IT´S TIME WE PRIMED THE PUMPS

District heating networks powered by heat pumps offer a straightforward solution to our energy crisis and the transition away from gas. It's time for the Government to properly address costs and help create demand, argues Dave Pearson of Star Refrigeration

The district heating system at Queens Quay, pictured above, now officially known as the West Dunbartonshire Energy Centre, is home to the UK's largest water source heat pump, providing affordable low carbon heating and hot water to around 1200 homes and businesses via a network created by Vital Energi. Right: Work continues on housing at Queens Quay

THE heating of homes and buildings makes up around 30% of the UK's total emissions. Moving from using fossil fuel generated heat offers an opportunity for tremendous savings.

Large centralised heat pumps that supply district heating networks to supply high density groups of buildings have already been recognised by both the UK and Scottish governments, and the Committee on Climate Change, as a great way forward. However, there are two major problems that need to be overcome first. Neither of them is complex but will require policy shifts that must happen quickly to seize the opportunity.

The progress that has been made in clean heat over the last decade is amazing. The Scottish government is investing some £1.8 billion in heat and energy efficiency in buildings, including £300 million to support the development of large-scale heat infrastructure, such as heat networks.

The Scottish Government has already, for example, published a public consultation on its Heat Network Delivery Plan. In March this year, the UK Government's Green Heat Network Fund (GHNF), a three year, £288 million capital grant fund, opened to applicants. This builds on the progress made by the Heat Network Investment Project and the £10 million Green Heat Network Fund Transition Scheme which opened in July 2021.

All of this is well and good. Heat network projects in both Bristol and Clydebank show that generating clean heat for a district heating scheme from rivers is viable. In Scotland, over 80% of heat demand is within 1000 metres of open water.

However, as I began by saying, there are two major obstacles in the way of the UK seeing net-zero heat schemes being rolled out in our major cities. The problem is not money. At COP 26 Mark Carney pointed out that there are trillions of dollars looking for investment opportunities in the green economy and the global drive to net zero.

So, along with the fact that the technology is well proven, the source of finance is not the issue. Just as we know how to extract heat from the air, the ground and from water, to drive district heating schemes with heat pumps, we know international pension funds will deploy "long money" where they are certain of a reasonable return.

So what brings certainty? If district heating systems secure customers prepared to sign up, then income to district heating projects will flow from these customers to the developers. We need enough buildings to say, "yes please", ahead of the curve, and this needs to happen quickly.

We need to create offtake surety with strong legislation that forces buildings to stop burning gas if district heating is offered. The earlier this pledge is secured, the lower the risk and the lower the cost of debt. Somebody, presumably the local authority, should be seeking pledges from buildings to join a district heat network if made available. There are early signs this would be a welcome offer. Corporates are showing a lot of willingness to address their carbon footprint. For buildings, heating with gas stands out as a very noticeable item on the carbon footprint spreadsheet. For any organisation trying to address their carbon footprint, this is a problem that can't be solved by adding a few solar panels or EV charging hubs.

A complete shift from high carbon dioxide and nitrous oxide emitting gas-burning solutions, to low or zero emission solutions would follow the deployment of clean district heating, an example of which can be found at Clydebank's Queens Quay.

This shift could be addressed by government and local councils through zoning work north and south of the border. This could push building owners to join district heating networks or new proposed networks in their locality. However, investment needs a long lead in period so the sooner the question is put to building owners, the better.

Equally as important though is that the cost of clean heat is a considerable barrier to adoption. When heat pumps for district heating are deployed, the single largest cost of delivering heat over the next 40 years will be the cost paid for electricity to run the heat pumps.

Electricity costs are controlled by the UK Treasury and BEIS. The UK Treasury and BEIS hold the key when it comes to electricity pricing. It needs to be at a level that promotes the shifting from burning gas to electric heat pumps. If government do not get this right, we will see district heating shunned for being too expensive.

If government fails in this, instead of billions of inward investment generating taxable activity, along with a significant reduction in carbon emissions, what we will get instead is a slow motion car crash. High costs, and poor interim solutions that aren't actually low carbon, will strangle the usefulness and potential impact of this technology.

What it comes down to, is that as well as needing to have the government address seriously the problem of how to create demand for clean heat they need to create the economic model whereby it can be delivered in a satisfactory manner that is attractive to owners.

Without demand, nothing will happen. Without a return on investment there will be no supply. Both these issues need to be addressed.

Professional investors look at lifetime costs as a key part of the equation. It matters to them least as much as the initial capital deployment costs.

Heat pumps deliver a ratio of three times the energy that they consume, so the operating cost of heat is roughly 33% of the cost of electricity. Heat pumps of any shape and size harness local ambient heat (in the air, the ground or water) and boost this via a simple refrigeration cycle to deliver approximately three times as much heat but at a higher grade.

However, today electricity is being sold for four or more times the cost of producing it. This is a policy issue and can only be addressed by government. This equation simply does not work if we want to see a shift to district heating.

So, why does government policy make electricity so expensive?

To start with, one must give credit where it is due. Both the UK Government and industry have driven a huge deployment programme for both on-and offshore windfarms. This looks set to continue although there are concerns about utilisation and distribution.

The actual cost of producing electricity from wind farms has been constantly falling; it is currently around 5p per kWh and this is typically fixed for 20 years.

However, we, the public, pay a rate for electricity that rockets from 5p per kWh to 30p or more per kWh. The figure we pay includes a raft of additional charges beyond the straight generation charge. A significant part of this relates to grid transmission charges and 'time of use' balancing costs.

SPECIAL TARIFF

One solution would be for the government to create a special tariff for heat pumps. This could be the cost of generation plus a 20% transmission charge outside of peak times. This would not cost the government anything, since the electricity was being bought and paid for at cost, and the price would include a levy for transmission.

Below: Star Refrigeration's heat pump at the heart of the West Dunbartonshire Energy Centre

> **"Without action from government, clean heat will be so expensive, no third party will dare invest in it**

The peak charges would be paid "peak only" which network owners can easily avoid with a heat pump. Similarly, Government could drop the social and environmental levies for large heat pump electricity use. It is illogical to apply these to a technique that reduces the broader environmental impact versus gas by over 75%.

A huge benefit of this is that by creating flexible demand, we can secure a useful high efficiency value for all the generated output from windfarms. One of the arguments one hears today is that we could generate clean hydrogen when windfarms are constrained by grid issues. However, if hydrogen is used for heating, analysis shows that we only get about 18% of the heat that would be achieved with a heat pump. Hydrogen, as has been noted, over and over again, is a bad choice for heating. Also bad is deploying wind generation that isn't aligned to flexible but sensible demand.

At the same time, the tax revenues from billions of pounds of investment being made in deploying heat networks and heat pumps across the UK, balanced with lower imports of gas, would be very appealing for the Chancellor. Hopefully the Treasury will realise the huge upside in removing the artificial barrier to clean heat of expensive electricity.

As things stand we face the very real and worrying possibility of totally missing the UK's decarbonisation targets. This miss would be largely due to the fact that we are not pulling in pension fund investments to grow our generation of clean heat. Those investments will not happen without the necessary heat offtake demand. Without clean heating schemes to take windfarm generation output, we have a disastrous situation for consumers.

Windfarms are being given subsidies to generate electricity and are then paid again not to generate when there are grid constraints. That makes no sense, especially given today's volatile gas prices. Without action from government, clean heat will be so expensive no third party will dare to invest in it.

The signal needed isn't capital support alone. We need operational support as well. Otherwise we will only see heat networks with heat pumps where a private wire has been run from a windfarm and that is an inefficient use of resources.

Surely it is better to see high value employment, higher tax revenues, lower imports, a better balanced grid, cleaner air and best of all 20 year term stable pricing for clean heat?

We should be busy getting our cities ready for a new paradigm, auditing buildings in the vicinity and starting to survey and dig the trenches for heat networks. We should be building the operating models and signposting the future so everyone is already moving when the current outdated polices are resolved.

If we fail it will be because of outdated Government policy. ■