District Energy in Chile

Unlocking investments in sustainable heating solutions to improve air quality

SANTIAGO

JUNE 12th &13th 2017

Sebastien UGONA

ENGIE LATAM

INDEX

03

Concrete cases applicable in Chile

Example of fuel flexibility / diversity at ENGIE

ENORIS

- Urban Waste valorization
- Waste wood valorization
- Coal and Natural gas

ARGEO

- Geothermal energy
- New district from scratch

FORBACH

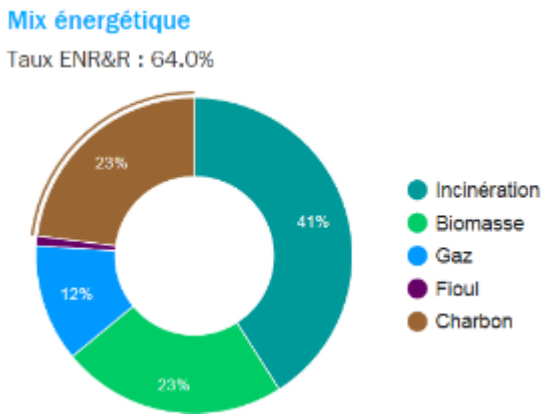
- Biomass cogen in a industrial wasteland.
- New energy sources for an existing network

ENORIS
Success story in Energy Transition

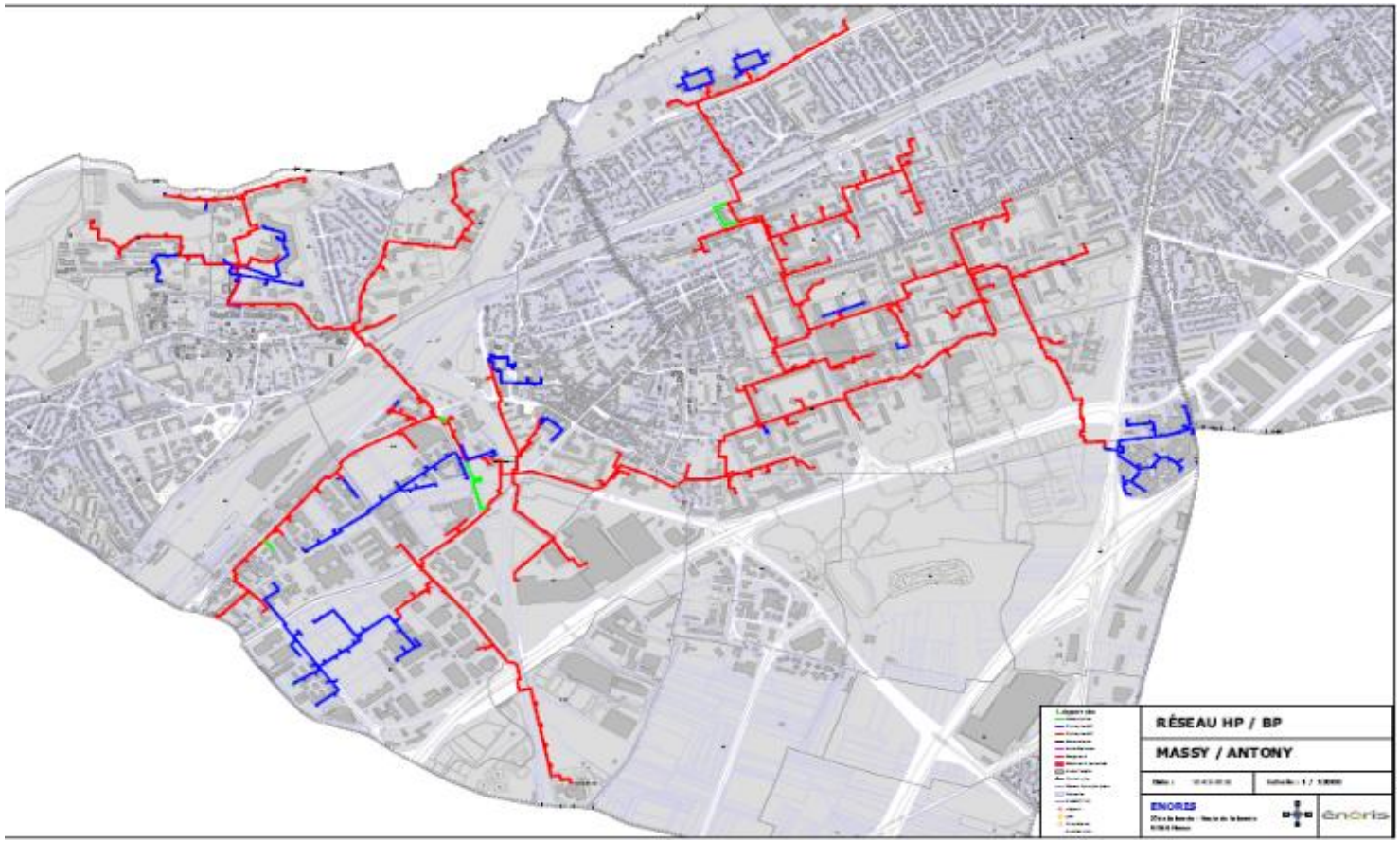
- **1960 :** Start of the construction begins of the boiler room with **heavy fuel oil** in the city center of Massy
- **1963 :** The operation of the district heating installations is entrusted by the SAGEMA (development company of Massy / Antony) to a consortium of companies, CURMA
- **1969 :** Creation of SIMACUR (*Massy Antony*)
- **1985/1986 :** Construction of the **coal-fired boiler plant and the incineration plant** route de la Bonde in Massy
- **2004/2005 :** Construction of the **gas-fired boiler** room and the domestic hot water heating system
- **2005 :** Membership of the Hauts de bièvre Community for the competence of waste treatment at SIMACUR
- **2005/2006 :** Upgrading UIOM standards
- **2009 :** Accession of the commune of Chilly-Mazarin for the competence of waste treatment
- **2014** : Renewal of the CONCESSION to ENORIS (ENGIE affiliate) **BIOMASS**

ENORIS
Success story in Energy Transition

ENORIS
Some figures…



- **Production :** 174 MW / 260 GWh
- **NETWORK :** lenght = 34 km
- **Distribution :** 225 building / 26 000 housing equivalent



ENORIS
La Bonde (main plant)

Waste Energy boiler

- 2 x 5,5 T waste per hour
- 87 000 t waste/year
- 2 x 17 t/h steam (213 °c)

LFC (Fluidised bed)

- 2 x 32 MW
- Mix of Waste Wood and Coal
- 3 t/h de Waste Wood / coal in complement
- Efficiency 85 %

Natural Gas Boilers

- 2 x 22 MW
- Back up / complement
- Efficiency 95%

ARGEO: Geothermal Energy

1st deep geothermal creation at Dogger in Ile-de-France for more than 30 years

- 2 holes at 1600 meters depth
- geothermal power plant
- 16 km district heating network, supplying the equivalent of 10 000 housing
- + 60% of annual requirements covered by geothermal energy
- 14,600 tonnes of CO2 saved per year, equivalent to 8,000 vehicles

ARGEO: Geothermal Energy

Efficient and continuous

- Available 24/7 – Storage inclued

Natural and clean

- Heat exists naturally in the ground and a geothermal operation produces very little waste and greenhouse gas emissions.

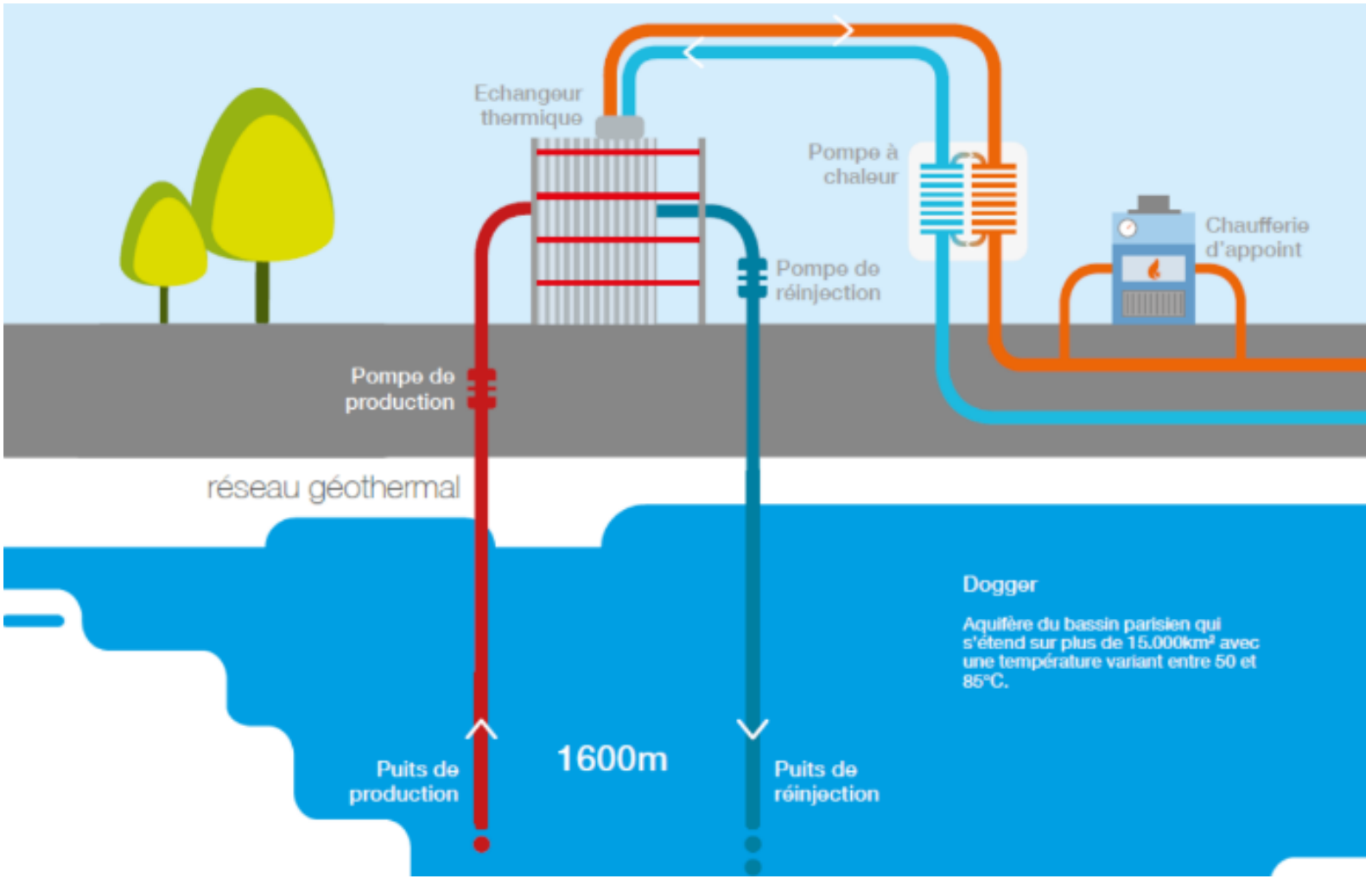
Renewable

- Unlike fossil fuels, geothermal resources do not dry up as they are exploited. The water is then reinjected into the subsoil and heats up continuously as it travels through the geological layers.

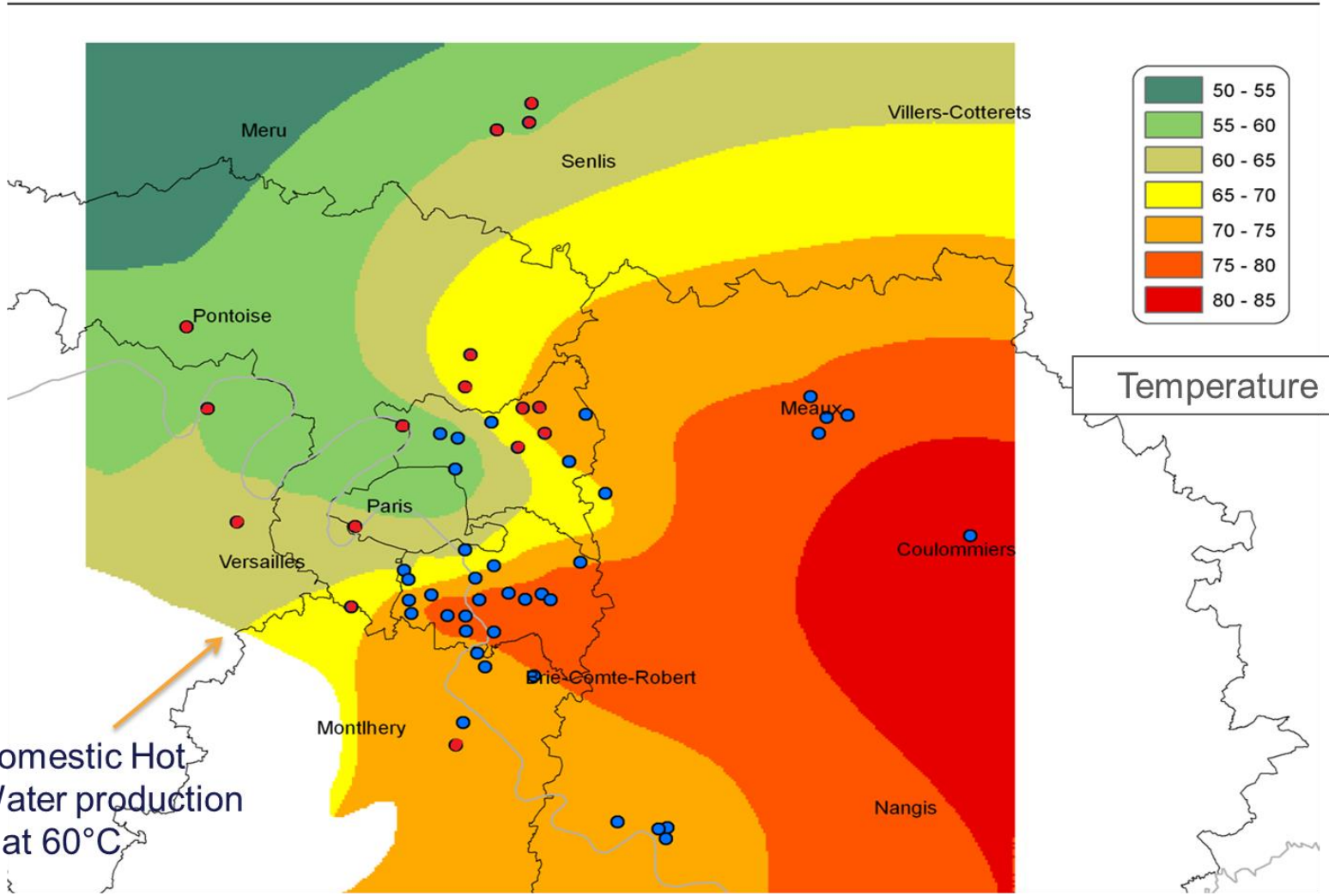
Local

- Present in the basement as close as possible to the needs, energy from geothermal energy does not require transportation. Exploited in very urban contexts, geothermal energy demands an area of exploitation that is not very greedy in space, once the drilling is done. It integrates perfectly with other urban projects.

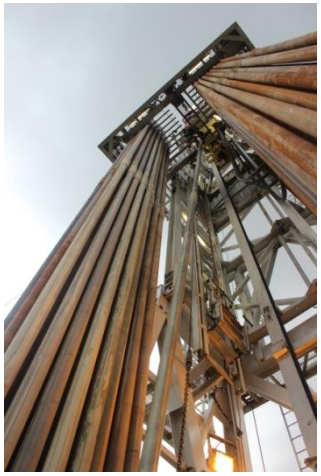
ARGEO: Geothermal Energy

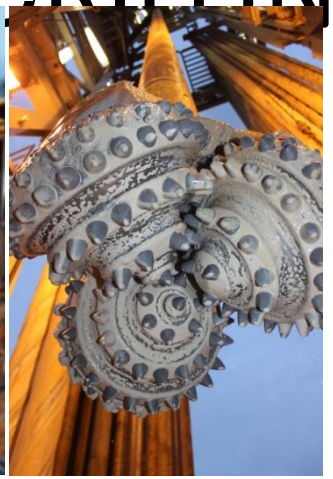
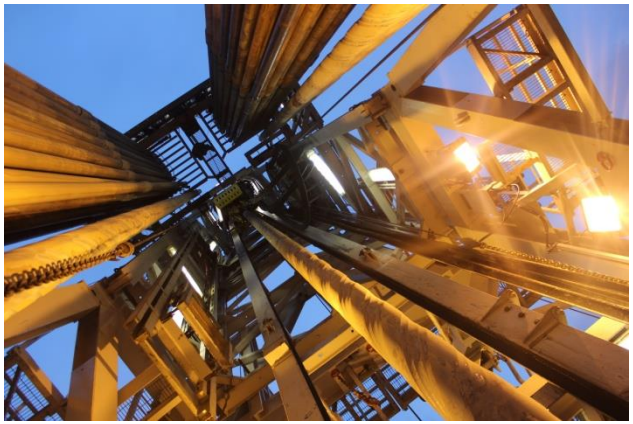


ARGEO: Geothermal Energy



ARGEO DRILLING




ARGEO

SOME FIGURES

10 000
Eq logements raccordés

13 km
Longueur du réseau

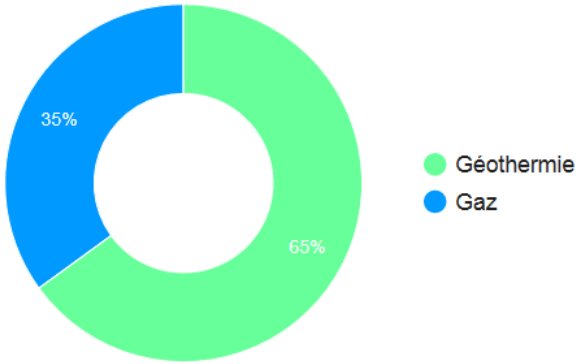
48 mw
Puissance installée

80
Nombre de sous-stations

100 GWh
Production

Mix énergétique

Taux ENR&R : 65.0%



ARGEO

Heat pumps

Geothermal heat exchangers

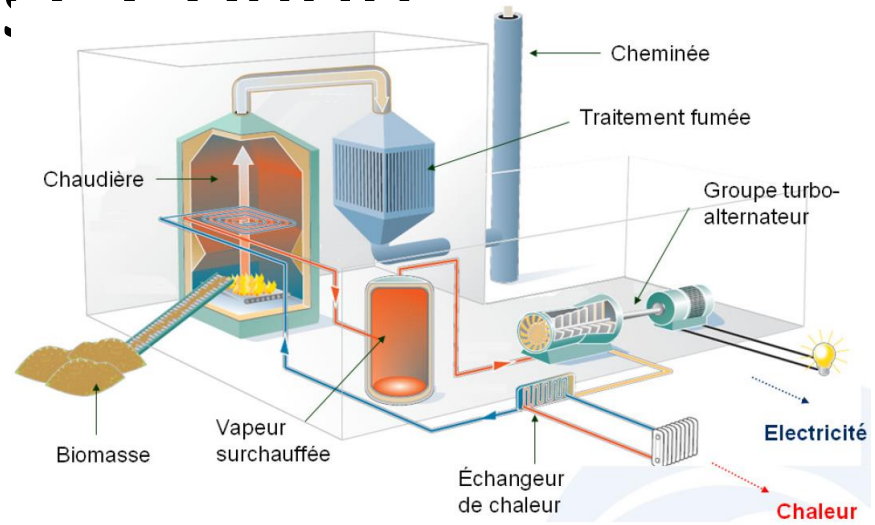
Forbach District Heating with Biomass Cogen

- Make innovative and sustainable technical decision to integrate the best technologies available to replace the exhausted supply of firedamp gas.
- Ensure the continuity of supply of heat and the long-term economic attraction to the Forbach district heating network.

→ **Construction of a biomass cogeneration plant to meet heating and electricity supply needs.**

- Reduced VAT rate 5.5% obtained for customers instead of 19.6% without renewable energy.
- Illustrates the successful reconversion of an industrial wasteland.
- 8,500 housing units-equivalent. 18 km length
- Total boiler plant power output: wood (22 MW) and gas (24 MW) Heat recovery boiler (8 MW) behind a gas turbine (5.5 MW) producing electricity. Energy mix: wood (55%), natural gas (45%).

Forbach District Heating with Biomass Cogen

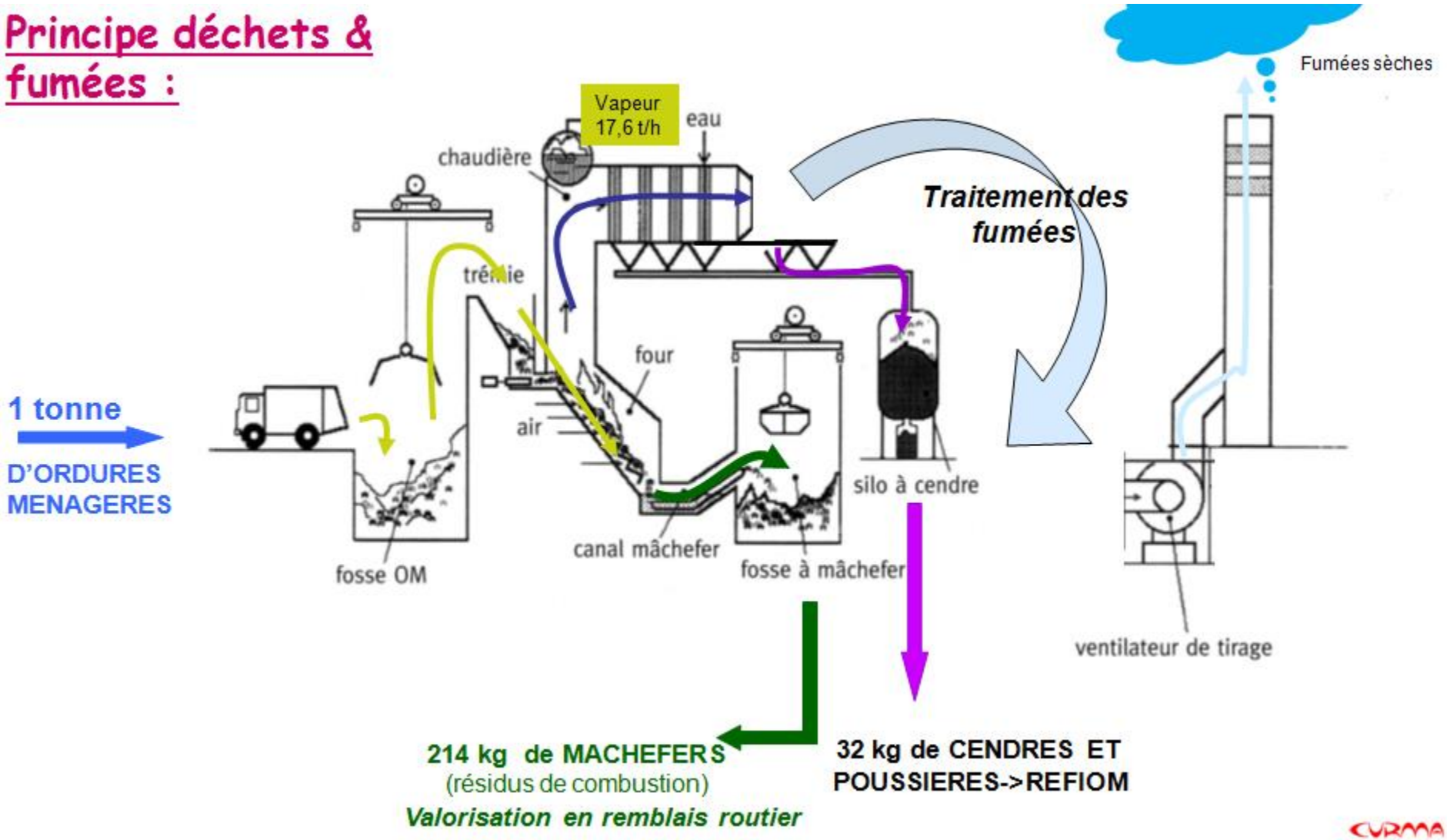


03

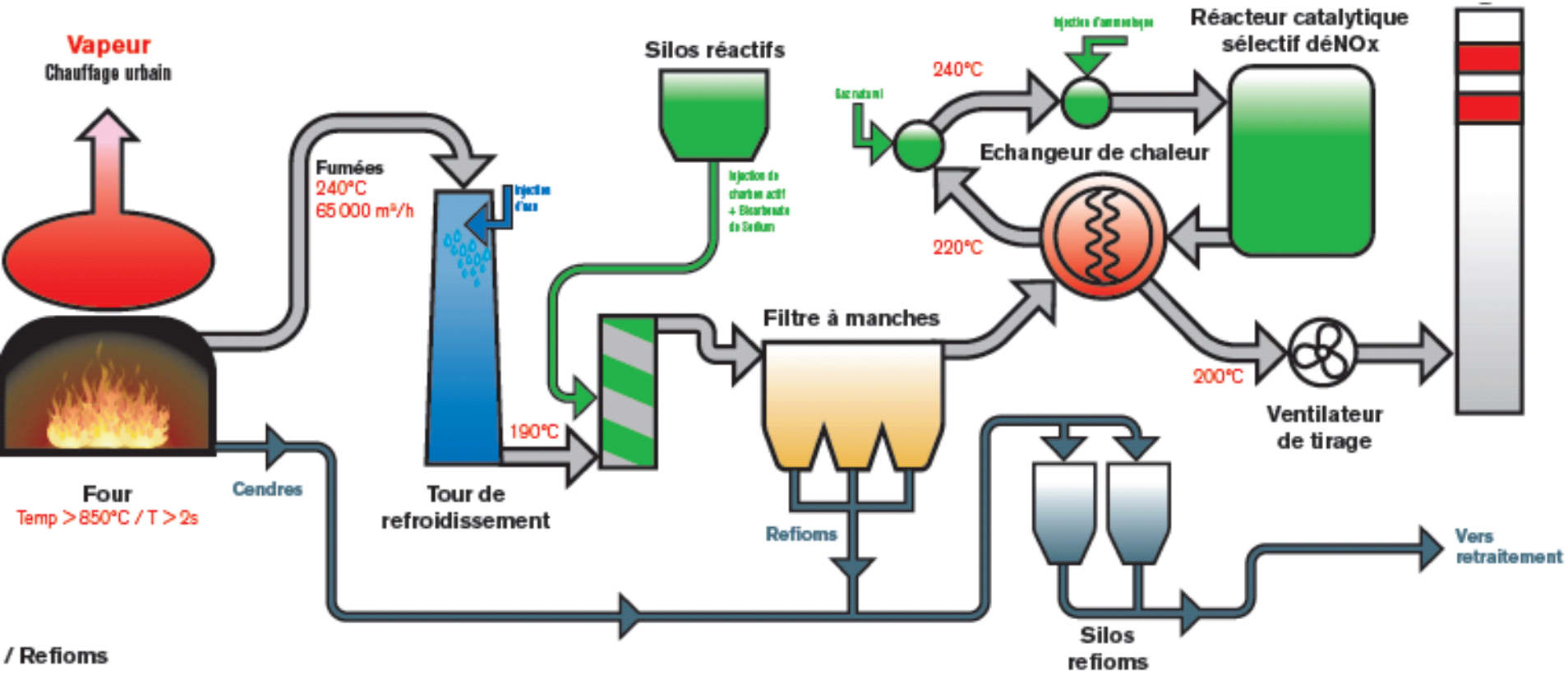
APENDIX


énoris

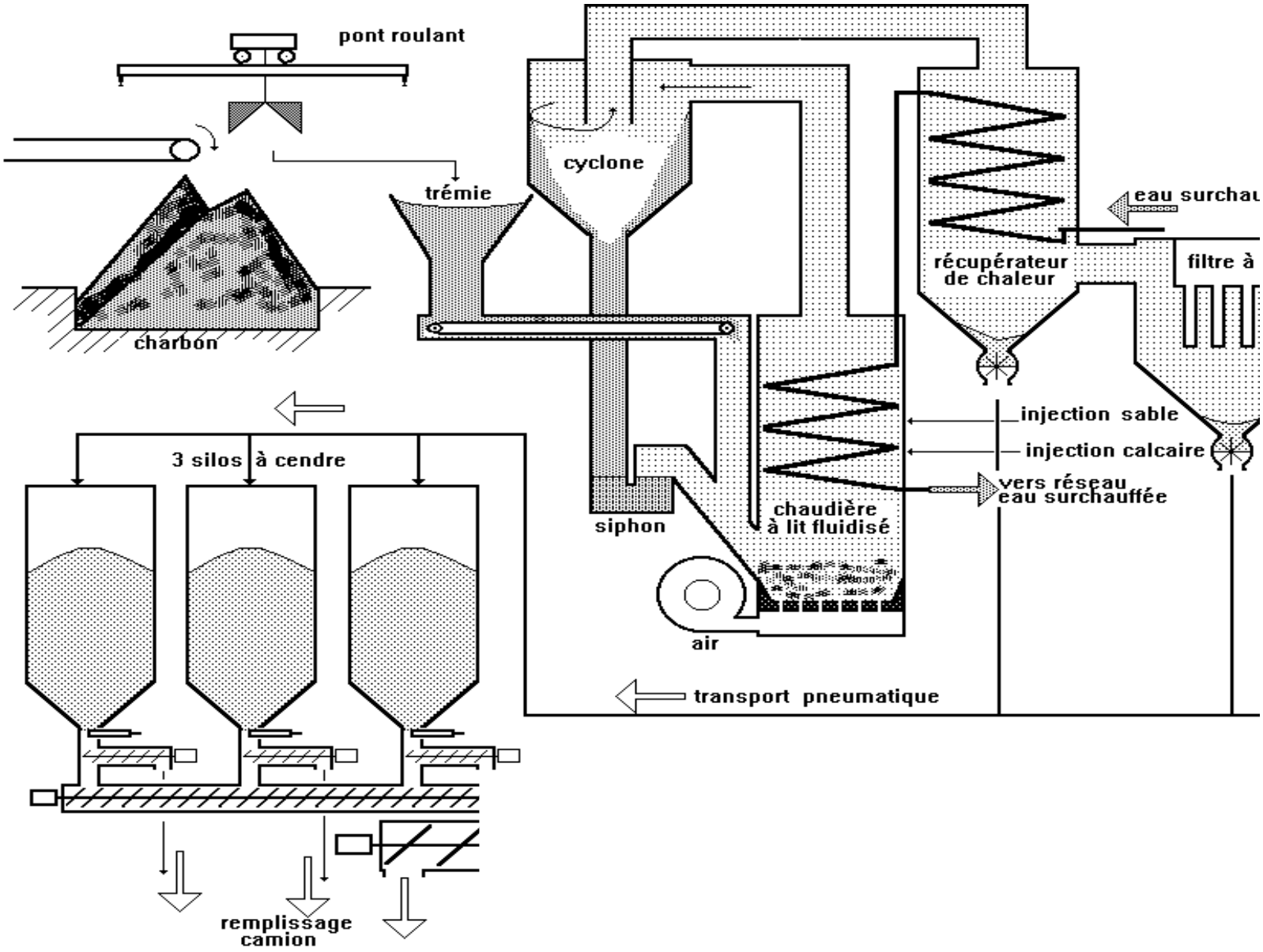
Procédé d'incinération des OM



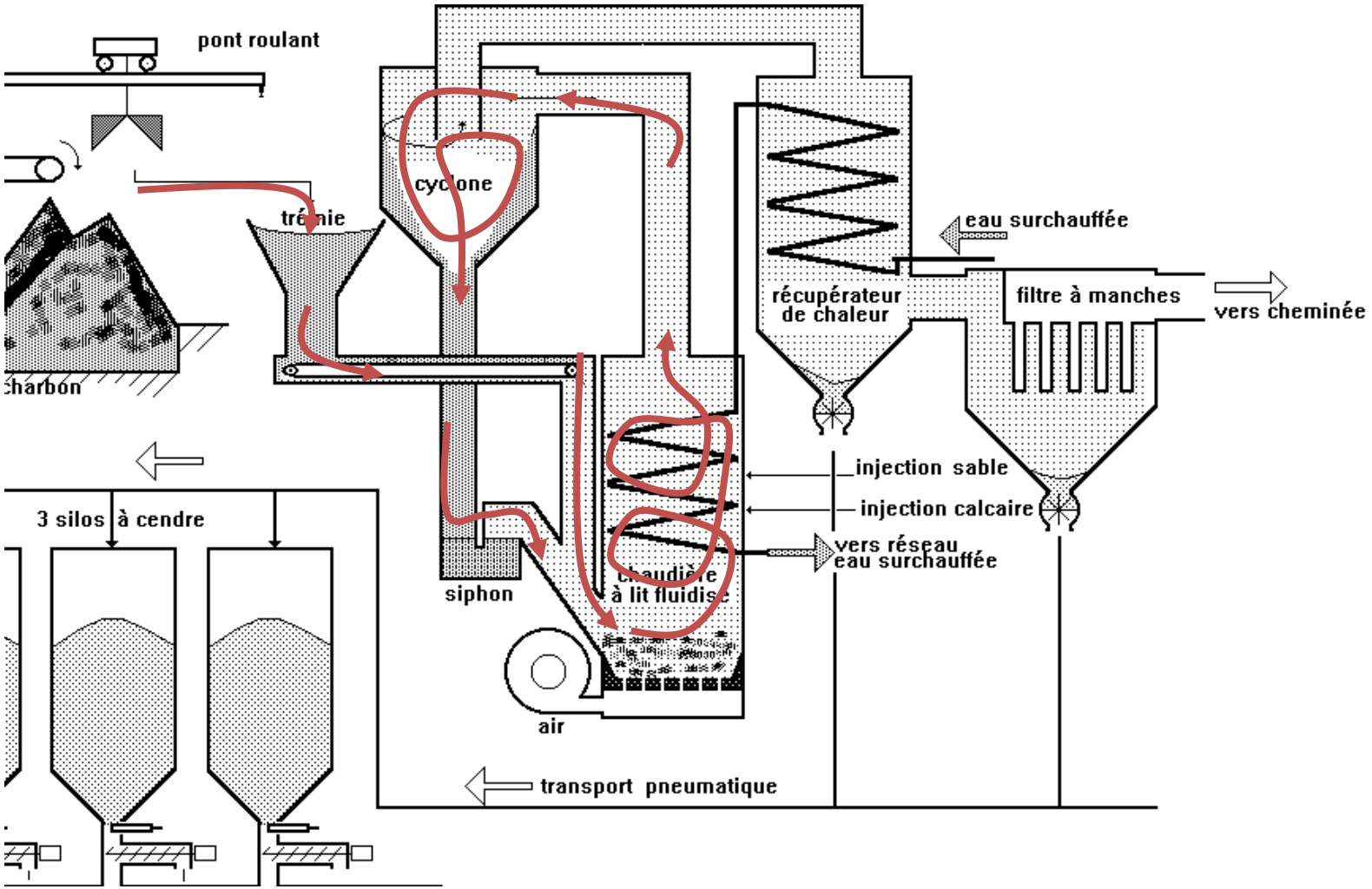
Procédé de traitement des fumées



Procédé Lit Fluidisé Circulant



Procédé Lit Fluidisé Circulant



Barcelona District Heating and Cooling (1/3)

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

Barcelona Cooling (2/3)
Forum Plant

- The Forum plant produces hot and cold water which is distributed through a network of district heating and cooling throughout the Forum and 22@ area.
- Almost all the heat and a great part of the cold are produced making good use of the steam created with the incineration of urban waste in the nearby treatment plant of TERSA.
- The rest of the cold is produced with industrial electric coolers that are seawater cooled, with water collected from the nearby Port Forum.
- The system is completed with a cold water storage tank of 5 000 m^3

Production of cold :

- **2 absorption equipments – Broad –** of 4,5 MW each indirectly refrigerated with seawater
- **1** cold water storage **tank** of 5 000 m^3
- **2 electric coolers – Mc Quay –** of 4 MW each indirectly refrigerated with seawater
- **2 electric coolers – Johnson Controls –** of 7 MW each directly refrigerated with seawater

Refrigeration System:

- **3 exchangers of seawater / cooling water**, machines of 12,5 MW each
- 1 seawater **collection station** of 5 000 m^3 /h

Heat production:

- **4 steam / water exchangers** of 5 MWh each
- **1 gas boiler** of 20 MW (backup, operating only when there is no steam availability)

Barcelona Cooling (3/3)
Tanger Plant

- This second plant aims to ensure supply in periods of higher demand and will be put into service in case of any eventuality.
- The plant has an advanced ice accumulation storage system which allows it to produce energy in periods of lower demand and to store it until it is necessary in periods of higher demand.

Production of cold :

- **2 compression equipment** of 6,7 MW for production of glycol water to -7°C.
- **1 compression equipment** of 6,7 MW for production of cold water at +4°C

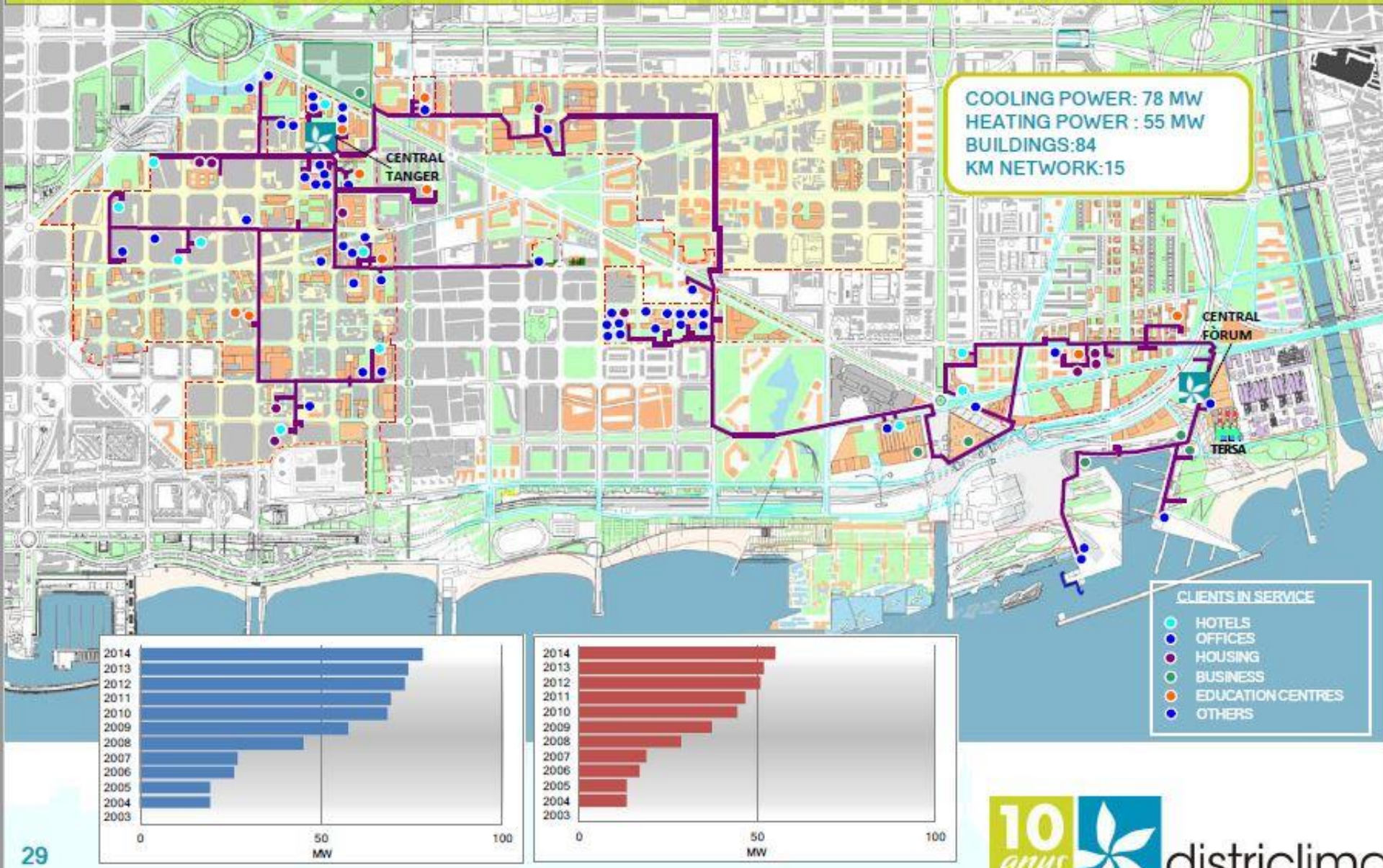
Heat production:

- **3 natural gas boiler** of 13,5 MW each one for hot water production to over 90°C.

Fòrum / 22@ DHC Network

A growing project

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



districlima