

**Energy Solutions for Cities of the Future:
Enabling the Integration of Low Temperature Renewable
Energy Sources into District Heating and Cooling Networks**



WEBINAR 1:

**Strategic heating and cooling planning for the
integration of low-temperature renewable energy
sources in district energy networks:
What key success factors?**

20 April 2020

- ☐ Webinar 1: 20 April 2020 - strategic heating and cooling planning for the Integration of low-temperature renewable energy sources in district Energy networks: what key success factors?**
- ☐ Webinar 2: 14 May 2020 - Integration of low-temperature renewable energy sources into existing district energy networks and buildings**
- ☐ Webinar 3: 25 May 2020 - Enabling framework conditions, financing and business models**

Agenda of the webinar

Opening remarks - Gurbuz Gonul, Director, Country Engagement and Partnerships, IRENA

Presentations

- Integration of low-temperature renewable energy sources in district heating and cooling: Main drivers and enablers - **Luca Angelino and Jack Kiruja, IRENA**
- Technology specific focus: Challenges and innovative solutions for integrating solar thermal into district heating and cooling – **Christian Holter, CEO, Solid**
- Developing an effective strategic heating and cooling plan: What key success factors? **Prof. Brian Vad Mathiesen and Nis Bertelsen (Aalborg University); and Jack Kiruja, IRENA**
- Case study presentation from France - **Paul Bonnetblanc, Ministry for the Ecological and Inclusive Transition**

Questions and answers

Speakers

Gurbuz Gonul	Christian Holter	Brian Vad Mathiesen
		
<p>Director, Country Engagement and Partnerships, IRENA</p>	<p>C.E.O, Solid Solar Energy Systems</p>	<p>Professor, Energy Planning and Renewable Energy Systems, Aalborg University</p>

Nis Bertelsen	Jack Kiruja	Paul Bonnetblanc	Luca Angelino
			
<p>PhD fellow, Aalborg university</p>	<p>Associate Programme Officer, Geothermal Energy, IRENA</p>	<p>Policy officer, Geothermal energy and CCUS, Ministry for the Ecological and Inclusive Transition, France</p>	<p>Programme Officer, IRENA</p>



GLOBAL GEOTHERMAL ALLIANCE



Integration of low-temperature renewable energy sources in district heating and cooling: Main drivers and enablers

20 April 2020

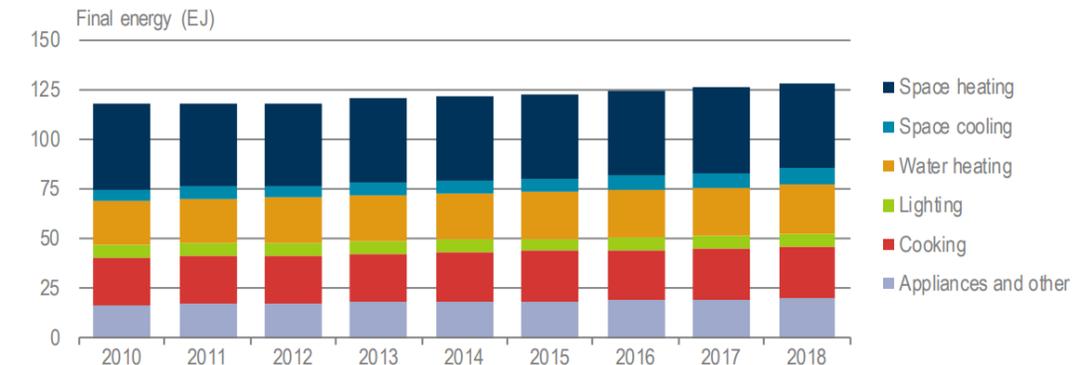
Context – Status and key role of heating and cooling in buildings and cities



Status: High share of individual heating systems & fossil fuels

- 55% of world population reside in cities. Expected to rise to 68% by 2050
- 65% of energy consumption takes place in cities, and cities generate 70% of carbon emissions.
- Heating sector accounts for about 50% of the global energy demand, 90% of heating is generated from fossil fuels (**results in emissions and pollution**).
- Individual standalone fossil-based heating systems are dominant (**inefficiency in operation and pollution**)

Global buildings sector final energy consumption by end-use



IEA (2019). All rights reserved.

Integration of low-temperature RE in district energy

Main Drivers

- Reducing air pollution
- Increasing concerns on security of supply
- Decarbonisation objectives for the heating sector

Main Enablers

- Improved EE in buildings, requiring lower temperature heating systems
- Increased efficiency of heat pumps, enabling harnessing of low-T resources at shallow depths
- Development of new generation district heating, allowing integration of low-grade geothermal and other RE sources
- Thermal storage

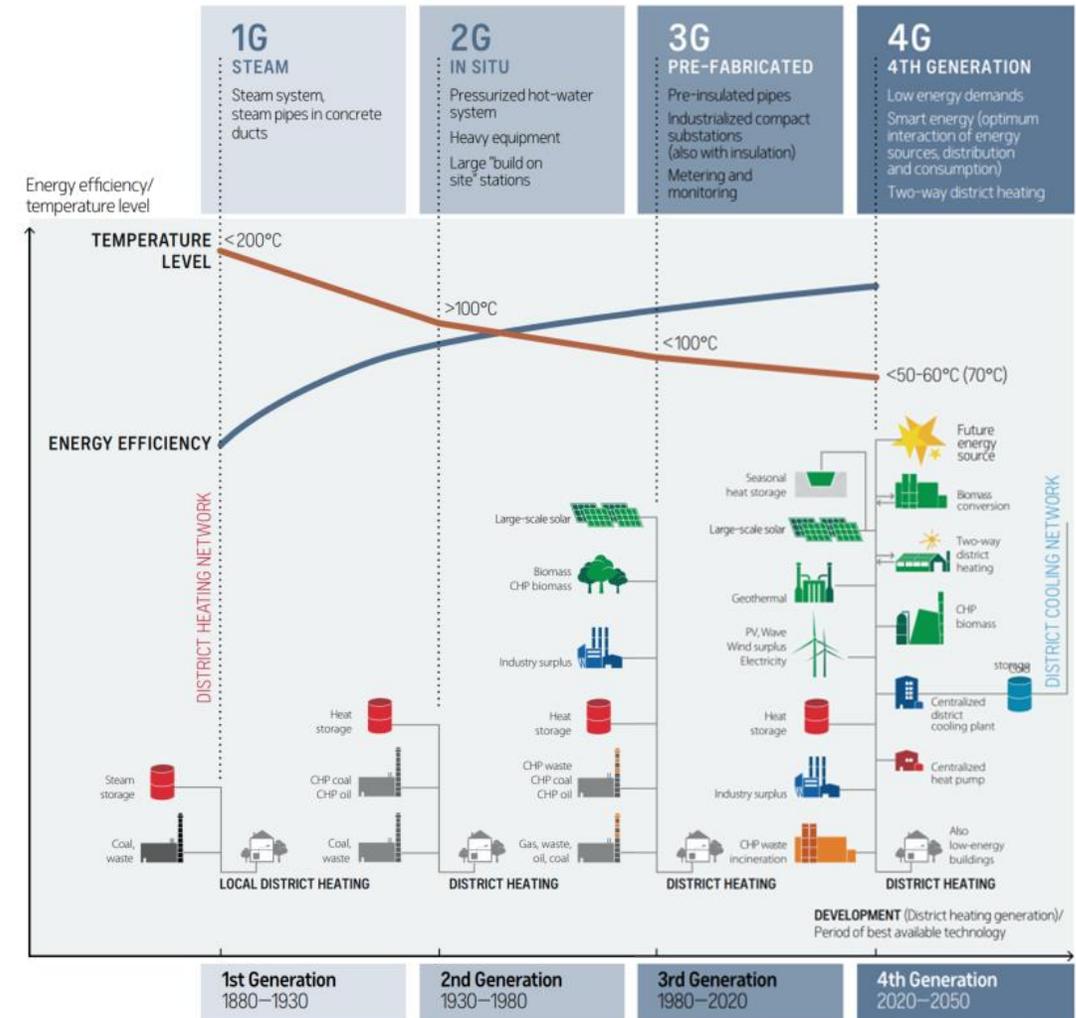


Illustration of the concept of 4th Generation District Heating in comparison to the previous three generations. Source: Lund et al. (2014)

POTENTIAL SOURCES DISTRICT ENERGY

Solar Thermal



Industry, data centers, many sources

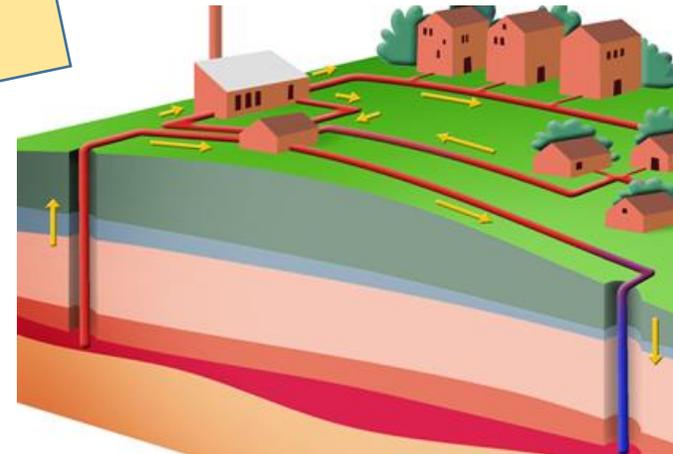


Cannot efficiently exploit these sources without district heating and cooling infrastructure

Water sources



Low- temp. Geothermal



<https://www.veks.dk/da/om-veks/varmeproduktion/geotermi>
https://www.licitationen.dk/project/view/1704/facebook_datacenter_odense
<http://dk.arcon-sunmark.com/nyhederogmedier/vojens-district-heating-denmark>

POTENTIAL SOURCES DISTRICT ENERGY – Example of geothermal applications

Low – medium -temperature geothermal resource (China)



Example of projects

- *Hebei*
- *Shaanxi*
- *Shandong*

Abandoned coal mines: Mieres (Barredo), Asturias, Spain



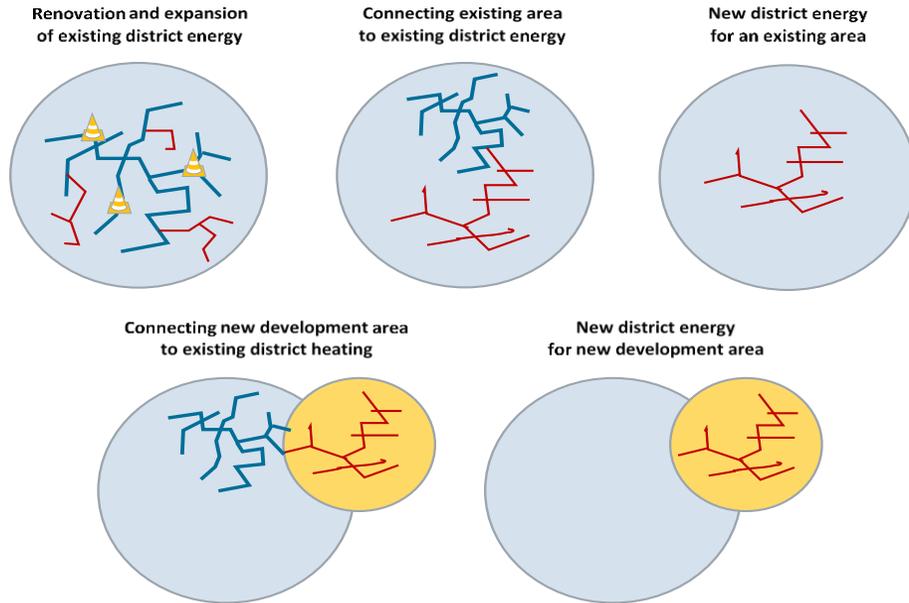
Ultra low-temperature geothermal resources (Paris Saclay)



Co-production from oil and gas wells (La-Teste, France)



Different scenarios



Source: Aalborg University

Different applications of LTDH and potential needed modifications of the elements of the system

	EXISTING DH SYSTEM	NEW DH SYSTEM
EXISTING AREA	<p>Adaptation of consumers connections, substations, and in-house installations for space heating and domestic hot water preparation</p> <p>Potentially need for retrofitting the network, if the network is not oversized.</p>	<p>Adaptation of consumers connections, substations, and in-house installations for space heating and domestic hot water preparation</p>
NEW DEVELOPMENT AREA		<p>New low-energy buildings with low-temperature heating systems (under-floor heating or low-temperature radiators) make LTDH supply particularly suitable</p>

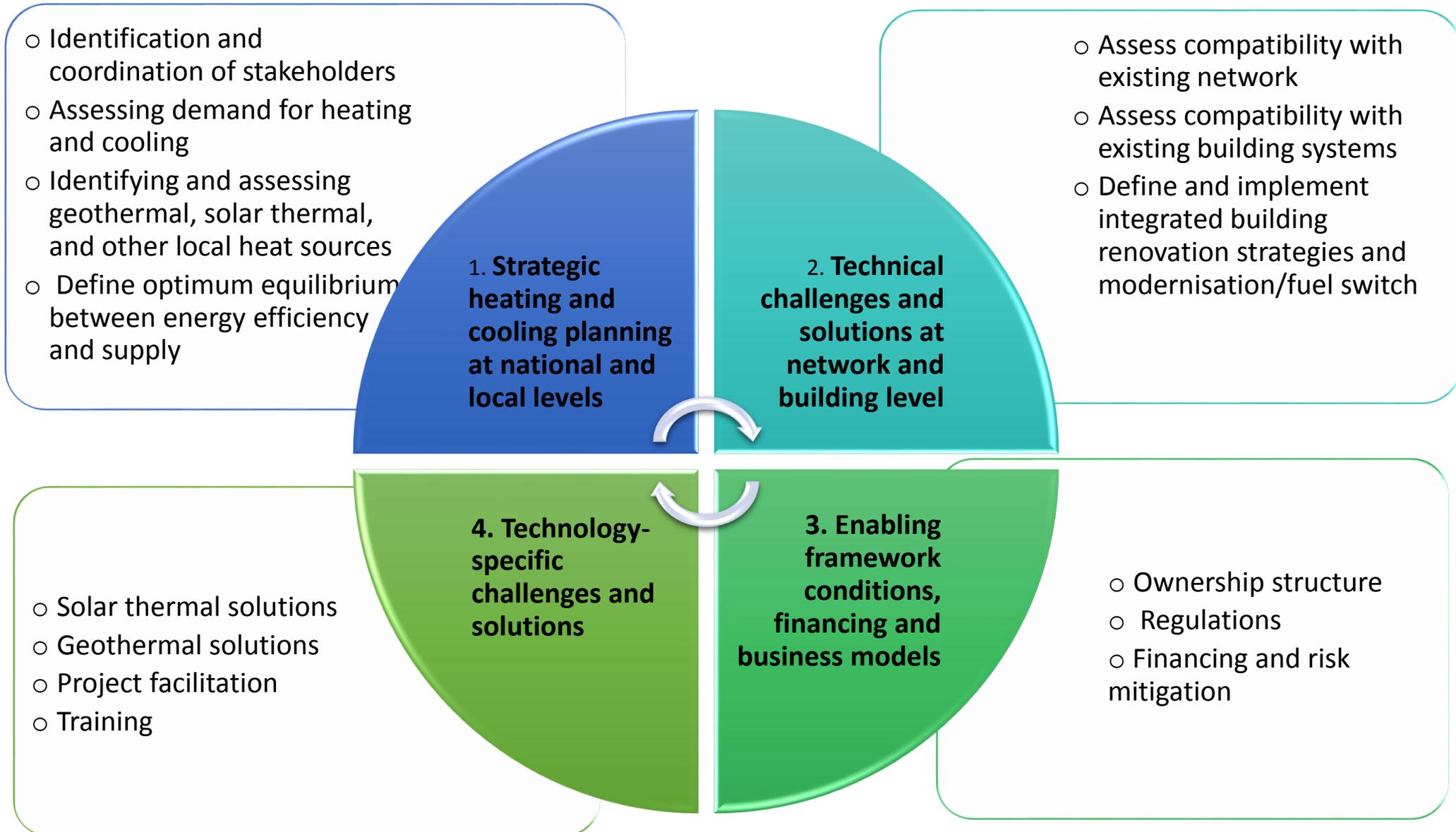
Key challenges:

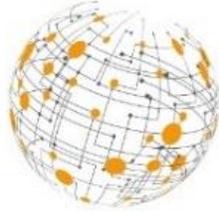
Lack of data for H&C

Risks on demand /resource availability over time

Technical /financial capacities

Key focus areas





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IRENA

International Renewable Energy Agency

THANK YOU

For further information:

www.globalgeothermalalliance.org

www.irena.org

