Chaire Economie du Climat
Université Paris-Dauphine
CDC Climat

VEOLIA
Research & Innovation

District Heating & Cooling (DHC) network

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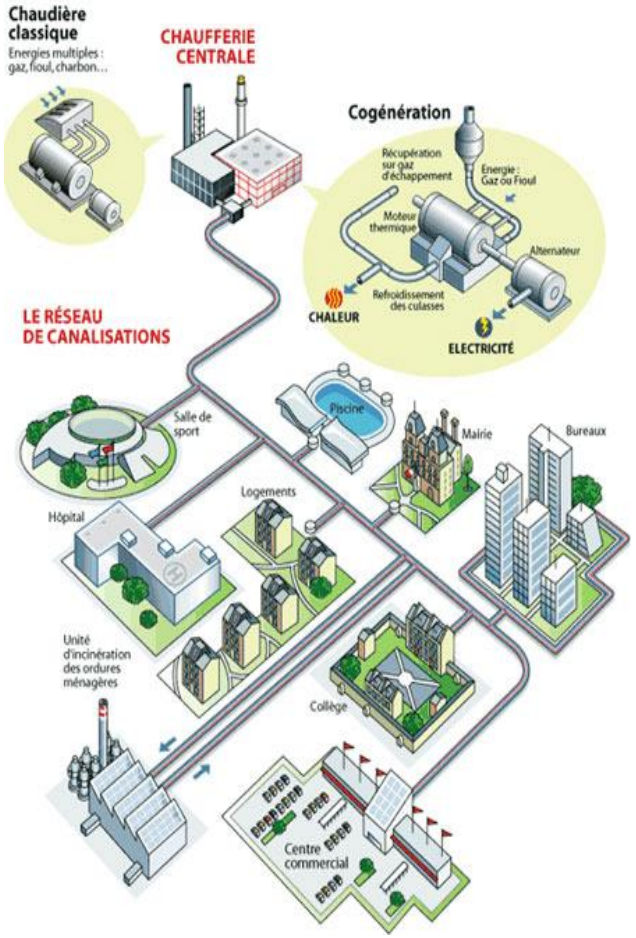
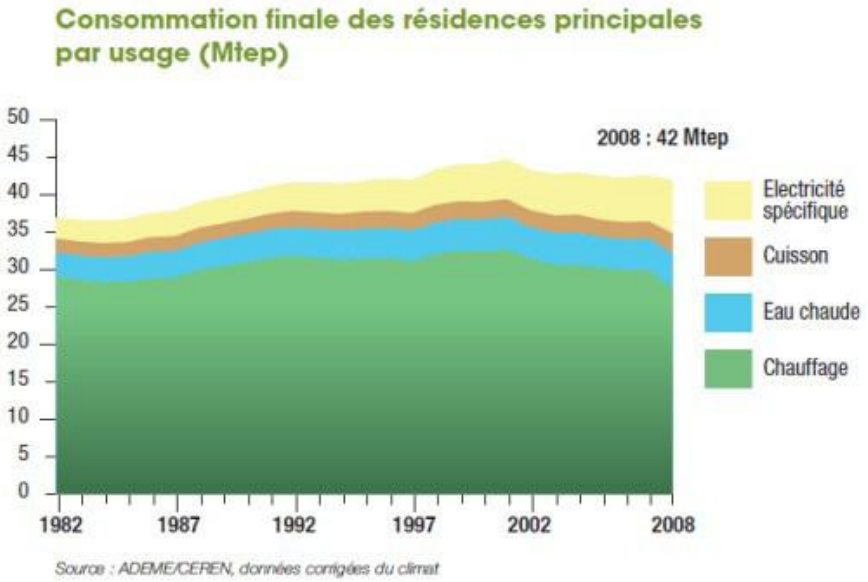
Agenda

- District Heating & Cooling (DHC) network
- DHC network – Issues…
- DHC network – Observations…
- DHC network – Example…
- Towards Smarter DHC...

District Heating & Cooling (DHC) network

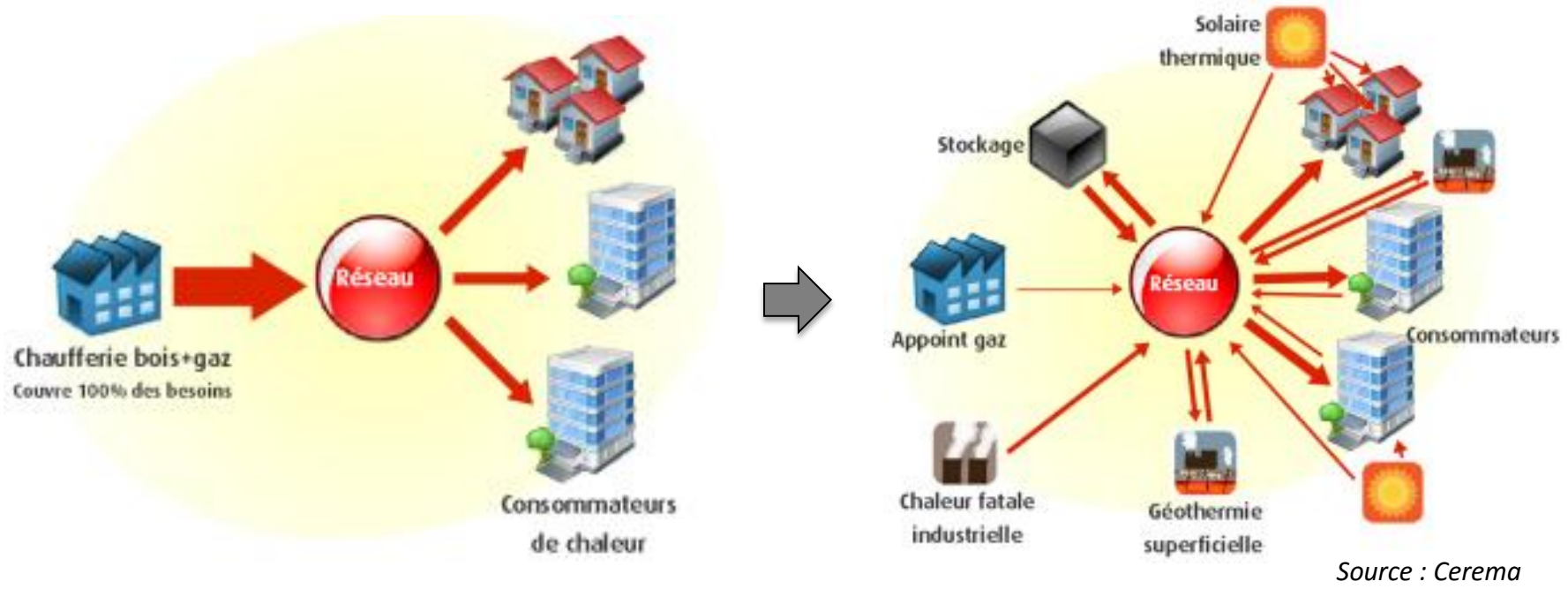




Production → Transport - Distribution → Consumptions

DHC network – Issues…

- Switching from linear mode to an interconnected and bidirectional mode



Source : Cerema

- Ensuring consistency
  - Needs/ expectation of the customers
  - Available energies
  - Recovery methods

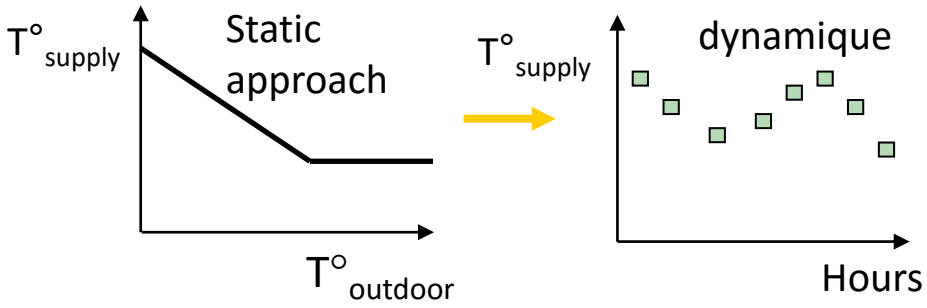
DHC network – Observations…

- Key performance Indicators (KPIs) in design phase
  - Thermal density (MWh / ml.an)
  - The duration of use at full power of the boiler
  - The needs of buildings were on average between 10% and 30% higher when calculated with the RT2012
  - Network operators generally provide a little gap in their design
- Explanation of differences between design/operating phases
  - Failure to take into account thermal renovation projects (for not informing owners)
  - Wrong phasing of the project, or delay of development that is ultimately not done
  - Non connecting some buildings
  - A particularly smooth weather

DHC network – Example…

- Supply temperaure optimization : objective and issues
  - Set the DHC operating temperature as low as possible in a real time approach, to decrease thermal losses.

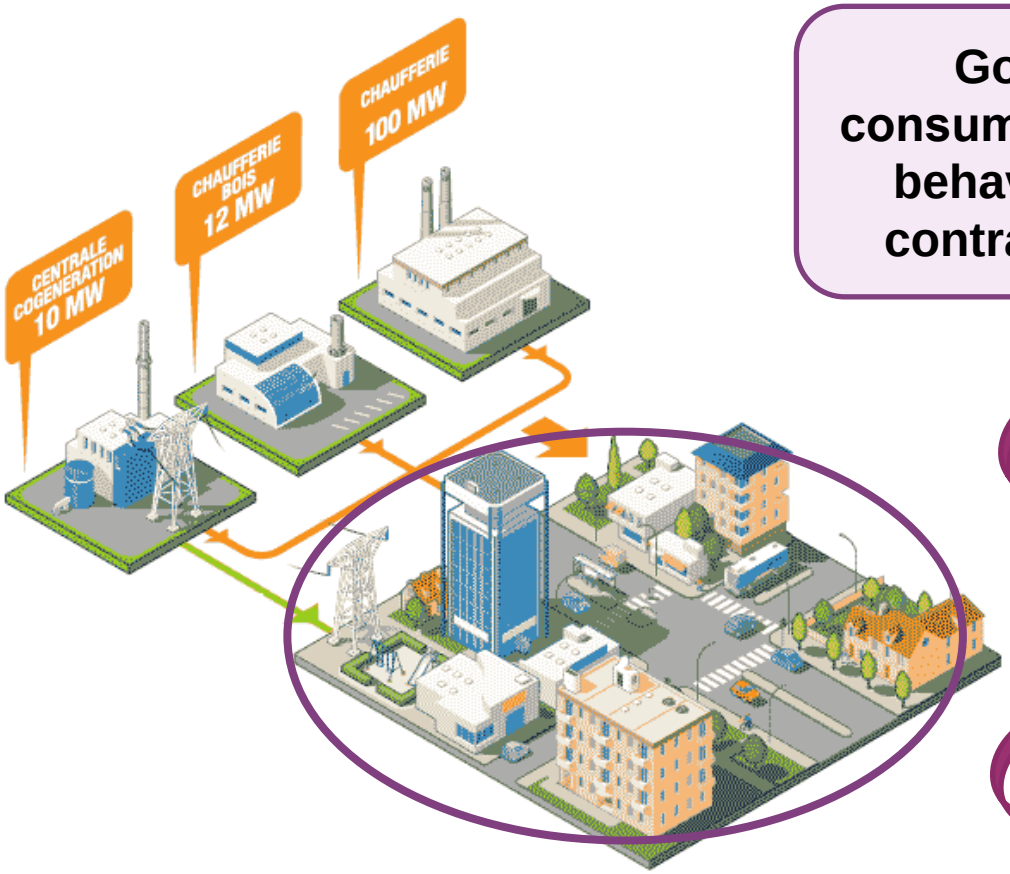
Basic static laws (Supply Temperature depending on Outdoor Temperature) → **Dynamic Temperature profil**



- Supply Temperature optimization has to take into account
  - Consumers real time demand / Consumers forecast demand
  - Propagation time of water into network pipes
  - Contraints related to max. pressure and flow in the network

Need of real-time DHC modeling…

Towards smarter DHC...

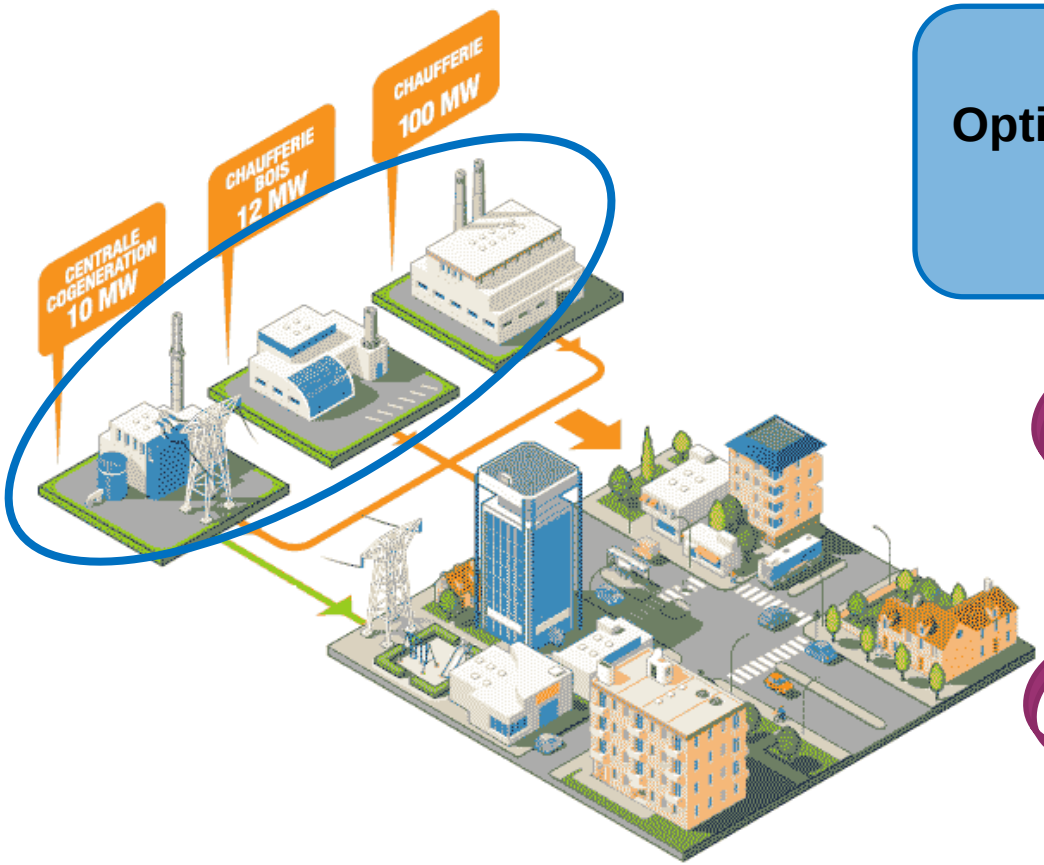


Good understanding of consumers' demand and network behaviour according to local contraints and energy market

Sub-stations/Buildings Demand/Monitoring

Heat and Electricity Load forecast

Towards smarter DHC...



Optimal sheduling of heat and electricity production

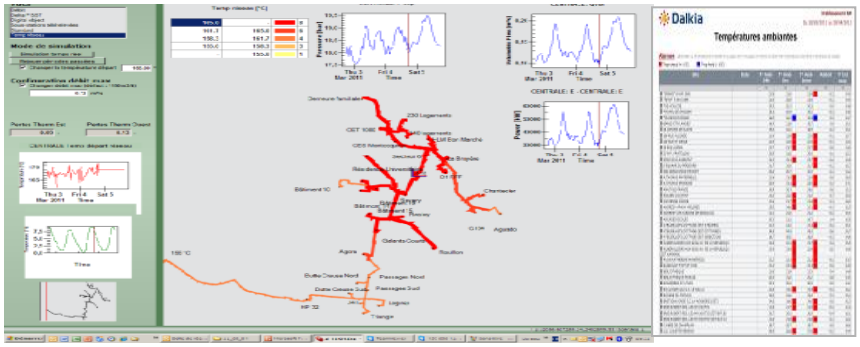
Choose the optimal sources and production mix

Use optimal decoupling of production and demand

Energy Storage: buffer or building mass

« Optimal »…: taking into account multicriteria contraints (economical, environmental, technical, local..)

Towards smarter DHC...



Clients

- Adjustment of parameters (priority, shedding ...)
- Storage management

Network

- Adjustment of temperature and pressure pumps
- Storage management

Central Production

- Energy costs, availability,
- Generators selection
- Efficiency of producers, technical minimum
- Market opportunities
- Environmental impact

Customer/ Markets data acquisition

- Expectations and needs
- Quality and Quantity
- Hot, Cold & electricity

Production parameters management

- Cost / Price Changes
- Commitments (Regulation, Contract ...)
- Availability (Quality & Quantity)
- Flexibility

Optimisation

- Modeling
- Forecasting
- Anticipation
- Arbitrations

Market Opportunities

Smart DHC