Andrew Frew

Electricity system operators must quickly install automatic load limiting and load 'turn up' control equipment, to achieve rapid decarbonisation of heat supply and to avoid supply interruptions and overloads due to new loads from fast electric vehicle charging and heat pumps. Also to accommodate dispersed renewable generation such as solar panels. Heat loads should be mapped to inform heat and power network plans, as electric heat pumps will meet most heat loads in future, and there are decisions to be made about installing heat networks and their linkages to large scale, long duration heat storage above or below ground.

Levies and transit fees do not only have a role in cost recovery, but also set up a system of investment and usage incentives when more investment is needed in heat and power storage on the demand side, by individuals and firms with a higher cost of capital than utilities. i.e. Incentives and cost differentials need to be larger to stimulate investment in say long term heat or power battery storage. The current system of large environmental levies and energy security costs onto power prices is no longer fit for purpose when electricity can now be very low carbon. Funding arrangements in different parts of the energy system should not intensify this misfit.
It seems unlikely that burning hydrogen will be viable as the sole source of heat for homes. A number of recent publications point to the use of efficient electric heat pumps being key to decarbonising heat. Producing heat with the more variable parts of wind energy output, and storing it in bulk for use later, may side-step difficulties with supplies of chemicals for electric batteries and limit the size of investments required in the power system, while utilising surpluses from corporate demands for 100% renewable power 24/7/365. e.g. Maximising the use of existing power connections along a new heat network at times of low non-heating power demands to produce heat, using banks of air source heat pumps, for transfer to longer term storage.
Ambient and near ambient lower temperature heat loops can also reduce peak power demands from heat pumps at individual homes in more dispersed settlements.

References:
http://www.sdewes.org/jsdewes/pid8.0340
"decarbonisation of the example district's power and heating energy can be reached even without the availability of biomass, if sufficient Power to Heat (XXL Hpumps) and Power to Gas capacity is integrated to the District Heating grid, and sufficiently more wind- and solar power is installed"
https://www.leeds.ac.uk/policy-leeds/doc/shared-ground-heat-exchange-decarbonisation-heat
Ambient temperature heat loops
Cambridge Econometrics study:
https://europeanclimate.org/resources/renovating-and-and-electrifying-buildings-strengthens-europes-economy-and-energy-security/

University of Ulster Article

https://www.sciencedirect.com/science/article/pii/S0960148122004153

Value of demand flexibility/ turn up for managing wind energy constraint and curtailment. Currently wasted wind energy could save fuel poor households up to £220 per year.

Has data on accommodating heat pumps on the existing grid.

(It may be easier to accommodate ground source heat pump units when they have a lower peak load or elevated source temperatures, Smart controls.)

https://www.imperial.ac.uk/people/c.markides
Thermo-mechanical energy storage systems can be very durable.
Can use salt cavern storage, the sea as a heat sink, underground strata.