

A VALIDATED METHOD TO SIMULATE DISTRICT HEATING NETWORK TOPOLOGIES TO ENABLE ASSESSING DISTRICT HEATING COST

Macchi S., Fattori F., Denarie A., Motta M., Energy Department Politecnico di Milano



FRAMEWORK Assessing the potential diffusion of renewable based district heating in Italy through energy mapping





Structure of the work MATCHING SOURCES **HEAT SOURCES HEAT DEMAND** AND DEMAND Estimation and spatial Estimation and spatial distribution of heat sources Spatial allocation of heat sources distribution in the residential and current individual and spatial distribution of DH in and tertiary sector solutions comparison with individual solutions



Overarching goal

Assessing the potential diffusion of district heating from a technical, environmental and economic point of view



Persson U., Wiechers E., Moller B., Werner S., Heat Roadmap Europe: Heat distribution costs. Energy 176 (2019) 604-622

cost in areas in which there's no DH



TOTAL LENGTH OF DISTRIBUTION NETWORK



STARTED FROM ALREADY EXISTING EMPIRICAL LAWS

Based on North European district heating networks

No datas on areas with low population density

Using the **MST**:

- Simulate district heating sorting network
- Minimum length of the pipes



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Application of MST to census sections





Use of network length in "effective width curve" to contextualise it to Italian territory







DENMARK

CONCLUSIONS



MST has shown to be an interesting tool to simulate the topology of DH networks

- Georeferenced results
- High replicability



The curve of the statistical sample seems to be well represented by an easy-to-use hyperbola to estimate the network lengths starting from housing data



Thank you for your attention

Samuel Macchi, Energy Dept. Politecnico di Milano <u>samuel.macchi@polimi.it</u>







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References

[1] Persson U., Werner S., *Effective width - the relative demand for district heating pipe lengths in city areas*. In: 12th international symposium on district heating and cooling, 5th to 7th of september, Tallin; 2010. p. 128-31

[2] Persson U., Werner S., *Heat distribution and the future competitiveness of district heating*. Applied Energy 88 (2011) 568–576

[3] Persson U., Wiechers E., Moller B., Werner S., *Heat Roadmap Europe: Heat distribution costs*. Energy 176 (2019) 604-622

