GLOBAL GEOTHERMAL ALLIANCE

IRENA
International Renewable Energy Agency

Integrating Renewables in District Heating and Cooling Systems

23 September 2021

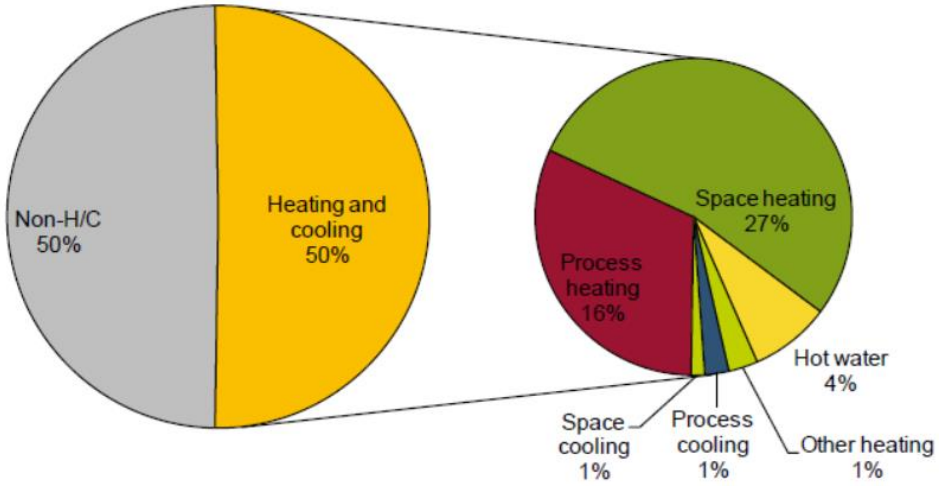
Context – Status and key role of heating and cooling in buildings and cities




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.

Photograph 1. **Air pollution in Mongolia**



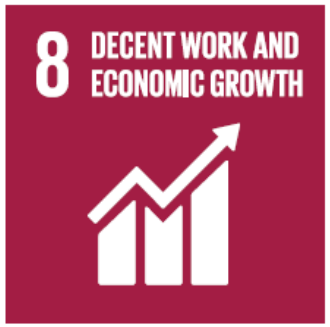
Heating and cooling demand in 2015 in the EU28 by end-use compared to total final energy demand

- 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**)

Renewable energy sources contribute to the Sustainable Development Goals

Reducing air pollution and related diseases

Increases access to cleaner technologies



Driving cities along a path of green growth

Acting as an evolutive backbone towards sustainable infrastructure

Contributing to resource-efficient and resilient cities

Contributing to decarbonisation of heating and cooling

POTENTIAL SOURCES OF ENERGY FOR HEATING AND COOLING

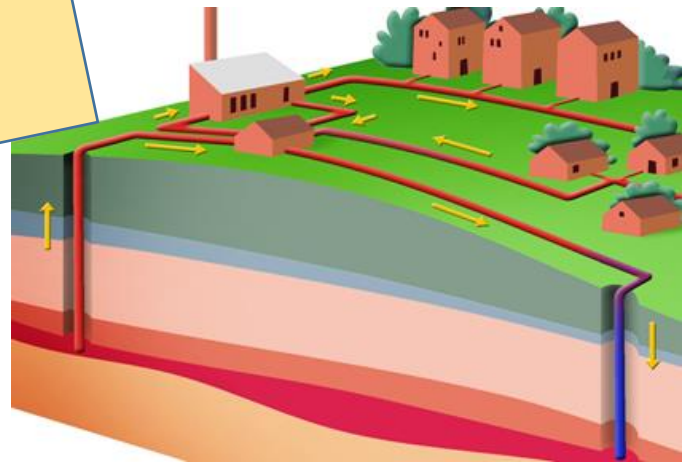
Solar Thermal

Industry, data centers, many sources

Cannot efficiently exploit these sources without district heating and cooling infrastructure

Water sources

Low- temp. Geothermal



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https://www.licitationen.dk/project/view/1704/facebook_datacenter_odense
http://dk.arcon-sunmark.com/nyhederogmedier/vojens-district-heating-denmark

Potential Sources Energy For Heating And Cooling– Example of geothermal applications

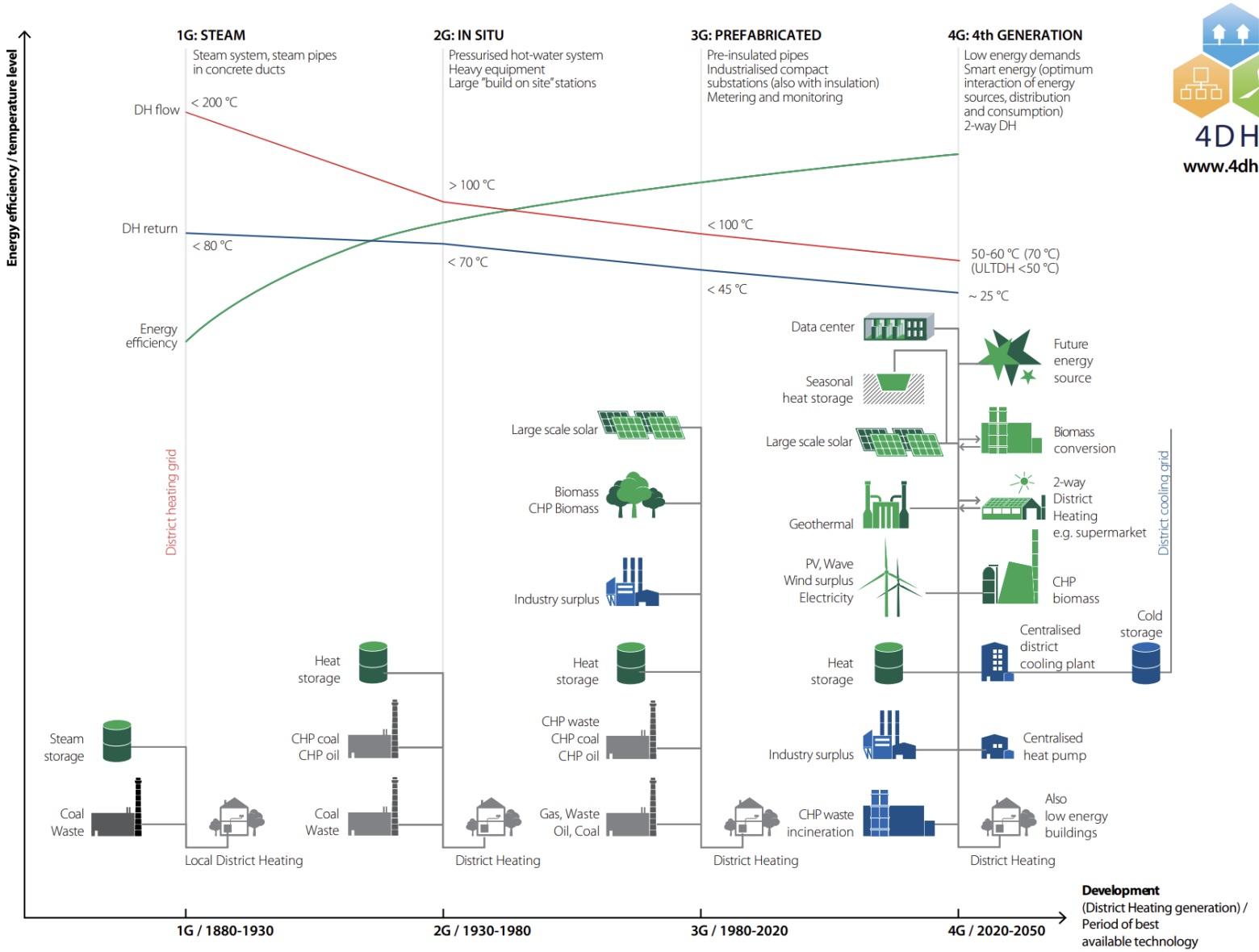
Deep and shallow geo resource (Iceland, Netherlands, China)

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

Ultra low-temperature geothermal resources (Paris Saclay)

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

Integration of RE in district energy Systems



4DH
www.4dh.dk

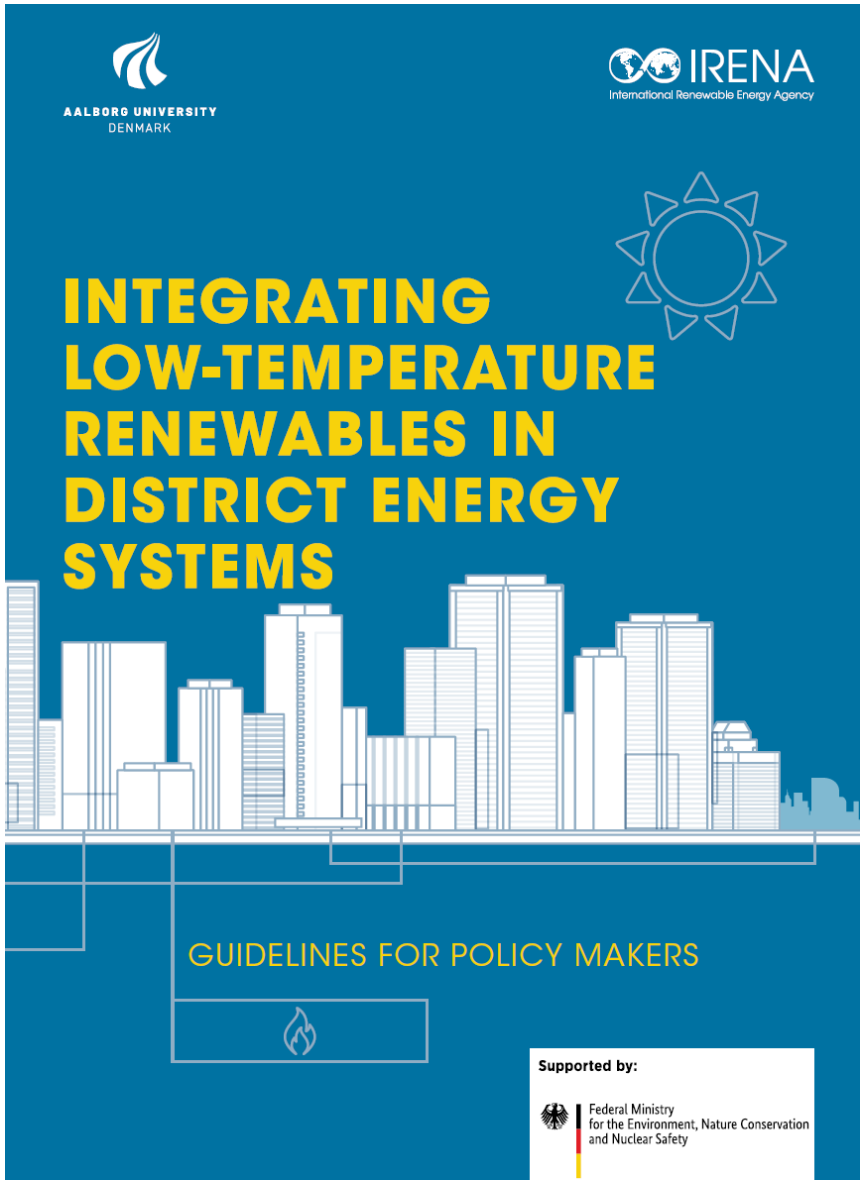
Main Enablers

- 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

Integration of RE in district energy Systems

New report “Integrating low-temperature renewables in district energy systems: Guidelines for policy makers”

- Understand the challenges
  - Identify challenges, barriers and general renewable energy context
  - Help understand key renewable energy sources and technologies
- Illustrated short cases



Integration of RE in district energy Systems

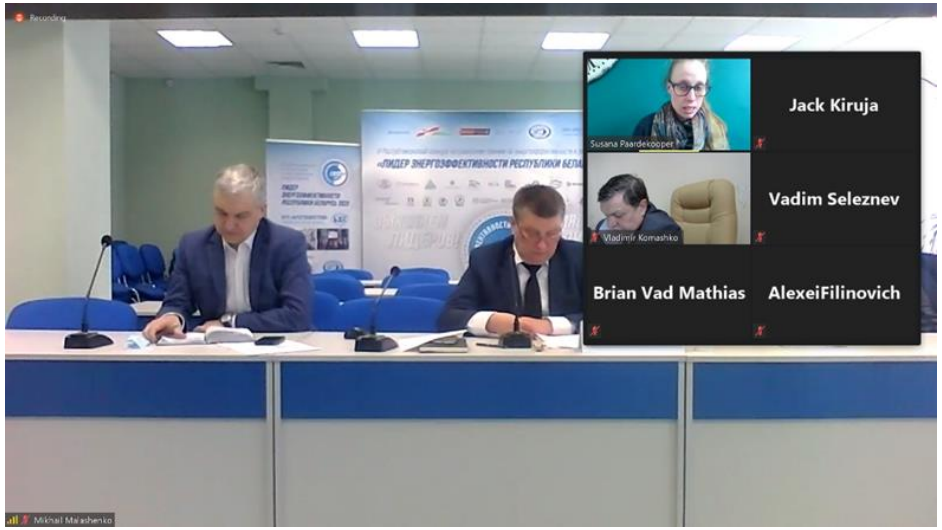
Objective

- Decarbonising cities using low-temp and waste heat resources
- Guidelines for policy makers on the tools and options for integrating RE in DHC networks
    - Scoping and stakeholder identification
    - Mapping of heating and cooling demand
    - Technical challenges and solutions
    - Regulatory framework conditions

Integration of low-temperature RE for district heating and cooling

Building capacity of **policy makers at national and local level** in countries with significant RE resources and require DHC

- ✓ Implementation of the findings of the guidebook for DHC
- ✓ Sharing experiences and best practices

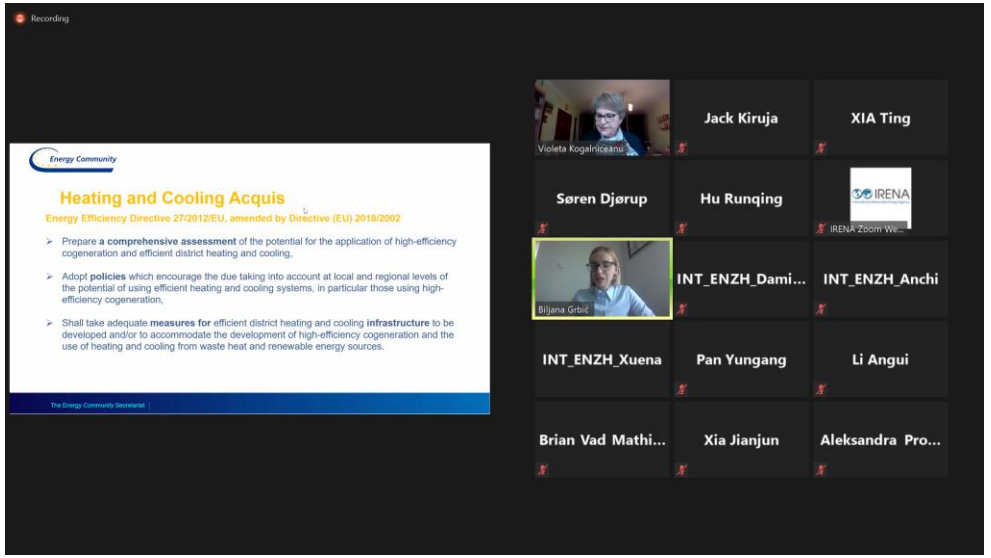


Workshop for Belarus (3-4 February 2021)

- Attended by 85 participants
- Belarus aims to increase the use of renewables in DH networks to create energy independence from imported gas
- Energy efficiency a key component of clean energy transition

Workshop for China (9 March 2021)

- Attended by close to 200 participants
- China aims to decrease the use of coal for DH to minimize air pollution in cities
- Good co-location of geothermal resources in Northern China, where DH is required



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THANK YOU

For further information:
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