H-DisNet

CASE STUDY HASSELT CITY-LEVEL HEATING DISTRICT NETWORK

WHAT ARE THE CHALLENGES FOR H-DISNET IN HASSELT?

H-DisNet encounters economic competition with low-cost carbon-intensive technologies such as gas or oil boilers, as well as thermal transport of surplus heat in district networks. Moreover, urban sprawl of residential units makes H-DisNet's initial CAPEX and running OPEX high. Some districts were identified with relatively low specific heat demand (< 1.25 GWh/km^2). Some uncertainty of technology performance also exists considering different in-house systems and various related components (e.g. H-DisNet heating system implementation requires a local low-temperature heat source such as greenhouses). Finally, heat pump operation within the proposed H-DisNet systems marginalises potential benefits.

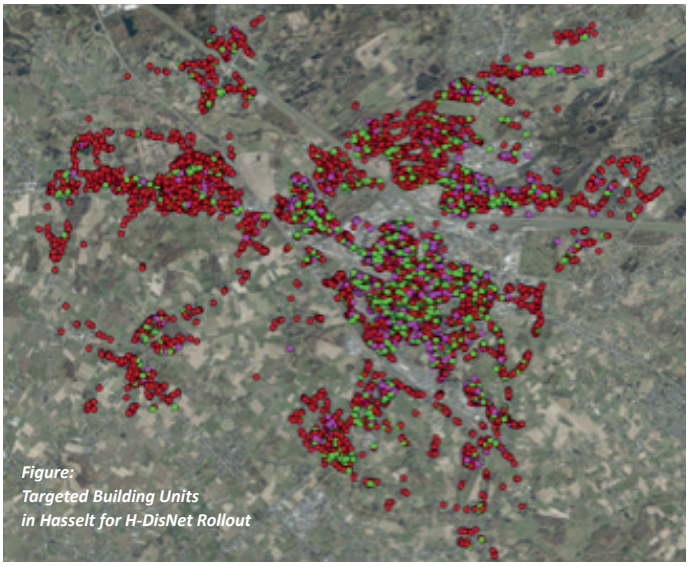

Figure: Targeted Building Units in Hasselt for H-DisNet Rollout

KEY FIGURES:

- 30.6 km^2 of a typical small-city structure
- 155 GWh of Heat Demand (42% Coverage of total city heat demand)
- 13,846 Average-EU residential buildings
- 2 km of pipeline plus 50 km of Shipping transport from supply in Aurubis Copper Plant to Hasselt Port

WHAT ARE HASSELT CASE STUDY OBJECTIVES?

1. To explore the potential and feasibility for a city-level TCF network in a real-life scenario using actual heat demand and building characteristics data.
2. To present potential H-DisNet advantages over alternative technologies at district level.
3. To investigate under which scenario(s) H-DisNet will be economically competitive/attractive.

KEY RESULTS:

- **Optimal Load Distribution** between TCF & Heat Pump within our proposed H-DisNet System: 60% TCF-40% Heat Pump (MODELICA simulations, for a typical Hasselt house)
- **(H-DisNet + Heat Pump) vs Standalone Heat Pump:** 10% lower CO_2 emissions, 14% less electrical energy consumption, 4.5% lower annualised project cost.
- **(H-DisNet + Heat Pump) vs Gas Boiler Systems:** 70% lower CO_2 emissions, 95% less fossil primary energy use, 58% higher annualised project cost
- **(H-DisNet + Heat Pump) vs Conventional Water-based District Heating:** Water-based DH has the best economic and environmental advantages; yet suffers from long-distance transport limitations (critical distance of 14 km for Hasselt case).

IS THE H-DISNET TECHNOLOGY A SOLUTION?

Provided that the correct government and/or European incentives are put in place, the technology has potential for the reduction of primary energy consumption and end-user cost. A sensitivity analysis over different European countries showed this for relevant conditions in the continent. In a future scenario based on a carbon price of around 70 €/tCO_2, countries with high natural gas prices and low CO_2 emissions in power mix, such as Sweden, rise as potential candidates for high H-DisNet market penetration. More-over, H-DisNet was proven as a viable solution in long-distance transport of surplus heat between supply and demand centres (50 km in Hasselt), where conventional district heating proves impractical or much less economically attractive.

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