

100% Renewable UK

<https://100percentrenewableuk.org/>

Why heat pumps?

Heat pumps operate rather like reverse fridges. Electricity is used to take heat from the air, ground or water source and deliver it usually for use in a building to provide heating. But they have a key characteristic that separates them from other forms of heating in that because heat pumps take energy from the environment (making them partly renewable). In doing so they have the effect of multiplying the heating value of the electricity by up to fourfold. Hence if the same electricity which is used in an ordinary resistive electrical, eg fan heater, is used to create heat through a heat pump, the heat output may be around 3xs the heat output if the same electricity was used to heat the electric heater.

The energy efficiency advantage works in the same way compared to gas boilers i.e. a heat pump is likely to produce 3xs as much energy for the same energy input.

Heat Pumps and decarbonising heating

An argument is raging about how to decarbonise heating buildings, between the options of replacing gas heating with either a) heat pumps powered by electricity (which in the future should be 100 per cent renewable energy) b) hydrogen produced from renewable energy c) hydrogen produced by natural gas with the carbon dioxide captured and stored.

Heat pumps are by far the most energy efficient means of delivering heating. Although a heat pumps strategy is sometimes attacked because it might increase electricity loads, in fact heat pumps can be used to integrate fluctuating renewable energy sources into the grid. This is because heat pumps can be made to operate flexibly so that they can absorb electricity when there is a lot of renewable energy and use less electricity when there is less renewable energy. This flexibility is one of the issues discussed in a webinar, organised by Jan Rosenow and Richard Lowes from the Regulatory Assistance Project (RAP), which you can see here:

<https://www.youtube.com/watch?v=CWQMQLbafX4&feature=youtu.be>

See the section on hydrogen on this website about the arguments against so-called 'blue' hydrogen – these include the difficulty of capturing more than around 85% of the carbon and also the fact that it props up the gas industry to produce unmitigated gas to sell to the rest of the world. But even hydrogen produced from renewable energy ('green' hydrogen) involves using renewable energy about four times less efficiently compared to heat pumps (energy is lost in electrolysis and heat pumps are much more energy efficient).

So using hydrogen for heating either means propping up the fossil fuel industry or wasting very large amounts of renewable energy. In fact using electricity from renewable sources as a direct heating sources (eg through fan or water heaters) uses renewable electricity more efficiently than green hydrogen since no energy is lost through the electrolysis process.

Gas heating should be banned for new buildings. Heat pumps should be used instead to provide the bulk of heating, perhaps supplemented by cheap electric heaters where needed. In existing buildings retrofitting for heat pumps is more difficult, but sometimes possible - especially when district heating systems can be used where heat can be supplied by large scale heat pumps. But even in existing buildings, using direct (resistive) heating which can be supplied through relatively cheap electric heaters, is substantially lower carbon compared to either 'blue' or 'green' energy if 100 per cent of the electricity comes from renewables.

Key sources:

Policy debate starring Jan Rosenow, Richard Lowes and Lee Fischer

See policy discussion about heat pumps on YOUTUBE at <https://m.youtube.com/watch?feature=youtu.be&v=HynxliEuP1Y>

Description of policy debate video (taken from YOUTUBE link): Heat Pump rollout in the UK is the topic of discussion on the video version of the BetaTalk podcast with Jan Rosenow, Principle and European Programme Director at the Regulatory Assistance Project (RAP), Policy researcher Richard Lowes based at Exeter University and heating engineer Lee Fischer based in Lincoln. Richard and Jan have just finished collaborating on their first report together: Heating without the hot air: Principles for smart heat electrification Dr. Rosenow serves on the Executive Committee of the International Energy Agency's demand-side management program and sits on the board of the European Council for an Energy Efficient Economy. He has also advised the International Energy Agency, the European Commission, the European Parliament, the U.S. Agency for International Development, the German Corporation for International Cooperation (GIZ), government departments in a number of countries, and the UK's Office of Gas and Electricity Markets, as well as serving as an expert witness on several occasions to the British Parliament. He was the lead author of the International Energy Agency's global assessment of market-based instruments for energy efficiency.

For more information about the advantages of heat pumps, see the report: Heat pumps key to net zero target - Published by the Heat Pumps Association

<https://www.coolingpost.com/uk-news/heat-pumps-key-to-net-zero-target/>

Heat Pumps Association website: <https://www.heatpumps.org.uk/>

Also: Air source heat pumps versus ground source heat pumps – by Energy Saving Trust. See:

<https://energysavingtrust.org.uk/blog/air-source-heat-pumps-vs-ground-source-heat-pumps>