European Commission

Sustainable Heating

Impulses for Improving District Heating Systems

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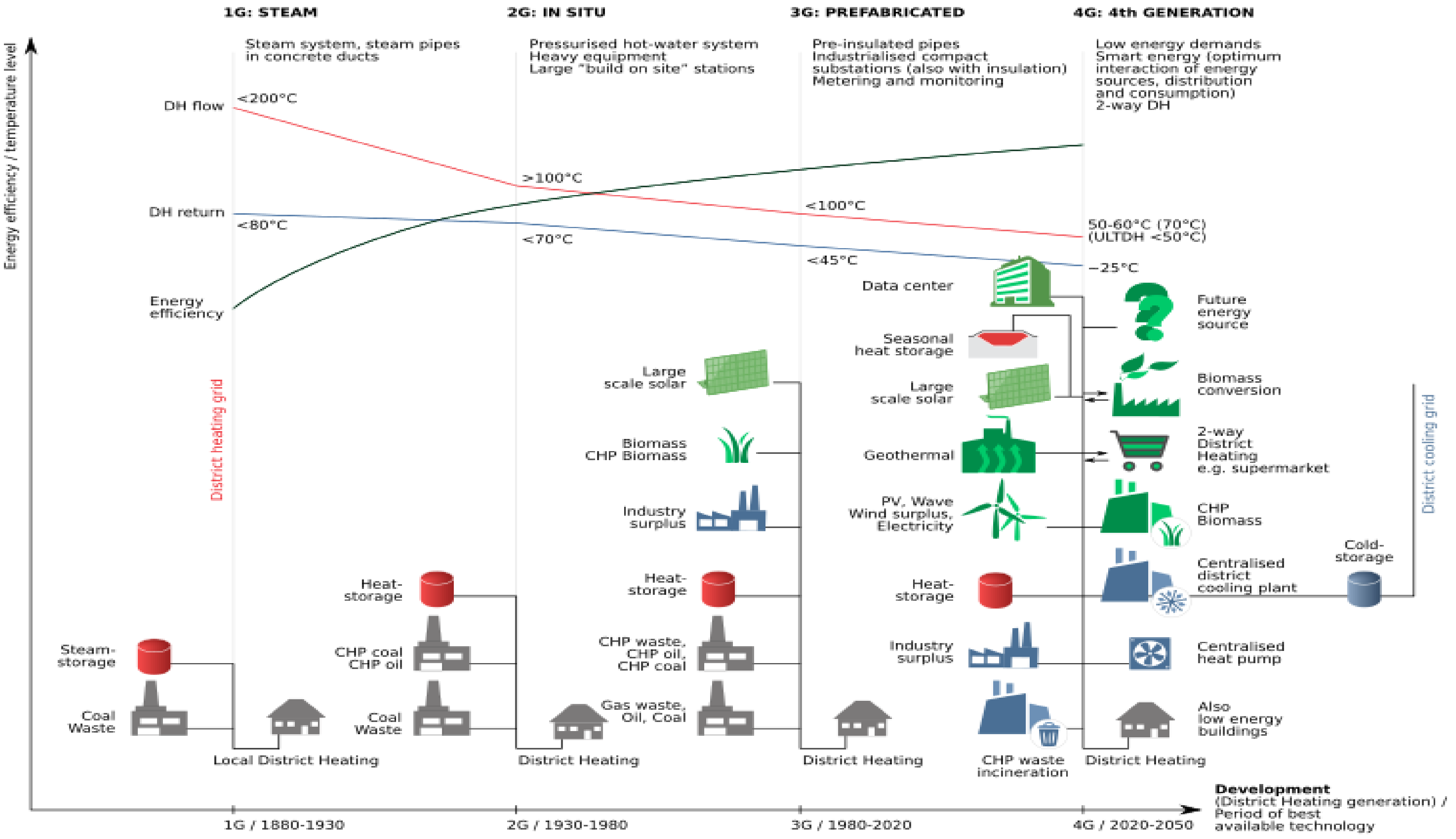
ICLEI Europe

Energy

Evolvement of district heating generations



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Source: Rasmus Lund, Aalborg University, 4DH Paris, 2017

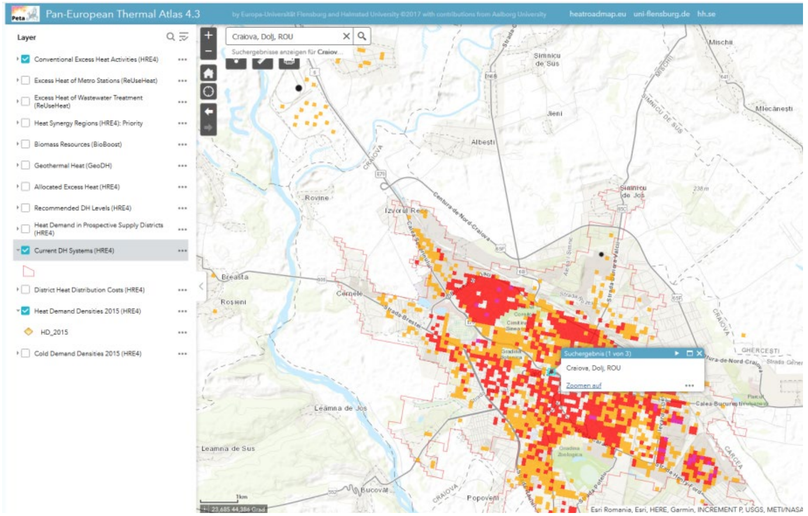
Low-carbon heating and cooling strategy 2050

- **CO_2 emissions can be reduced by about 86%** compared to 1990
- By redesigning the HC sector **costs of decarbonisation can be reduced by 12%** compared to a continued fossil fuel based HC (less fuel/more investments)
- **Natural gas and inefficient electric heating in buildings can be phased out** through a combination of refurbishment/end use savings, individual heat pumps and district heating using excess heat and renewable
- **Renewable energy covers about 87%** of the total primary energy supply in HRE, and the remaining fossil fuels are primarily in transport, industry and flexible combined heat and power
- **Electricity production increases** from 2.71 PWh (2015) to 8.83 PWh (2050)

HRE 2050 – efficient, cost-effective, affordable

Energy Union, national and local approach should include:

- **At least 25% end use savings** in 2050 (demand and supply, 30% space heating target, 1.5-2% refurbishment rate)
- **Thermal infrastructure expansion** (from 12% to at least 50% DHC in urban areas supplied by biomass boilers (10% peak), different types of excess heat (25%), combined heat and power (25-35%), large-scale heat pumps (20-30%) and other renewables (5%)

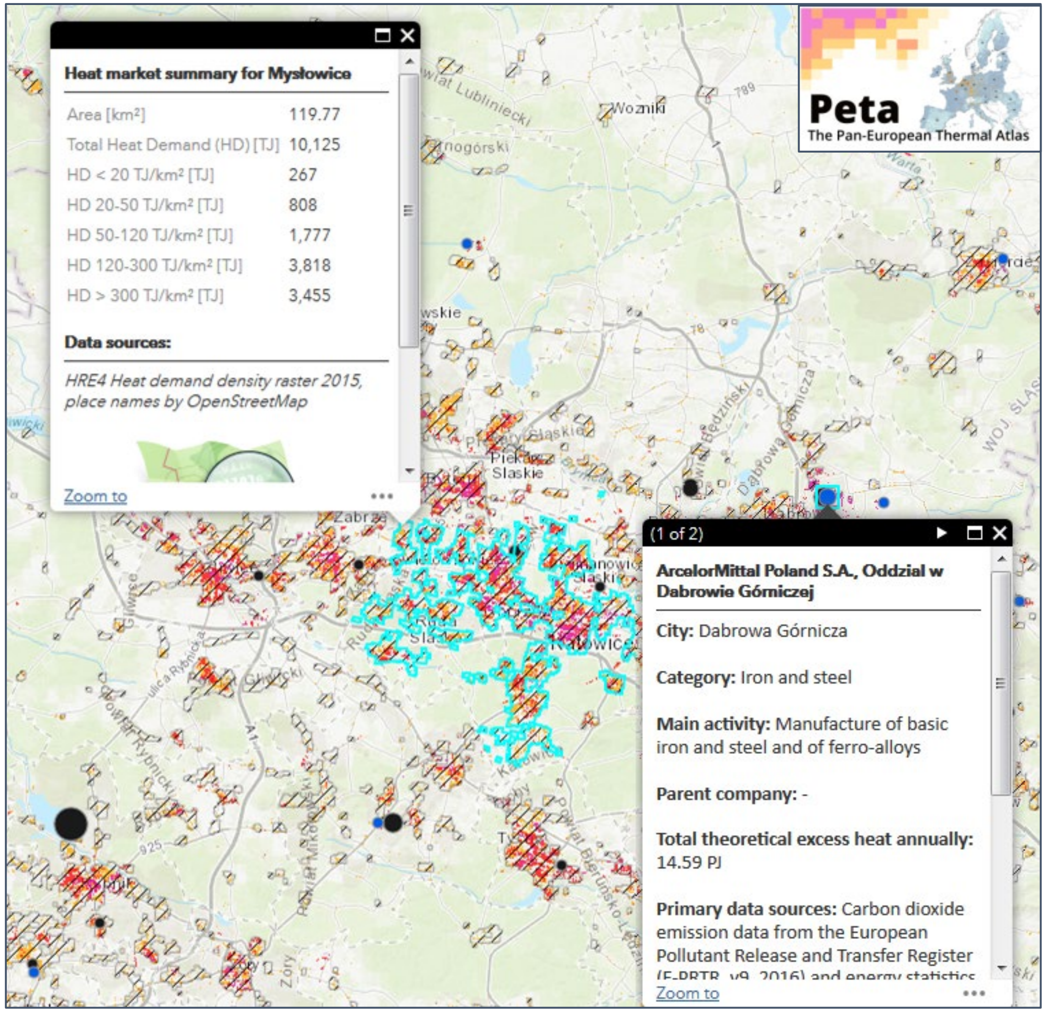


- **Excess heat recovery** from industry and power production (requires strategic planning of location and HP to supply sufficient temperature)
- **Individual heat pumps** will be key to enabling resource efficiency and electrification in areas where district energy is not viable (from 1% to about 50% combined with solar thermal, biomass boilers and energy savings)

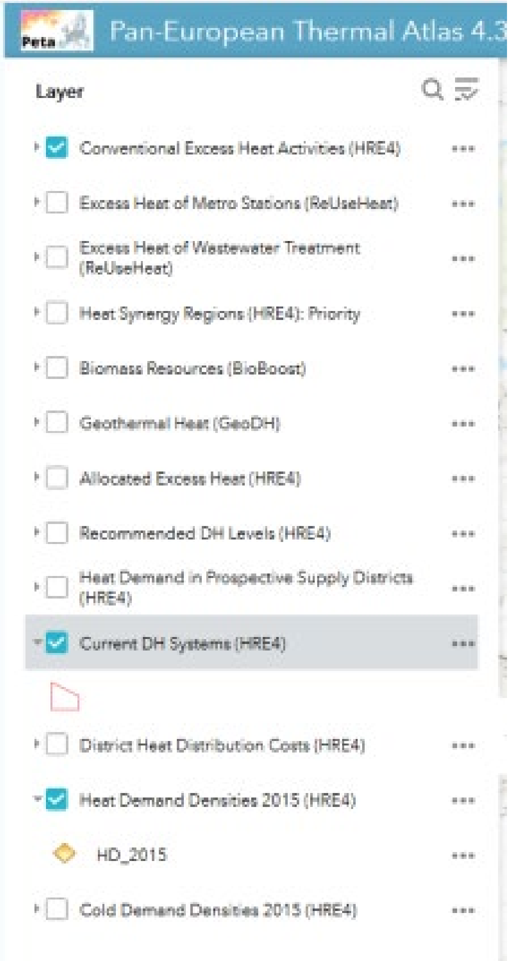
Use the Pan-European Thermal Atlas (Peta4)

Platform for Coal and Carbon-Intensive Regions in Transition

- Facilitate data/tool exploitation
- Make sure that the necessary **data** is generated and distributed:
  - It should be **verified** and **updated**
  - Put into **usable** tools/ formats for lead-users
  - Made **accessible** to those who need it for research and planning



*Comparing **Katowice**'s heat demand to excess heat, from the [Peta4](#) online platform [[HRE4](#), 2017]*



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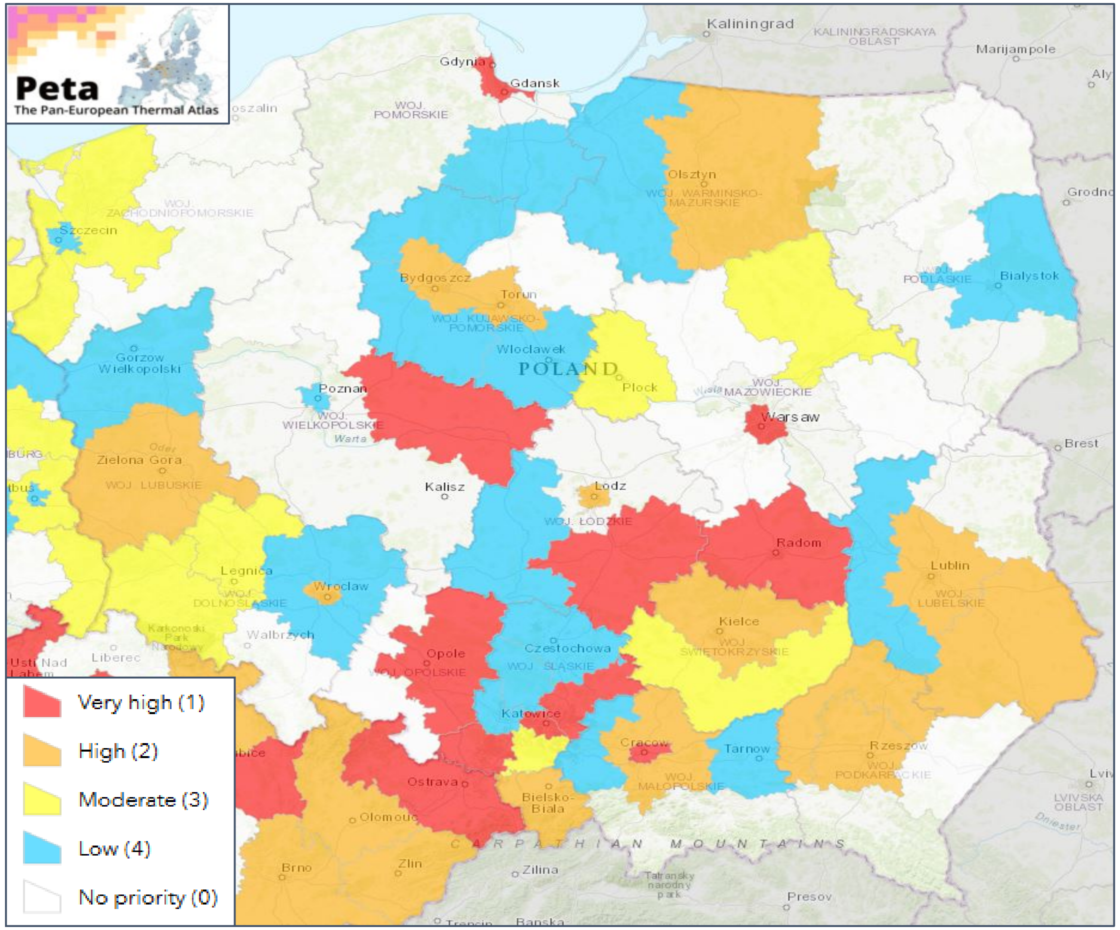
Build Heat Synergy Regions

- Stimulate **RES** and **EE**, instead of fossil fuels
  - Remove **burdens** to homes and SMEs
  - Support schemes to **decentralised** RES and EE
- Strategically **plan RES, EE and DHC**
  - Demand- *and* supply-sides

- DHC should utilise (sustainable) **excess heat**
  - Heat Synergy Regions
  - *How well do Poland's 16 voivodeships collaborate with its 379 powiats?*
- Mainstream the use of **data** and **tools**
- Don't just draft, but **bring them to life!**



Heat Synergy Regions (NUTS33) *from Peta4 [HRE4, 2017]*

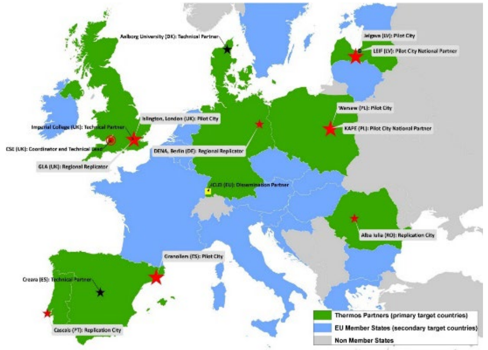
H2020 resources for your transition: THERMOS

1. **Building-level energy system mapping** – scalable to cities, regions and countries
2. **Energy system models** with direct representation of networks: **going beyond 2D heat mapping**
3. **Optimisation** to identify best solutions
4. **Free, open-source** product, aimed at local authorities: no requirement for expensive third-party software
5. Use of **open-data** for inputs whenever possible
6. Close collaboration with **pilot local authority partners** to make sure we build tools with the most meaningful features
7. Supported rollout to **replication partners** to ensure post-project sustainability

THERMOS software features

Thermal optimisation by:

1. Adding new sites and connections to an existing network
2. Designing a new network based on an existing energy source
3. Designing a new network to supply a given set of buildings, with one or more potential energy sources
4. Assessing / comparing the performance of specific networks and non-networked solutions



THERMOS

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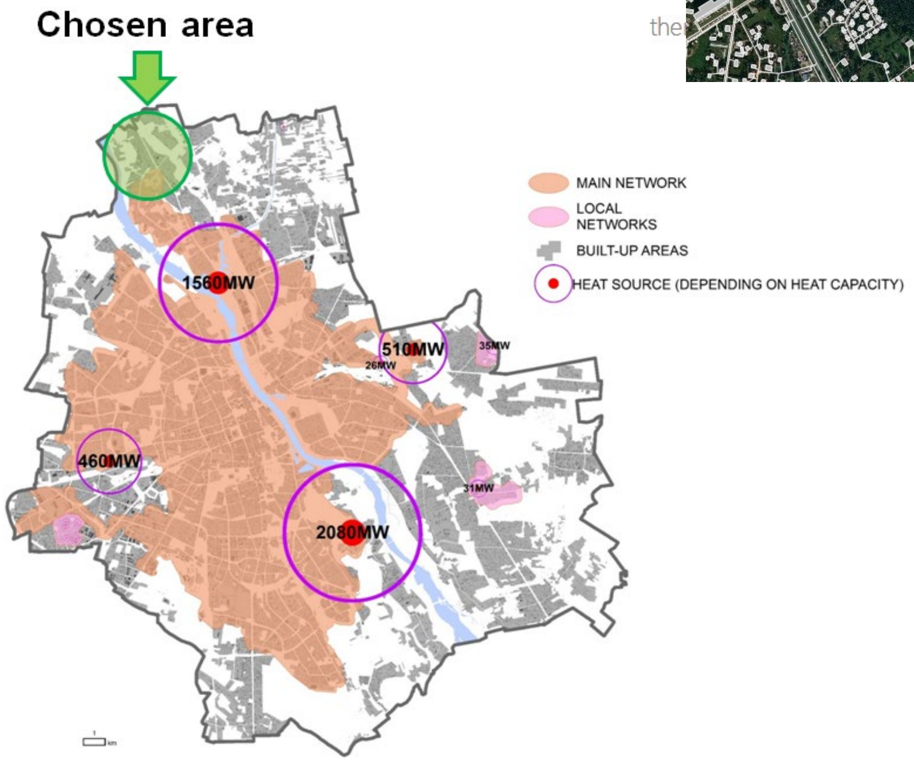
Warsaw, Poland

How is the tool applied?

1. Comparison of results of pre-defined solutions:
   - 1st connection to the existing network
   - 2nd using waste heat from MPWiK Czajka
2. Analysis of which paths of expansion are optimal for each case (without strict pre-defining)



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Granollers, Spain

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Heating and Cooling in the local context

Industries in Congost and Jordi Camp industrial parks

At least 30 companies identified with high thermal energy demand.

Real values (10)

Estimated: IDAE (kWh/m2 per year with activity's surface and working hours) and for hot water (employees)

Llegenda	
Categoria	*Num. Empreses*
Biogas source	2
Generation plant location	2
Companies with detail energy profile	11
Possible new companies	5
Companies with heat/cooling demand	11
Waste heat sources	3

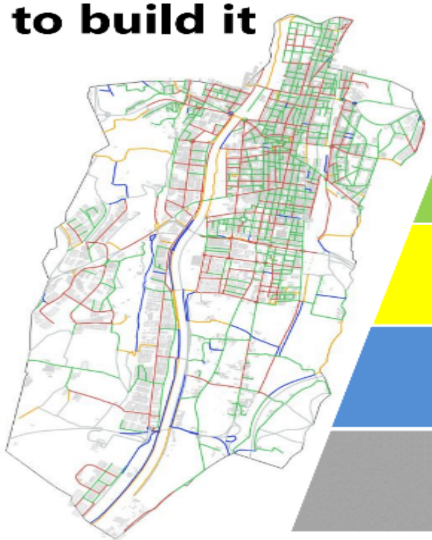
Routes geography

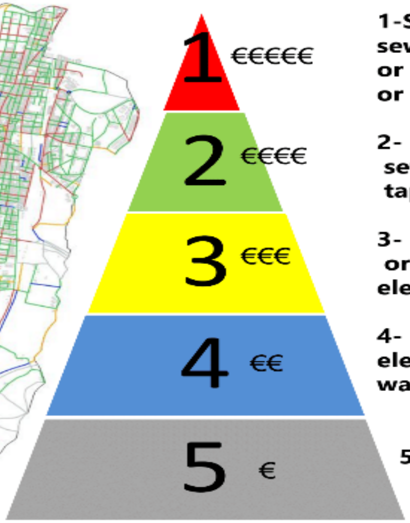
1969 lines

No building's connection lines

Attributes:
- Street names, slope....
- Thermos = path to take into account for DH alternatives
- Pavement (to join with pipe costs table) : path surface
- DIFICULTAT - Type of difficulty : bridges,....
- Grau : 1,2,3-4 (degree of DIFICULTAT)

Degree of difficulty to build it





1-Sanitary sewer : sewage pipe > 600 mm or high pressure natural gas pipes or high voltatge electricity pipelines

2- Sanitary sewer : sewage pipe > 300 mm and/or tap water pipes

3- Medium pressure natural gas pipes or medium voltatge underground electricity pipelines

4- Low voltage underground electricity pipelines or non-potable water pipes

5-Not difficult

H2020 resouces for your transition: KeepWarm

- Old and inefficient district heating systems, often using obsolete technology
- Poor maintanance, inadequate management and lack of investments
- Dominance of (imported) fossil fuels
- Low heat production efficiency and sustainability
- High costs for heat production
- High transmission losses
- Oversized coverage of network

KeepWarm
Renewing district heating

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Step-by-step approach for modernizing the district heating system

1st
- Retrofitting and optimising DHS networks for grid efficiency

2nd
- Accelerating the use of nearby renewable energy in heat production

3rd
- Integrating sustainable excess heat from industrial/commercial facilities

4th
- Using waste-to-energy solutions in line with waste-reduction strategies

5th
- Deploying smart heat distribution and control management systems

Your opportunities within KeepWarm´s transition cycle

- Peer-exchange with 25+ pilot DHS operators – site visits, capacity building and business plans development for a coal transition in e.g. :
  - Pisek, CZ
  - Velenje, SI
- Close interaction with potential investors and funds
- Integration of DHS modernization in local, regional and national policies
- Replication of demo cases in focus countries (HR, CZ, LV, SI, SRB, AT, UKR) and beyond
- Be part of the ambassador programme
- Assess our resource library

KeepWarm
Renewing district heating

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www.heatroadmap.eu

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Renewing district heating

THERMOS

Heat Roadmap Europe

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