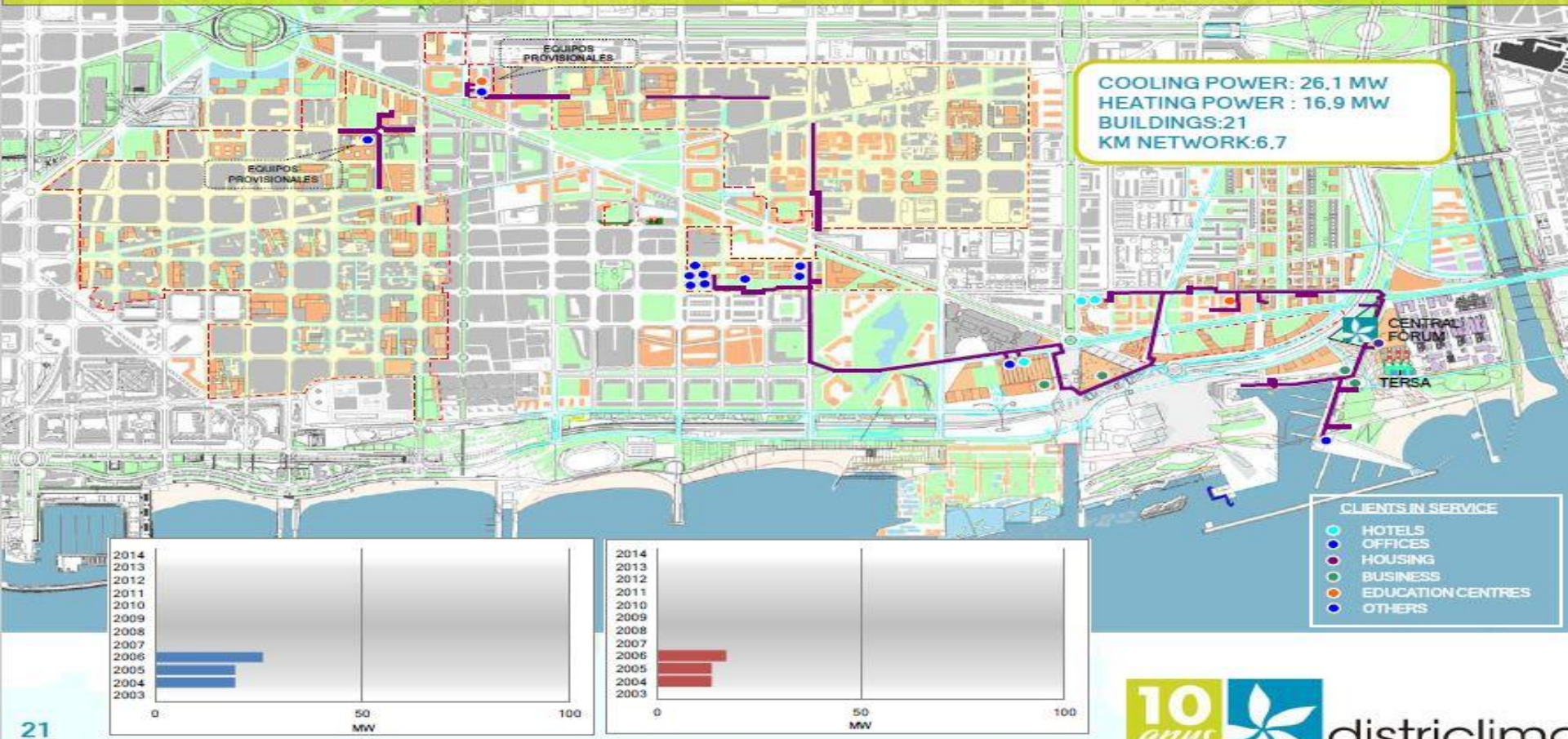

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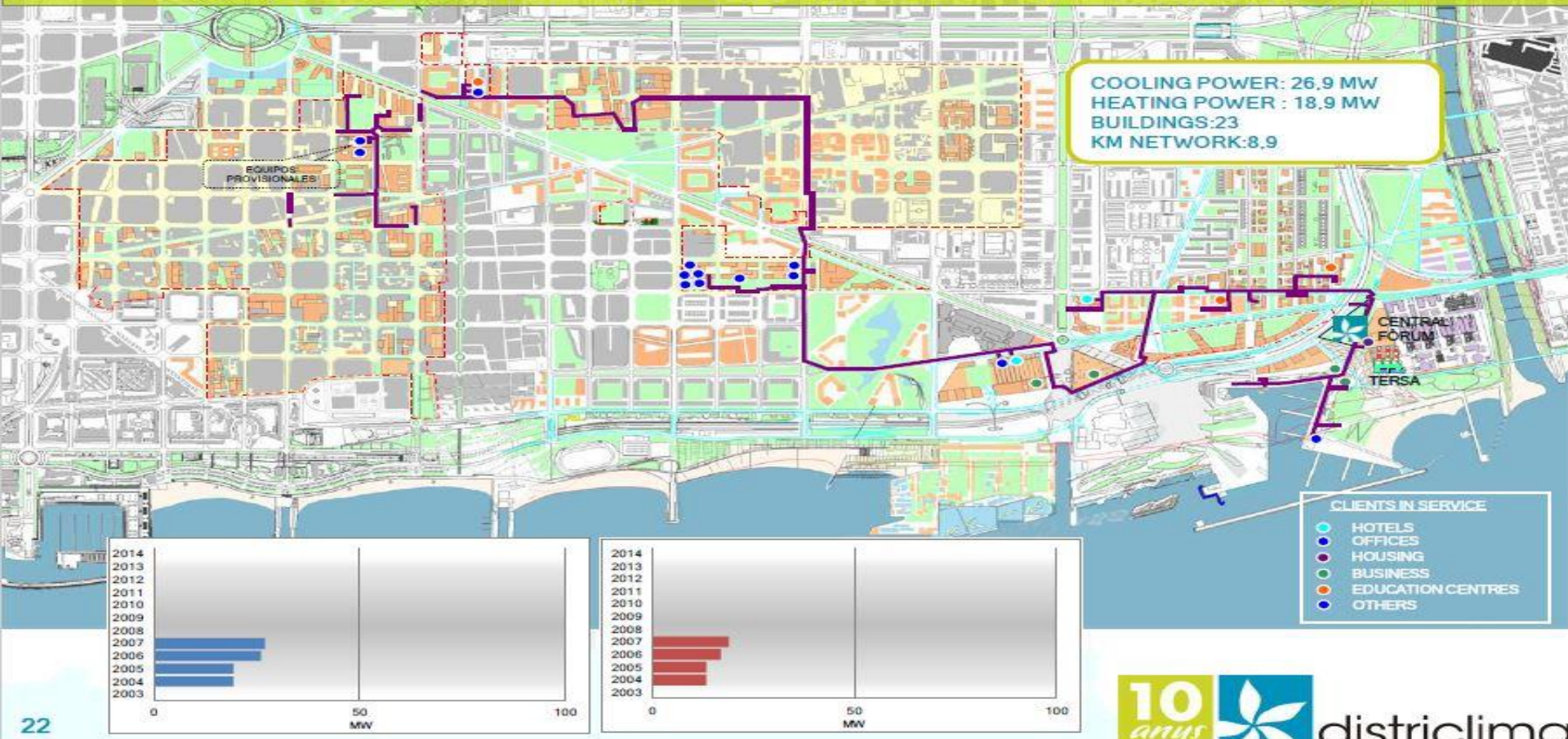

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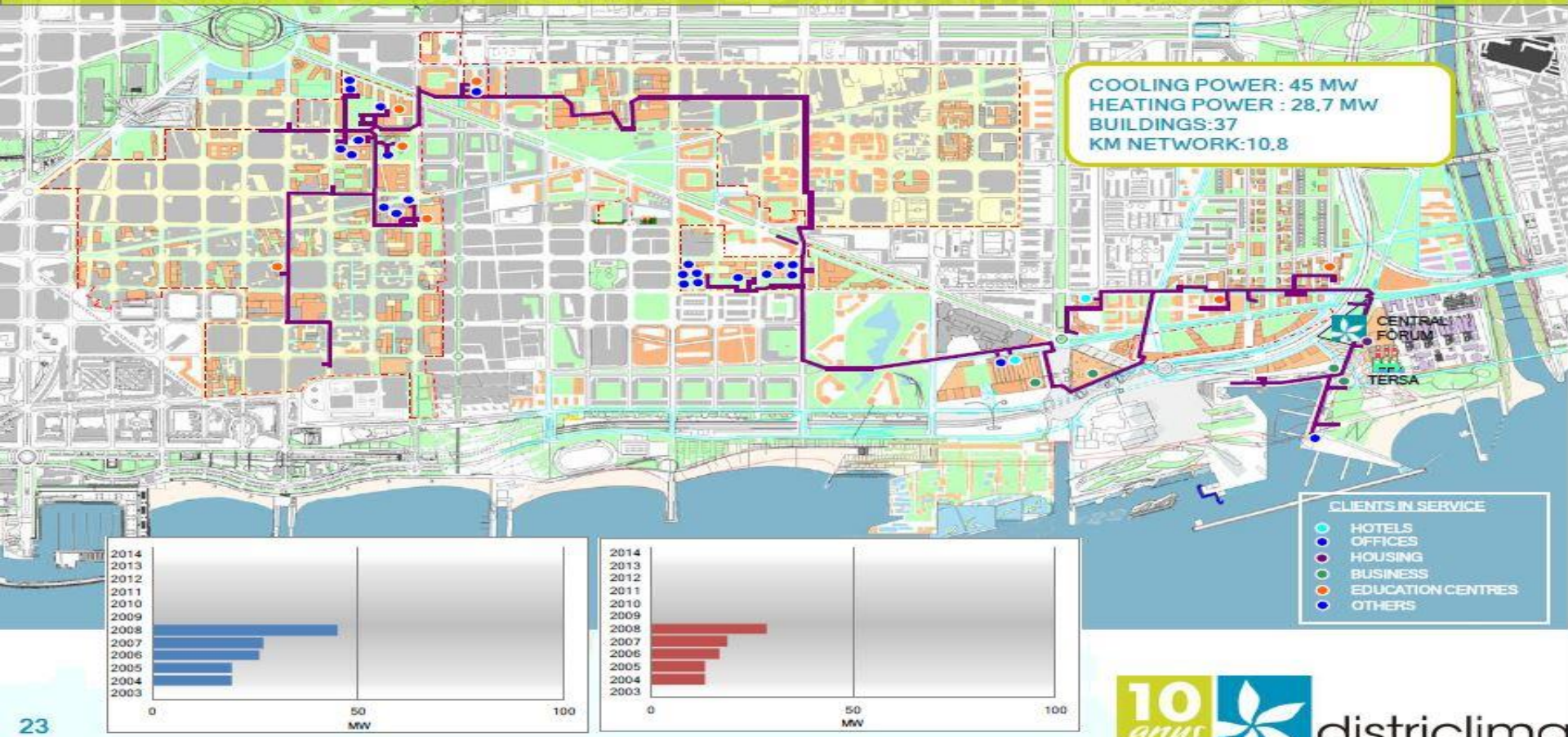

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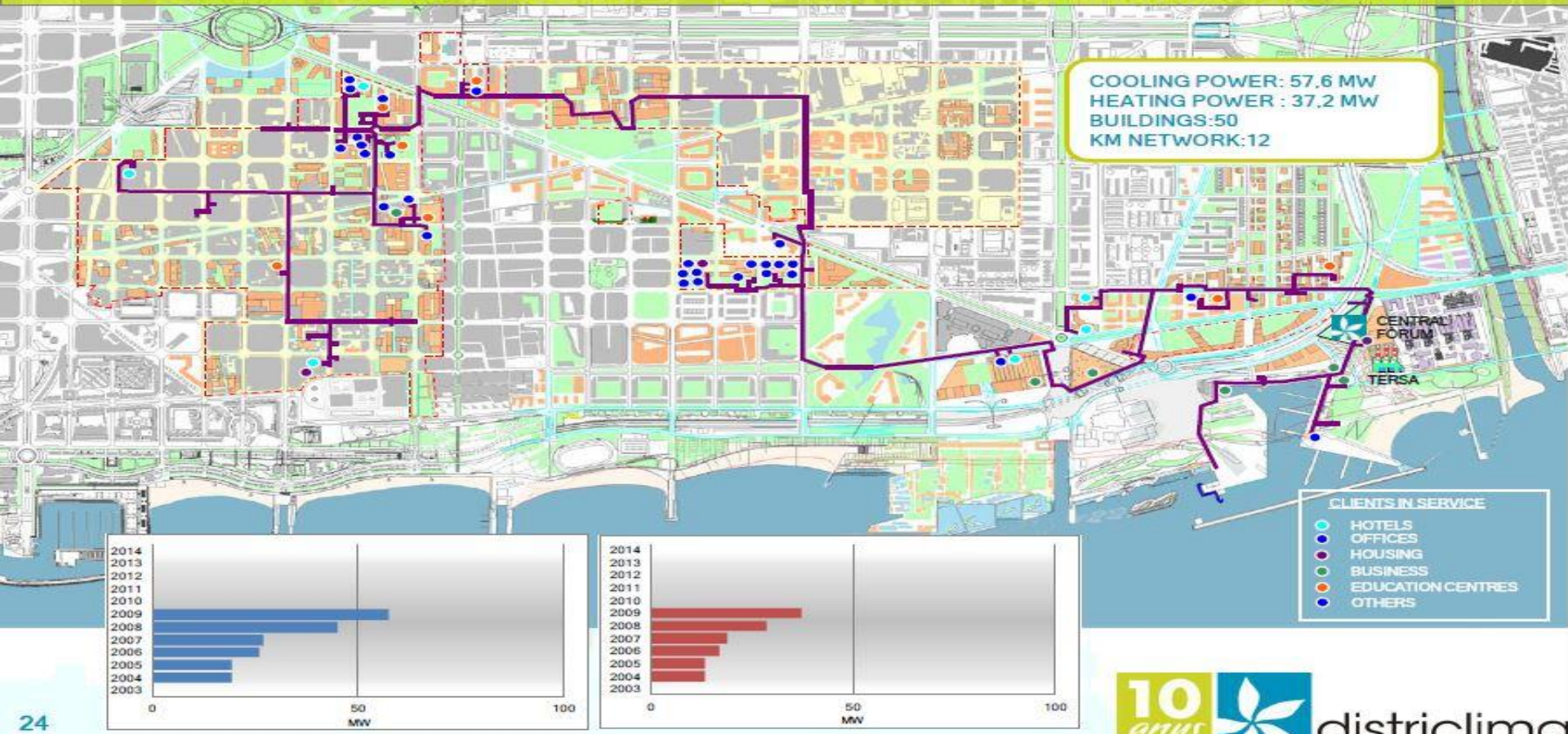

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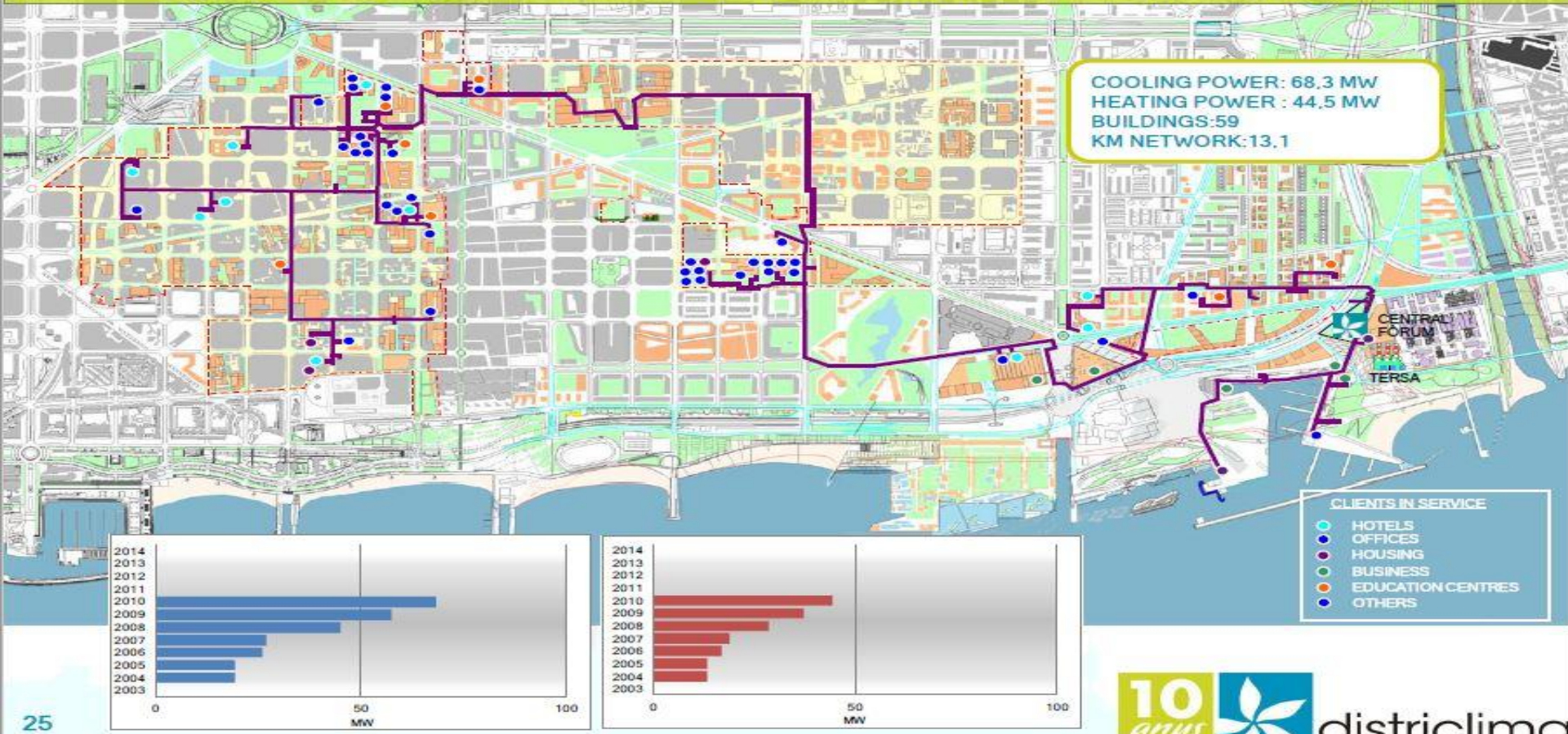

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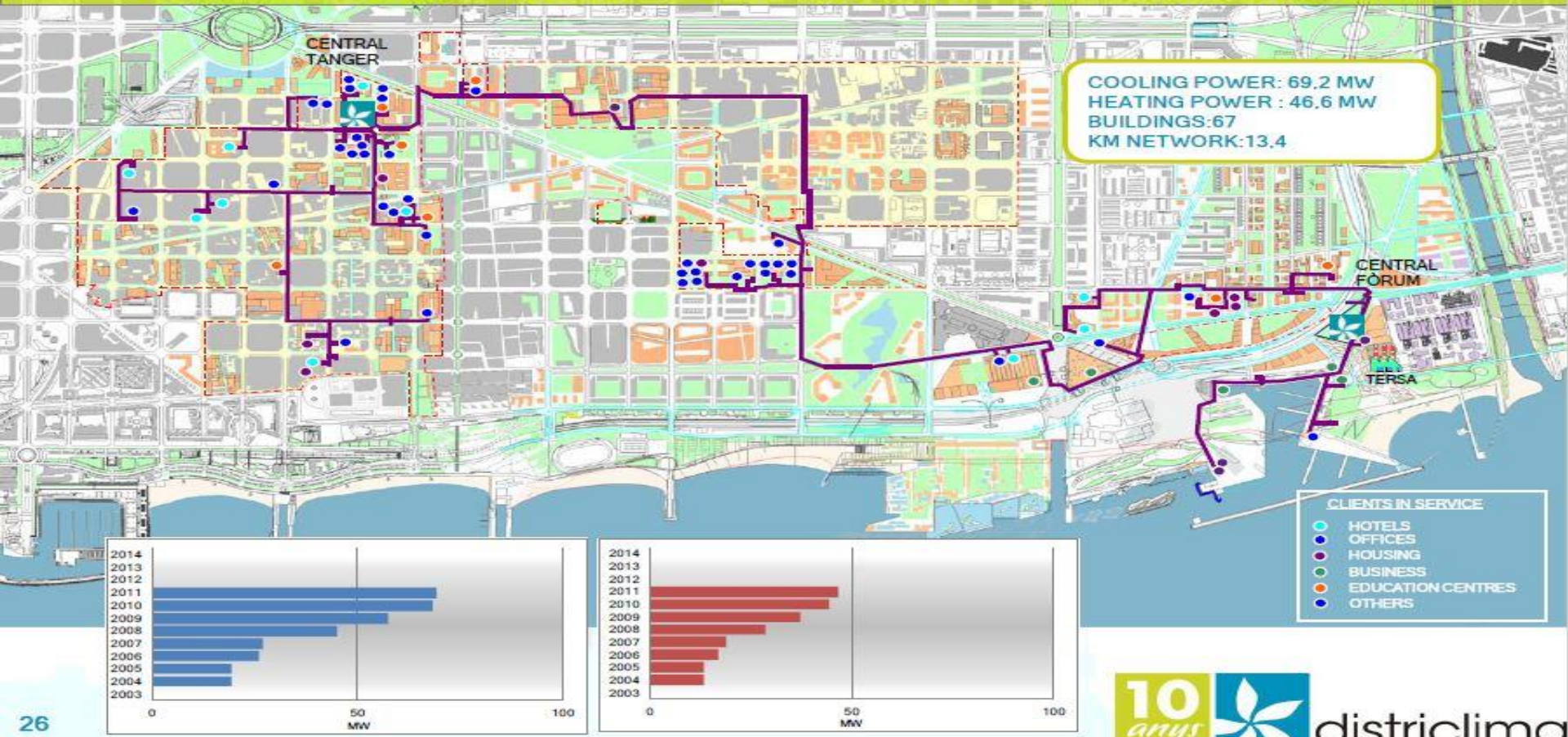

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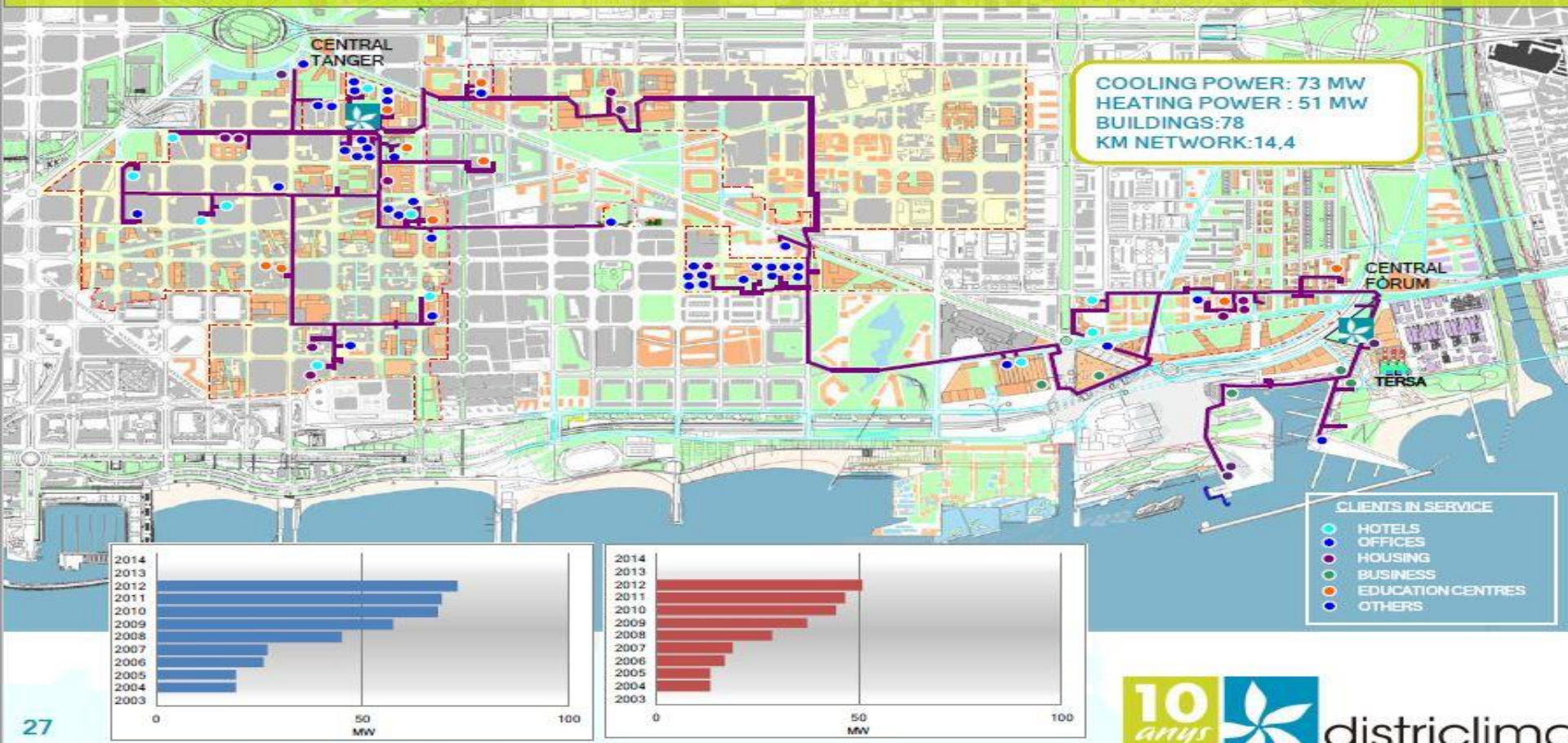

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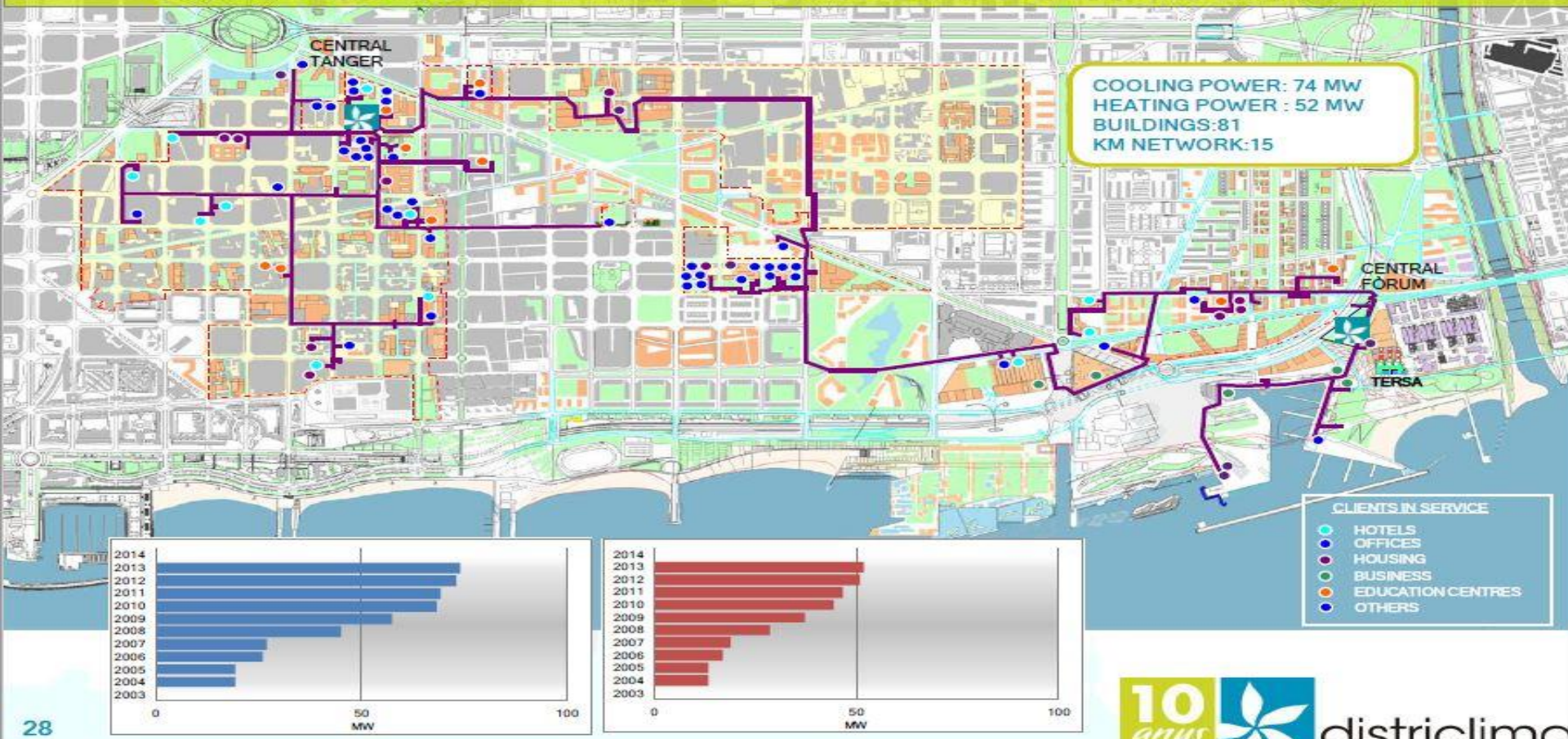

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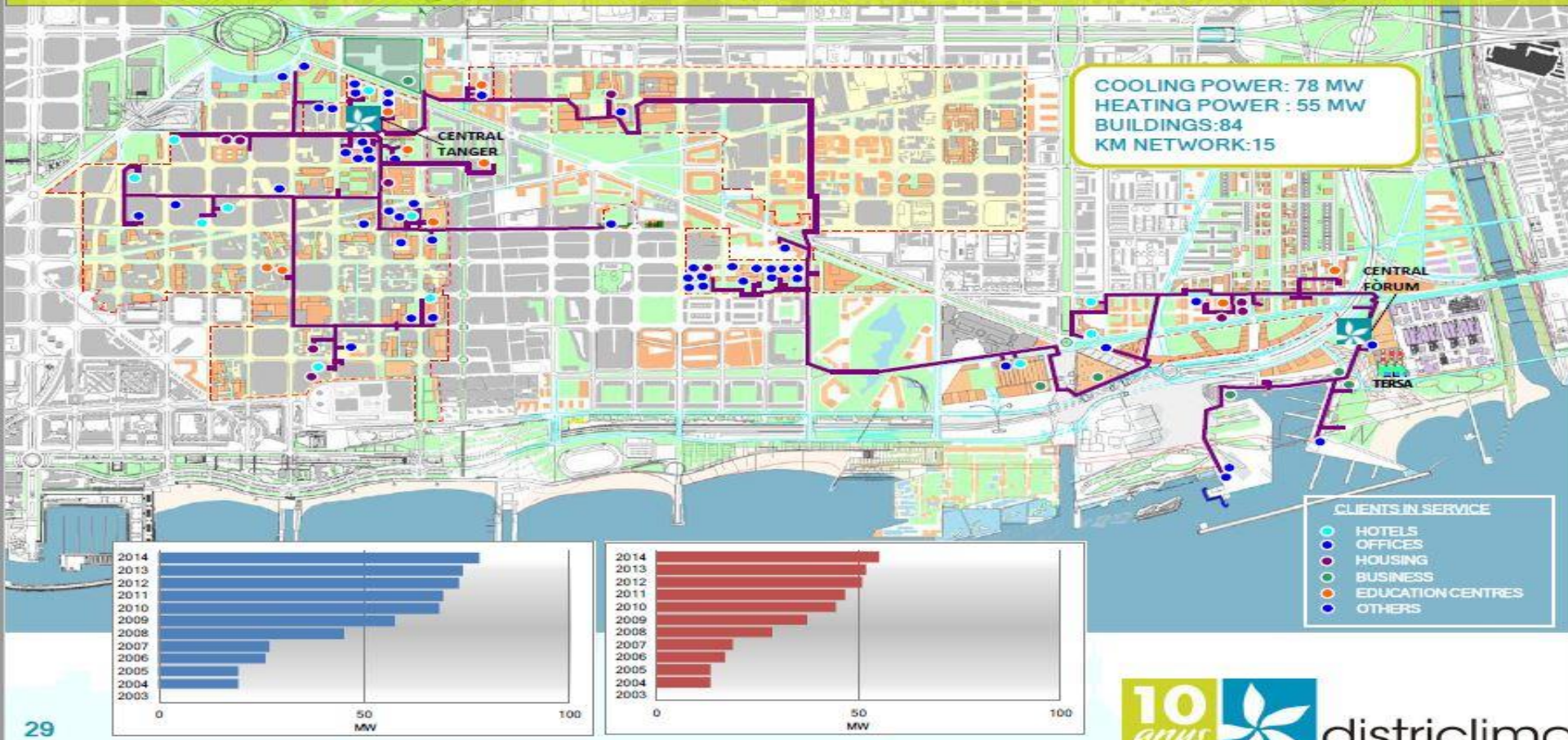
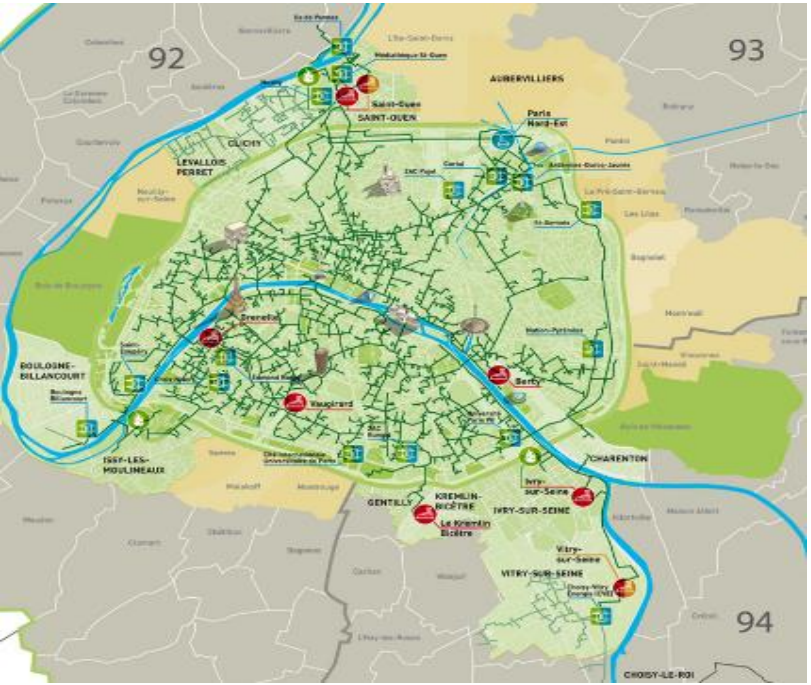


districlima

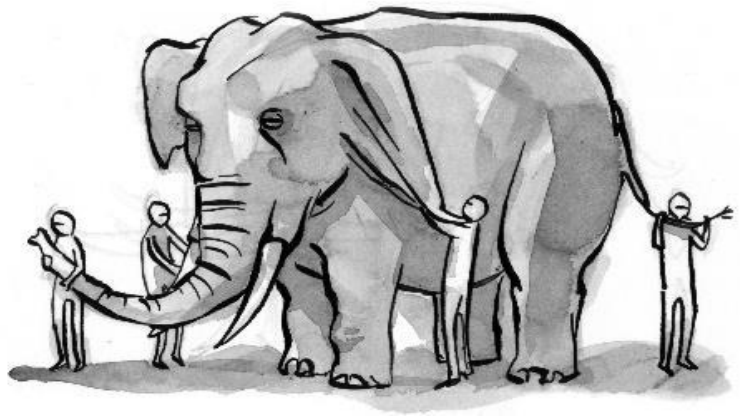
02

How to make it happen?

HOW TO DO THAT ?



How do you eat an elephant?



Choose the good part to start
One bite at a time

Developing a District Energy
The importance of the cities in initiating projects

- Many district networks were developed following a major public event, a national reconstruction policy or a change in regulation which acts as **a catalyst**: the 98 Lisbon International Exposition, the 2004 Barcelona Forum, the 2008 Saragossa exposition or the 2012 London Olympic Games.
- **Cities/Public authorities play a fundamental role** as a regulator and a market facilitator, enabling easier access to :
  - Construction permits
  - Overcome regulation requirements
  - Obtain subsidies
- Public can also ensure financial profitability by **acting as a client and guaranteeing connections**.
- Finally, the **area must be attractive** in terms of **needs concentration**, and should allow a **technical competitive advantage** when compared to stand-alone system (river, sea, waste to energy…).

Developing a District Energy
How to make it grow?

- The involvement of cities can also influence the orientations taken by the network: in particular it can give certain **social or environmental orientations**, such as a percentage of green energy or tariff control.

- Certain municipal policies can **give incentives** to connect to the network, or incentives not to pursue stand-alone solutions:

  Architectural constraints:

  - in Paris, French architects do not allow cooling tower close to Monuments for construction or modification permits

  - in Barcelona, the necessity to install thermal solar panels can be bypassed if you are connected to the network

  Fiscal aspects : lower IVA rate for final consumer

  Obligation to connect in London, Lisbon

- Finally, the network must keep a competitive advantage when compared to stand-alone basis and **always looking for being competitive.**

03

DES initiatives in Chile

DES Initiatives

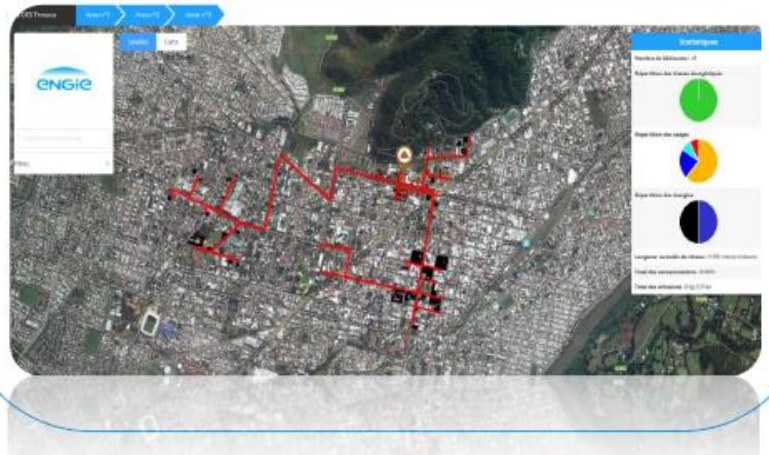
In partnership with Engie, UNEP and Municipalities

Rapid Assessments to study potential of District Heating Systems (mid 2018)

ENGIE's District Energy Tools: FeederMarket

FeederMarket

- **Online Prospecting** tool for mapping District Energy Potential
  - ✓ Centralise building features (construction, consumptions, surface, …)
  - ✓ Measures network linear meters

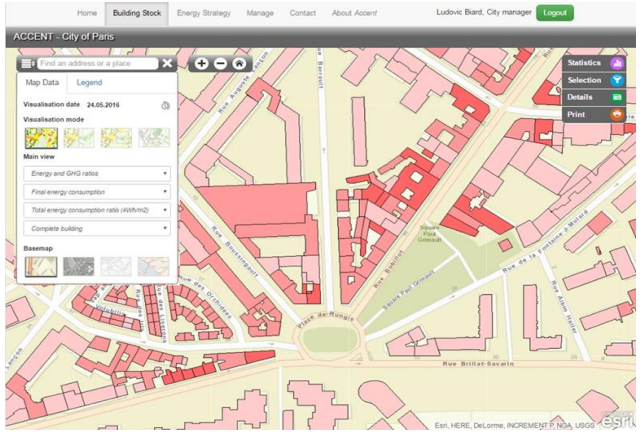


AVAILABLE IN CHILE

ENGIE's District Energy Tools: ACCENT

Planification tool for buildings' energy transition

- Origin: European Project lead by ENGIE
- 4 pilot cities: Paris (France), Ferrara (Italy), Reggio Emilia (Italy) & Valencia (Spain)



Buildings

Surface, age, energy system, type, ...

Structuring data

Cities

Climat data, architecture, ...

Calculation Engine

Modeling

kWh

CO2

€

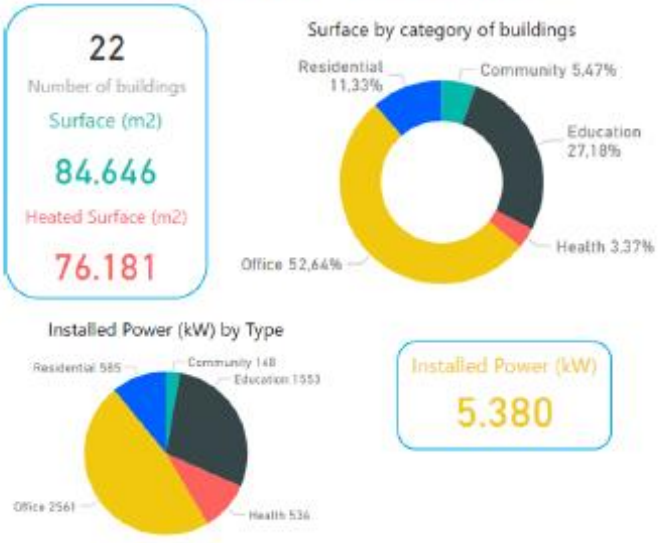
Results:

- ✓ Primary and Final Energy Consumption (estimations)
- ✓ Greenhouse Gas Emissions
- ✓ Energy Cost
- ✓ Benefits with energy efficiency actions

Case of Temuco

Potential areas in Temuco

Area n°1 scan

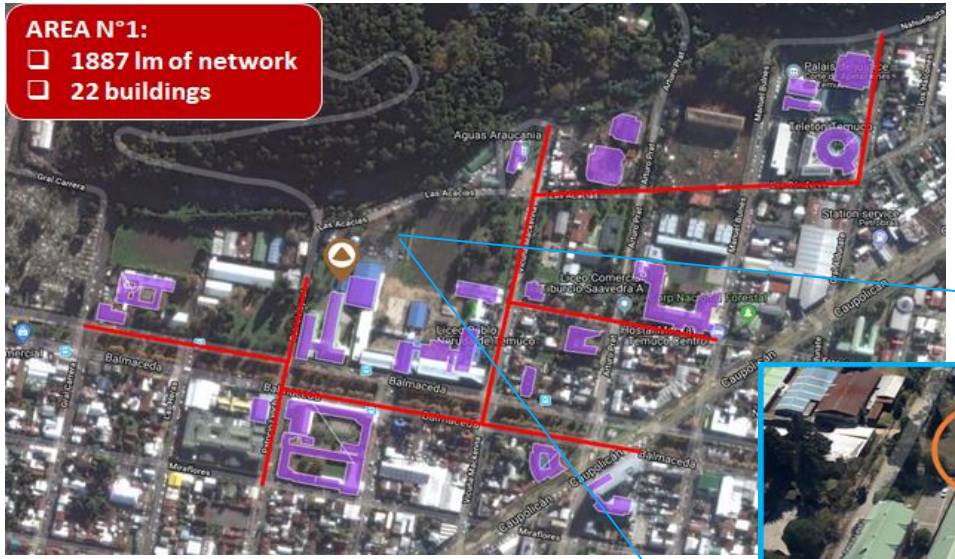


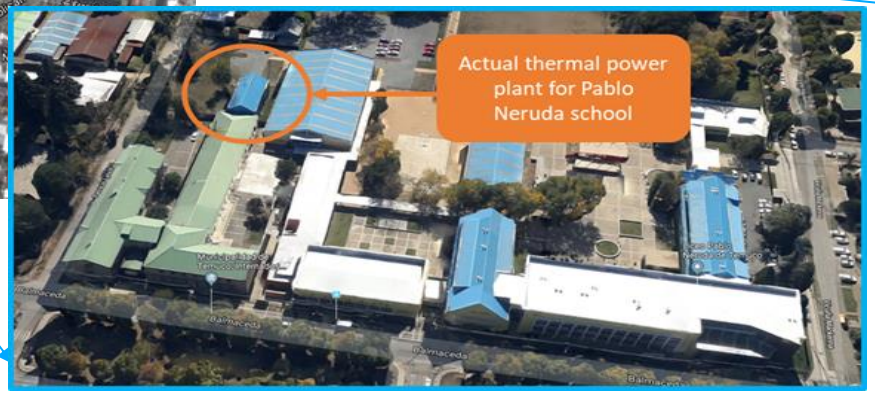
Preliminary results: **"Start small and grow Big"**

- Area n°1 is selected area to deepen study (anchor clients, available landfill, …)
- 22 buildings ~ 5 GWh of heat consumption ~ 2 km of network
- Recommended technology (non-exhaustive!): Biomass boiler house (3MW)

Case of Temuco: Area n°1

Example of heating network





Observations:

- Data collection: several difficulties to gather clients consumptions.
- Reasons: no bills, no real directives to collect data
- Example: To the date, local expert has not been able to have a meeting with the Regional Hospital

Next steps

- **Continue Rapid Assessments** on other cities (Renca, Recoleta, …)
- In parallel, UNEP, Municipalities and Ministries (Energy and Environment) should work on **facilitating regulatory requirements and permits.**
  - Example: Adapt Concession Business Model to facilitate a District Heating Network (How was Gas Distribution implemented in the past?)


Thank you for your attention
ENGIE