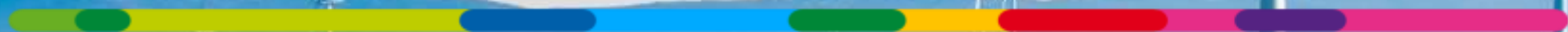

Métier B2T –District Heating and Cooling

Presentation – IDEA 10th June 2018

Dr-Ing. Michael Schack
Director Networks and Cogenerations
ENGIE



SUMMARY

Chapter 1

ENGIE and the energy revolution

Chapter 2

Heating and Cooling what is at stake ?
The role of District Heating and Cooling

Chapter 3

District Heating and Cooling

01

ENGIE AND THE ENERGY REVOLUTION





A GLOBAL AND DIVERSIFIED FOOTPRINT*

€65 billion
OF REVENUES (IN 2017)

ACTIVITIES IN
70 COUNTRIES

153,000 EMPLOYEES
ACROSS THE WORLD (IN
2017)

112.7 GW
OF INSTALLED POWER
PRODUCTION CAPACITY

4,350 emp.
2016 rev.: **€4.7 billion**
11.7 GW installed**

North America

133,770 emp.
2016 rev.: **€52.7 billion**
44.7 GW installed**

Europe***

1,380 emp.
2016 rev.: **€0.5 billion**
26.3 GW installed**

Middle East

3,130 emp.
2016 rev.: **€2.9 billion**
7.5 GW installed**

Asia

6,235 emp.
2016 rev.: **€3.9 billion**
17.2 GW installed**

Latin America

400 emp.
2016 rev.: **€0.3 billion**
1.4 GW installed**

Africa

3,825 emp.
2016 rev.: **€1.6 billion**
3.9 GW installed**

Oceania

** Figures as of 31 December 2016

** Installed capacity at 100%

*** Including Turkey

**** Including Mexico

AN ENERGY REVOLUTION IS ONGOING

The new energy world is characterized by **decarbonization**, **decentralization** and **digitalization** (the 3 “D”).



DECARBONIZATION

Worldwide renewable energies: annual additional capacity to grow by +70% in 2030 vs 2015



DECENTRALIZATION

Decentralized solutions to more than double by 2030



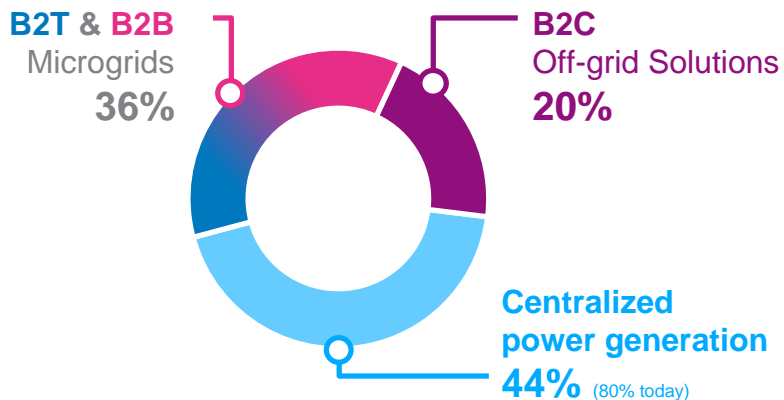
DIGITALIZATION

Digital disrupts energy systems and improves customer offers

CITIES & REGIONS: AT THE HEART OF THE ENERGY TRANSITION IN A FAST CHANGING WORLD

IEA Scenario “Energy for all” 2030

Cities



2 % of World Area

50 % of World Population

75 % of World Energy Consumption

80 % of World GHG



A COMPETITIVE POSITIONING



CITIES: A PRESENCE ON ALL “VERTICALS” ANSWERING TO TRANSVERSAL CUSTOMERS NEEDS

Our customers' needs

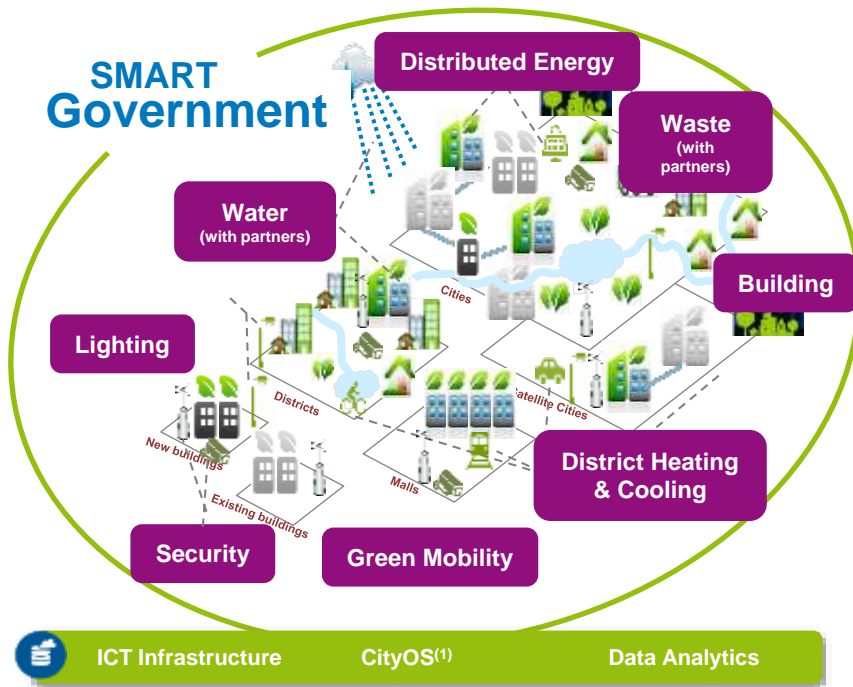
To improve
Security and Resilience

To benefit from
Fluid & Green mobility

To ensure an
Enjoyable environment

To develop the
Local attractiveness

To allow to
Reduce costs



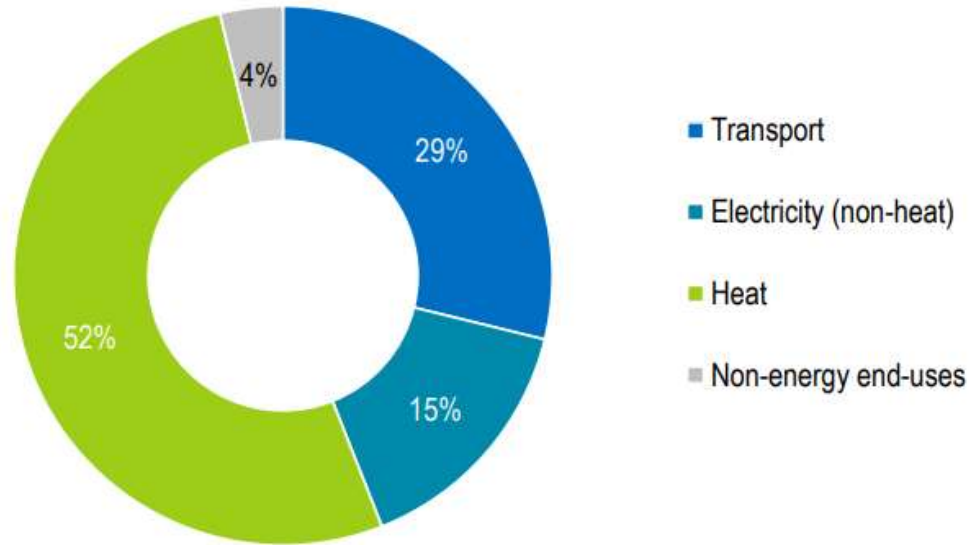
(1) Includes city management tools such as dashboards to enable city stakeholders to make informed decisions

02

HEATING AND COOLING WHAT IS AT STAKE? *The role of District Heating and Cooling*



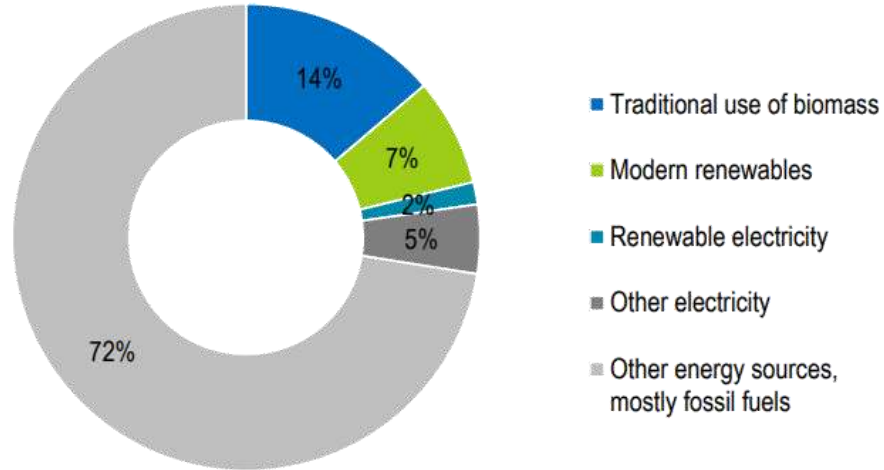
HEATING IS 50% OF FINAL ENERGY CONSUMPTION



Heat dominates global energy consumption providing key services such as space heating, hot water and industrial process heat.

TOTAL GLOBAL ENERGY CONSUMPTION FOR HEAT, 2015

Almost three-quarters of heat consumed is produced through the direct combustion of oil, coal, natural gas.

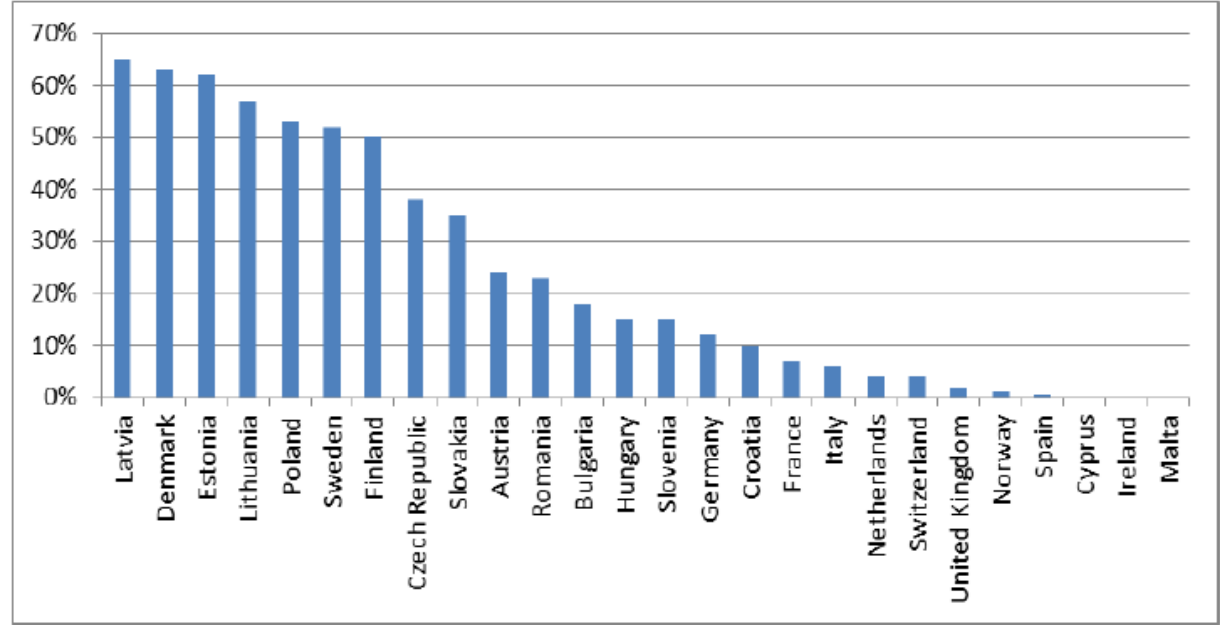


Fossil fuels continue to dominate global heat consumption. Heat is therefore an important contributor to CO2 emissions.

THE ROLE OF DISTRICT HEATING AND COOLING SYSTEMS

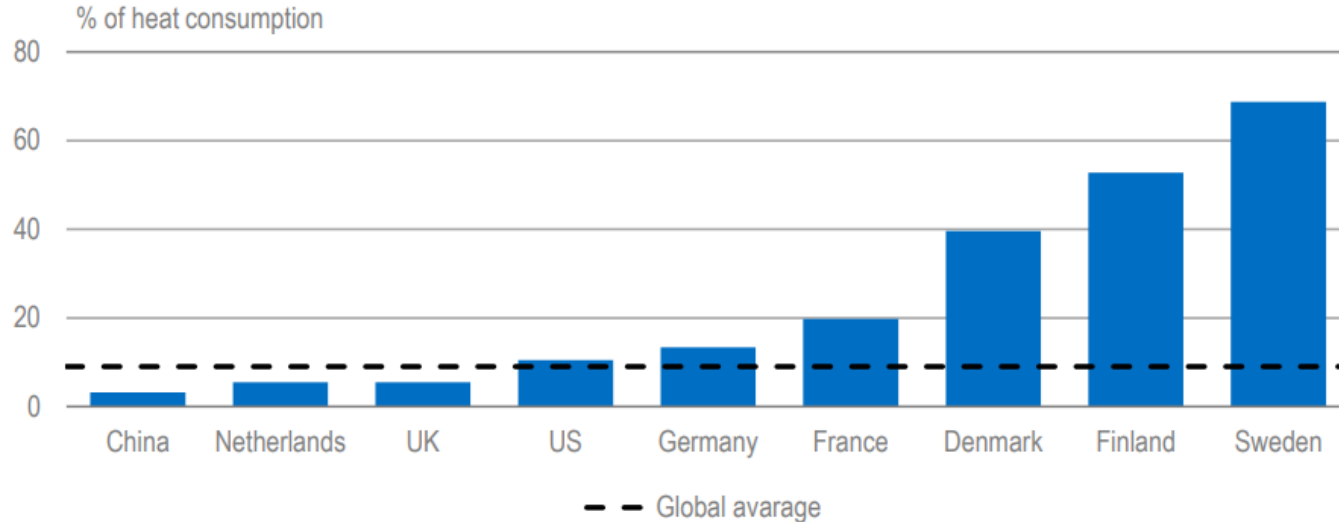


- District heating accounted for around 11% of heating energy consumption in 2013 (IEA, 2016) ;
- In highly-populated areas of cold climate regions with high heating demand, large-scale district heating systems are usually feasible and cost-effective;
- Small-scale district networks are increasingly being deployed to service groups of buildings such as university campuses or hospitals ;



Source: Commission services using data supplied by Euroheat and Power

SHARE OF RENEWABLE HEAT IN HEAT CONSUMPTION, 2015



- Some district networks also supply cooling based on renewables or natural cooling (e.g. Paris uses cool water from the Seine River for its district cooling scheme) ;
- Expanding the supply of heat through district heating is a major plank of low-carbon heat strategies in some countries (e.g. the UK and Netherlands) and some cities (e.g. Paris, Munich and Vancouver)

DISTRICT HEATING AS AN ENABLER FOR HIGH SHARES OF RENEWABLE HEAT

	Share of renewables in heat consumption 2015	Percentage of citizens served by district heating 2013	Heating Degree Days 2016 (European Union average 2904)	Main renewable heat source
Sweden	68.6%	52%	5125	Biomass
Iceland	63.4%	92%	4962	Geothermal
Finland	52.8%	50%	5338	Biomass
Latvia	51.8%	65%	4003	Biomass
Lithuania	46.1%	57%	3827	Biomass
Estonia	49.6%	62%	4208	Biomass
Denmark	39.6%	63%	3136	Biomass

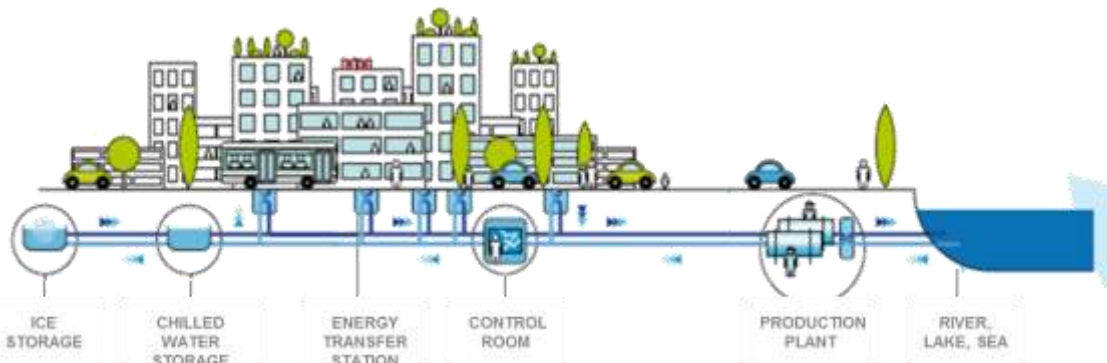
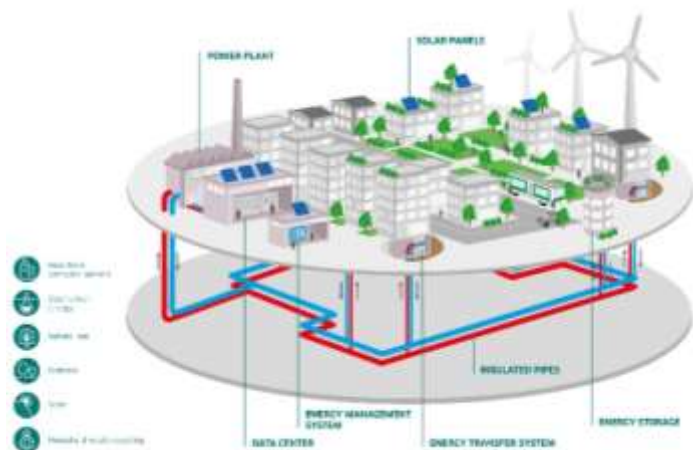
- In dense urban areas, district heating networks may offer the only option for using a significant share of renewables and other low-carbon heat;
- District heating also provides opportunities for integrating short-term and seasonal thermal storage, for using excess heat (e.g. from industry), and for providing flexibility for variable renewable electricity generation;

03

DISTRICT HEATING & COOLING



DISTRICT HEATING & COOLING



Improvement in energy efficiency



Less CO₂ emissions



Less water consumption



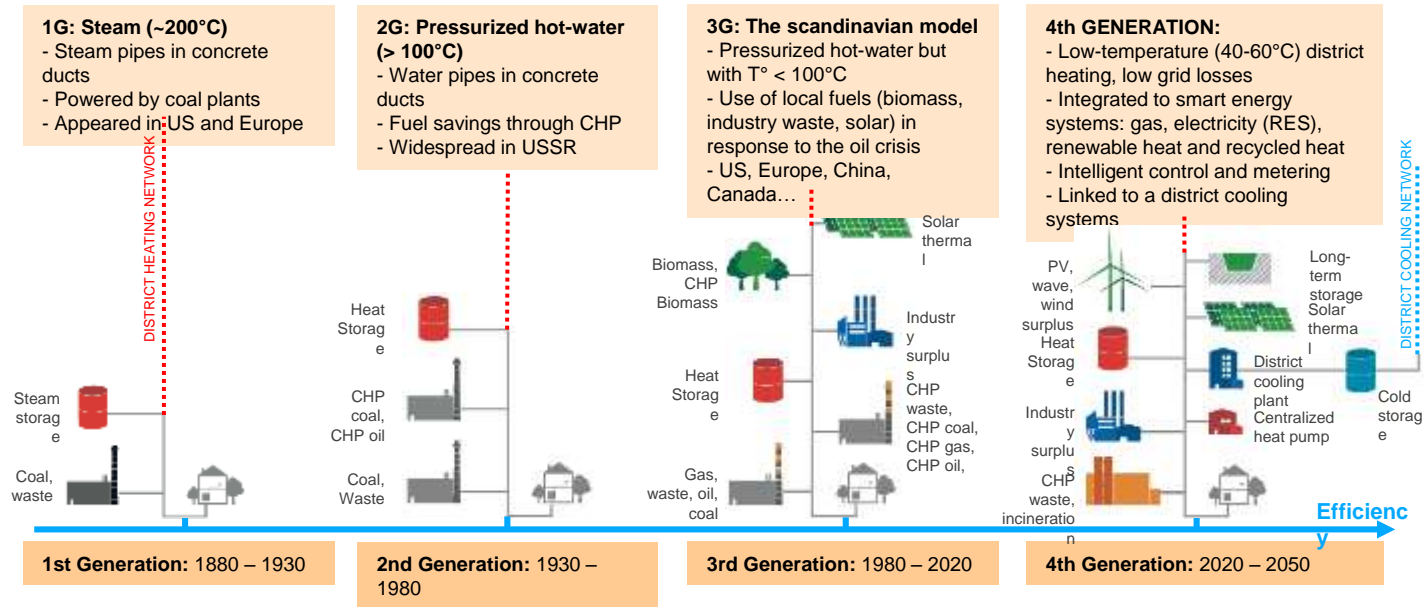
Less electricity consumption



Less usage of chemicals

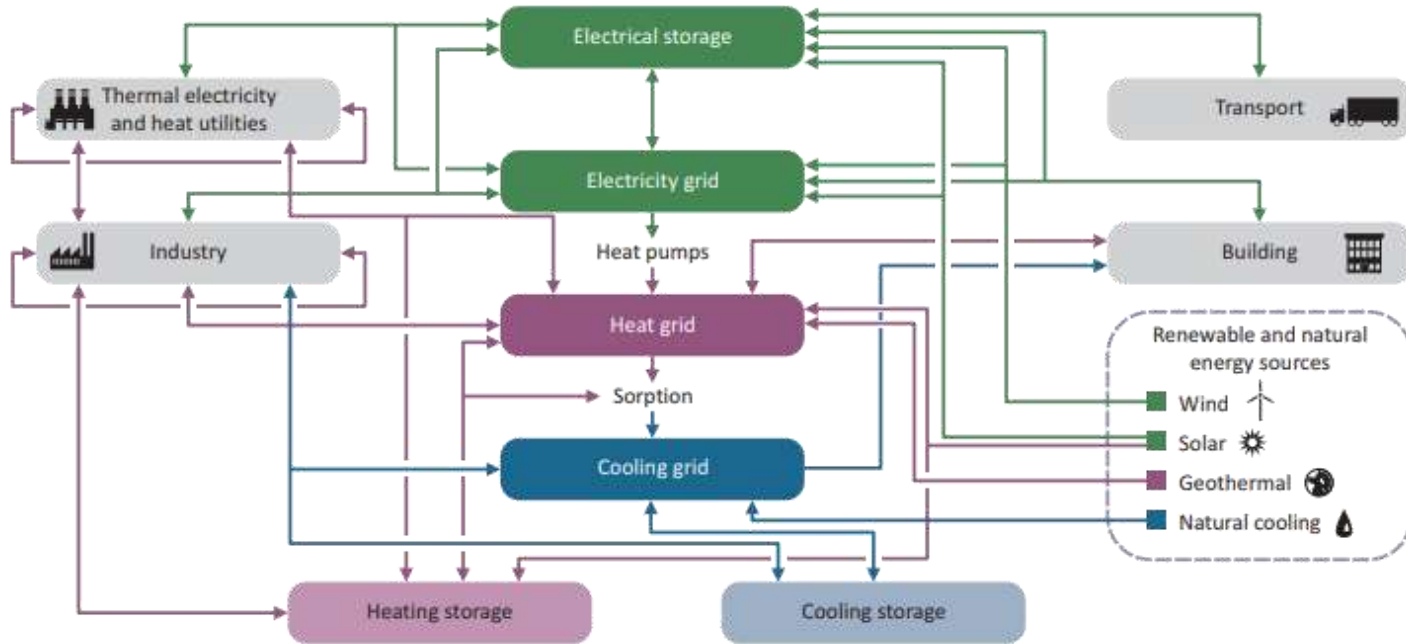
STRATEGY - DHC AS THE BACKBONE OF SUSTAINABLE CITIES

Integrating smart thermal grids into future sustainable energy systems (4th generation DHC)



DHC AS THE BACKBONE OF SUSTAINABLE CITIES

Interconnected systems (4th generation DHC)



Electricity and heat systems are likely to become increasingly interlinked, with a growing use of heat pumps and thermal storage

CITIES: A PRESENCE ON ALL “VERTICALS” answering TO TRANSVERSAL CUSTOMERS NEEDS

Our customers' needs

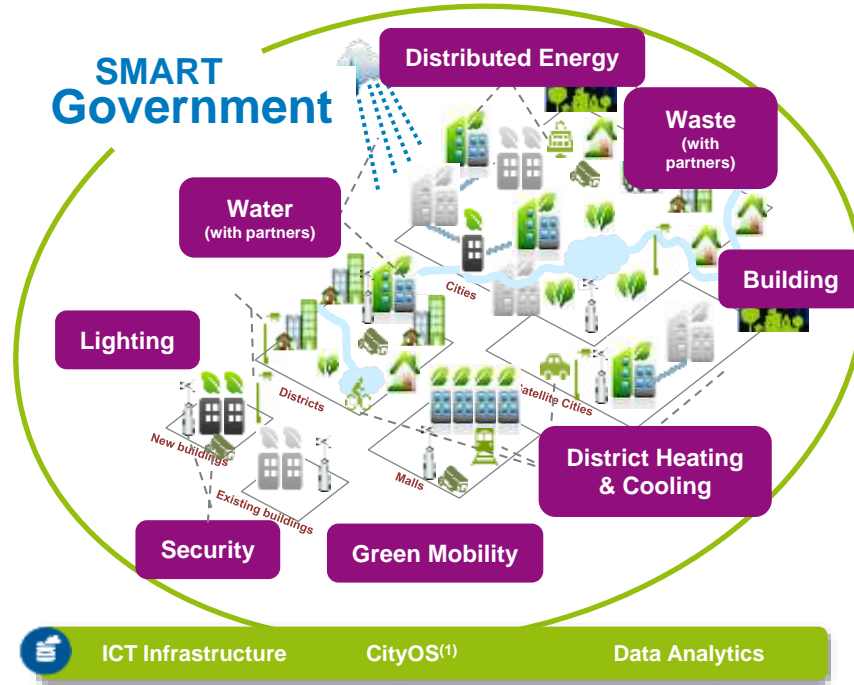
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A BRILLANT FUTURE FOR DHC AND A PRIVILEGED GROWTH VECTOR FOR ENGIE

- Energy systems are currently experiencing some fundamental changes, driven by policy (especially related to climate change), technological innovation (e.g. **digitalisation**), and economics (e.g. falling PV prices)
- The new energy world is characterized by **decarbonization**, **decentralization** and **digitalization** with **modern DHC at the heart of the energy revolution**.
- 3rd and 4th generation **DHC Systems are the most efficient way to decarbonize dense areas** like City Centers, or tertiary or industrial parks, and will be **the backbone of the sustainable City of Today and of Tomorrow**.
- Engie together with its partners in different parts of the world, **believes that DHC will create tremendous value for customers and stakeholders** and has identified it as a privileged growth vector significantly contributing to Engie transformation.



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THANK YOU !
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