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Welcome to the June/July issue of Heat Pumps Today

TRAINING, TRAINING, TRAINING... that is the mantra out in the sector. I've spent the last month visiting a selection of training centres, and been informed about a plethora of others opening in due course. It's so heartening to see the industry identifying, investing and embracing not just apprentices but also, providing training for experienced engineers who are making the transition into renewables, in effect; heat pumps, underfloor heating and the like.

This leads nicely into the fact that the ACR & Heat Pump Trainee of the Year awards are now open for entries. Who do you know in the sector that stands head & shoulders above? How do you, as a business/employer reward those trainees? Ensuring they are recognized for their achievements creates confidence, eagerness to learn and of course loyalty!

Visit **www.acrjournal.uk/acr-trainee-of-the-year** to enter your well-deserved trainees/apprentices

The ACR & Heat Pump Journal's team are looking forward to exhibiting at the Installer Show, Birmingham in a couple of weeks' time. If you are also visiting or exhibiting, please pop along to our stand (5B70) for a catch up and a goodie bag!

Finally, have you registered to exhibit or attend the Leeds ACR Exhibition at Elland Road in September? Visit **www.acrjournal.uk/regional-exhibitions** for further information.

Juliet Loiselle MinstR
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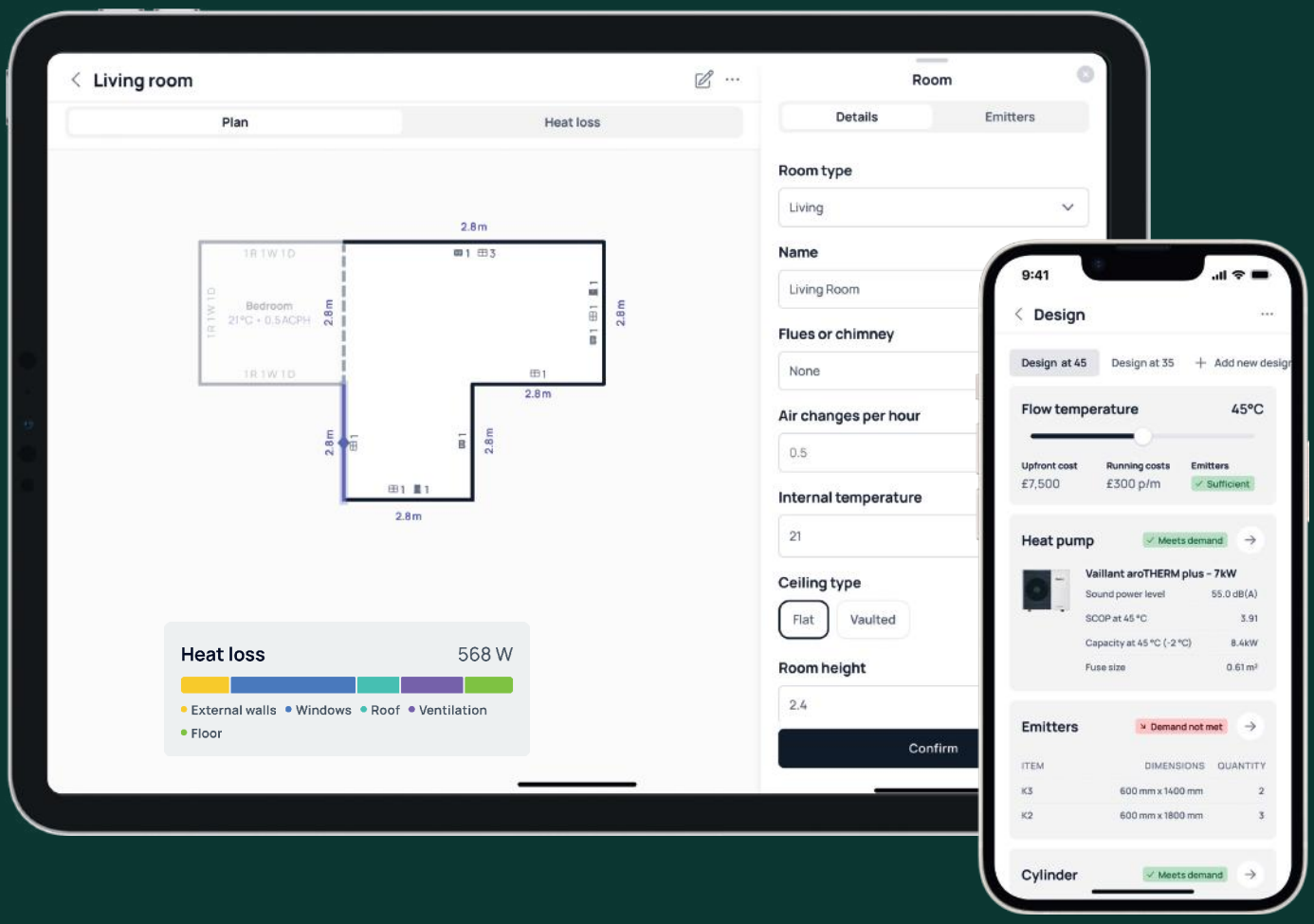

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"A real game-changer for the heating industry"

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Mitsubishi Electric opens state-of-the-art heat pump training centre in Livingston

Heat Pumps Today editor, Juliet Loiselle travelled to Livingston, Scotland to attend the opening of the brand new Mitsubishi Electric training centre and enjoy a factory tour of their large manufacturing facility.

The centre was officially opened on 15 May with key government and industry figures attending. This included: Graeme Day MSP, Minister for Higher and Further Education, and Tadashi Fujiwara, the Consul General of Japan in Edinburgh.

With the UK government aiming for 600,000 residential heat pump installations per year by 2028, there is a growing demand for skilled and accredited heat pump installers. Legislation, including funding, by Scottish Government and demand from homeowners and businesses to replace fossil fuel boilers with more sustainable forms of heating, such as heat pumps, is helping to drive growth for more installers.

Over 1,000 people per year can be trained as accredited heat pump installers at the new Livingston Training Centre. As well as hands-on training, Mitsubishi Electric has developed Virtual Reality (VR) training opportunities giving installers a new and innovative way to learn and understand the workings of heat pumps.

To mark the opening, Mitsubishi Electric is offering free training over the next three months[1] for installers who wish to complete their Part 1, 2 and 3 training in the design and install of Ecodan heat pumps, or who would like to attend a practical, hands-on workshop at the Livingston centre, for all Scottish registered installation companies.

The Livingston Training Centre joins the company's two other centres in Manchester and Hatfield.

les.mitsubishielectric.co.uk/upskill-to-ecodan

Decarbonising Islington Waste and Recycling Centre

Islington Council had a target for their Waste and Recycling Centre to be decarbonised and to take steps towards a greener and healthier future for the borough. The project is now complete, and this milestone achievement marks a significant step forward in the Council's efforts towards achieving net-zero emissions by 2030. The Waste and Recycling Centre will be the first council building to be completely transformed with energy saving upgrades.

Vital Energi also installed 852 solar panels on the roof of the recycling centre and delivered essential mechanical and electrical work which included the replacement of six Air Handling Units (AHUs) with electric and refrigerant coils. The generation system in the plantroom, which was run by two Direct Gas Fired Domestic Hot Water (DHW), now runs via an air-to-water source heat pump DHW system which supplies the centre with hot water.

The project received grant funding from the Public Sector Decarbonisation Scheme (PSDS), which is administered by Salix on behalf of the Government's Department for Energy Security and Net Zero.

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NIBE represents air source heat pump technology in the Science Museum's new Energy Revolution gallery

The Science Museum in London opened its doors to the new Energy Revolution: The Adani Green Energy Gallery today, which includes cutting-edge low carbon solutions and their role in our journey to a sustainable future.

NIBE's S2125 Air Source Heat Pump (ASHP), a high temperature, energy saving model, which uses natural refrigerants, had been chosen by the museum to showcase the very best in ASHPs.

Featured as part of the 'Future Power' section, sitting alongside nuclear fusion experiments, tidal turbine blades and other contemporary technologies, NIBE's heat pump will help educate the Science Museum's millions of visitors on the way energy supply and use is being transformed.

Free to enter, The Adani Green Energy Gallery is split into three sections: 'Future Planet' explores the changes to our climate we are already experiencing and examines how scientists use complex computer models to glimpse the climate futures we could face, depending on the decisions we make today.

'Future Power', where NIBE's heat pump is featured, focuses on the projects and technologies we could use in a low-carbon future. From historic artefacts to contemporary technologies.

'Our Future' includes children's ideas of how the world will meet its energy needs in decades to come.

Energy Revolution replaces the Atmosphere gallery, which welcomed more than six million visitors between 2010 and 2022.

www.nibe.eu/en-gb

British Gas launches UK's lowest heat pump rate to drive take-up

British Gas has launched the UK's lowest heat pump rate to make low carbon technology more affordable and encourage heat pump uptake.

The new energy offering is available to all British Gas energy customers that purchase any air source heat pump from British Gas and aims to help drive the adoption of heat pumps in the country.

They are providing a unit rate of just 14p/kWh for the electricity used to run the heat pump for the first year. Households could save up to £450 for one year by switching to a heat pump, making use of the new rate and capping their gas meter, compared to heating a home with a D-rated gas boiler. The savings from the new rate will automatically be credited to customers' energy bills each month.

The move tackles the ongoing running costs of heat pumps making them a more affordable option for home heating and cutting carbon emissions. British Gas also offers a range of payment options including two years interest free credit.

www.britishgas.co.uk/energy/gas-and-electricity

Low carbon energy supply for some of the tallest residential towers in Canary Wharf

Following the signing of a new 25-year contract, the energy teams at Veolia UK are set to manage low carbon heating and cooling supplies for the new district energy network serving the prestigious Consort Place development on the Isle of Dogs, London.

Developed by Far East Consortium (FEC), it is designed to support local decarbonisation of energy, and the contract will deliver essential heating and cooling to the 80,000 m2 mixed-use development covering 636 apartments, together with a 231-bed hotel, school, pub, and smaller retail units. This will support the network that serves some of the tallest residential towers in the Canary Wharf district including the 217-metre-tall Aspen with 65 storeys, and the neighbouring 125-metre-high Alta, which has 34 storeys.

Low carbon energy

The Team will manage the entire system and deliver energy supplies from the energy centre to each customer on a year-round 24/7 basis. As space heating and hot water accounts for about 21% of total UK carbon emissions, the baseload for the low carbon energy comes from the latest water source heat pump technology with water cooled chillers providing the cooling load. To optimise efficiency, heat is recovered from the chillers' condensers circuits, before the cooling towers, to feed the cold side of the heat pumps. This should guarantee delivery of 850kW of heating and 600kW of cooling to the network that will serve around 20,000 people including residents, hotel guests and other building users.

Operations and maintenance

Veolia will be fully responsible for all plant and equipment in the energy centre, the district heating mains on the site, and the rising mains up to and including either the consumer interface units (heat meters), or the commercial heat exchangers. This operations and maintenance service will be fully responsible for compliance with all current legislative and regulatory requirements, and produce reports covering carbon emissions, building regulations and local planning.

Commenting on this latest development, John Abraham, Chief Operating Officer - Industrial, Water and Energy for Veolia UK & Ireland said:

"This latest contract marks a further step forward in the drive to make London a sustainable city and advance the decarbonisation of buildings. Providing the essential low carbon power to support new communities, and boosting energy efficiency, are key to establishing the sustainable cities of the future. By using the latest technology, and optimising energy management, we can not only power modern living but also make a real contribution towards meeting London's environmental targets. As one of the biggest cities in the world it is important for London to set an example, and this shows what can be achieved."

In the UK, Veolia currently manages the energy plant and networks across 60 sites and operates over 120 community heating schemes serving large campuses and hospitals. These distribute low carbon or renewable heat from combined heat and power plants, waste wood biomass, heat pumps, and Energy Recovery Facilities. Using district heating the company provides essential energy to support 66,300 residents, 244,000 students, and 44,500 hospital beds (equivalent to 8.1million in-patients per year). The Group currently operates around 600 district heating networks covering 7000km of heat mains around the world.

With GreenUp, the business becomes a catalyst for ecological transformation for cities and industries, ready to seize the opportunities created by the demand from populations all over the world. Already a player in the research and development of environmental solutions, with 14 research centres worldwide, the Group will significantly accelerate its investments in innovation with an additional €200 million to design the technologies of the future.

From planning to power:
ensuring grid stability in district heating projects

By Ulrik Vadstrup, Regional Europe Segment Sales Manager HVACR and Torben Poulsen, Business Development Manager, Drives and Pumps, at ABB Drives

As the world strives towards a more sustainable future, district heating schemes are shifting from traditional fuel-based models to incorporate large-scale heat pumps. This evolution not only represents a technological leap but also a commitment to environmental stewardship and energy efficiency.

Unlike their fossil-fuelled predecessors, heat pumps offer a startling enhancement in energy efficiency, as shown by their impressive Coefficients of Performance (COP). Simply put, these systems are proficient in generating multiple units of heat for every unit of electricity consumed, drastically reducing the dependence on conventional, carbon-heavy energy sources.

By tapping into renewable resources, such as excess heat, ambient air, or water sources, heat pumps can minimize the carbon footprint of district heating systems. They have the versatility necessary for meeting diverse heating requirements, from individual buildings to entire city blocks, charting the course for a more sustainable approach to urban planning and energy usage.

The impact of harmonics

However, while the increasing adoption of heat pumps is a promising development, it brings to light the infrastructural challenges of harmonics and power quality in the electrical grid.

It is important to note that the widespread electrification of various aspects of society also contributes to the total harmonic distortion in the power system. The increased use of devices such as electric vehicle chargers, domestic heat pumps, LED lighting, and a variety of consumer electronics, introduces additional sources of harmonics. These devices, like variable speed drives (VSDs), have their own non-linear characteristics that cumulatively affect the quality and stability of the electrical grid. These harmonics can interfere with the stability and efficiency of the grid, potentially impacting other electrical consumers and causing broader network issues.

Heat pumps, particularly large-scale installations, often employ VSDs to regulate their operation. While VSDs offer high precision in control and contribute to energy savings, their non-linear load characteristics can also introduce significant harmonic distortions into the power system.

Harmonics are electrical frequencies that can distort the fundamental waveform of the electrical supply, leading to a multitude of problems. For instance, they can cause overheating in electrical equipment, leading to premature wear and reduced lifespan. In addition, they can lead to the malfunctioning of sensitive electronic equipment, increase operational costs, and in severe cases, may result in system outages. With the grid connected to a diverse collection of residential, commercial, and industrial users, the harmonics produced by large-scale heat pumps can ripple across the network and deteriorate the power quality experienced by numerous consumers.

Furthermore, harmonics can resonate with the natural frequencies of the grid components, amplifying the distortion effects and leading to grid instability. This could result in the tripping of protection devices, loss of service, and costly damage to infrastructure. Thus, it is critical to conduct thorough harmonic analysis during the planning phase of integrating heat pumps. Techniques such as active and passive harmonic filtering, and the use of ultra-low harmonic drives, can be employed to mitigate the effects of harmonics and protect the grid infrastructure.

Collaboration is the key in project planning

Nevertheless, common mistakes are made during the conceptual stages of heat pump projects. A frequent oversight is underestimating the total harmonic distortion that will be introduced into the grid once the heat pump is operational. Planners may not fully account for the cumulative effect of the heat pump

when combined with existing grid loads, leading to harmonic levels that exceed acceptable thresholds. In countries like Denmark, stringent technical regulations are in place, setting firm limits on the allowable quantity of harmonics. There is also a tendency to overlook potential grid expansions or upgrades in the vicinity, which could compound the harmonic issues in the future if not addressed during the initial design phase.

Additionally, a lack of communication between project developers, grid operators, and local authorities can result in the absence of a clear strategy to tackle harmonics. When stakeholders fail to collaborate from the outset, it often results in costly post-installation fixes. For instance, retroactively implementing harmonic filters or revising the grid infrastructure to accommodate the heat pump's electrical demands can significantly inflate project costs and timelines.

To address these challenges, project developers should prioritize communication with grid operators early on to determine harmonic standards and grid capacity. A holistic approach, factoring in the heat pump's impact on the electrical system, from generation to the point of end use, is necessary to avoid these pitfalls. Effective planning, combined with advanced ultra-low harmonic technologies and proactive collaboration, is the key to maintaining grid stability while embracing the benefits of large-scale heat pumps in district heating systems. This will ensure that every watt of green electricity is put to effective use.

The cornerstone of these advanced district heating systems is the adoption of ultra-low harmonic drives, which assure the operational integrity of the heat pumps and the network they operate in. These drives mitigate the electrical disturbances and harmonics, thereby enhancing the system's efficiency and durability.

While ultra-low harmonic drives present a higher initial investment, their long-term benefits are manifold. They deliver superior energy optimization, which translates into considerable cost savings over the heat pump's full lifespan.

Strategic use of technology at the design stage

Redundancy is also a critical consideration in these systems. It is common practice to install multiple pumps and compressors to ensure that the system can maintain its function even when individual components are offline for maintenance or if an unexpected failure occurs. The necessity to continue heat delivery cannot be overstated, especially during peak demand or in critical infrastructure such as hospitals or schools.

From a practical viewpoint, implementing large-scale heat pumps within a district heating network requires attention to both the load demands and the local grid's capacity. This often involves installing additional transformers and grid infrastructure to cater to the increased load, which may be measured in megawatts for larger projects. Therefore, great care must be taken to design these components to handle the maximum expected load without excessive oversizing, thereby maintaining economic viability.

Moreover, engaging with local grid operators earlier on in the planning process is essential to determine the feasibility of adding large-scale heat pumps to the region's energy mix. They can provide valuable insights into the availability of renewables, the capacity of the existing grid, and the necessary upgrades to accommodate these new energy consumers.

EFFECTIVE PLANNING, COMBINED WITH ADVANCED ULTRA-LOW HARMONIC TECHNOLOGIES AND PROACTIVE COLLABORATION, IS THE KEY TO MAINTAINING GRID STABILITY WHILE EMBRACING THE BENEFITS OF LARGE-SCALE HEAT PUMPS IN DISTRICT HEATING SYSTEMS

Conclusion

In conclusion, large-scale heat pumps signify a transition to energy-efficient district heating networks that capitalize on renewable resources and optimize power consumption. When created from renewable sources, energy becomes more and more valuable - we should use it wisely and manage it with great care.

This change, while challenging, is underpinned by detailed planning, stakeholder collaboration, and the strategic use of technology like ultra-low harmonic drives, ensuring grid stability and efficient heating.

By drawing from the wealth of experience in regions where such systems are already operational, like Scandinavia, and fully understanding the complexity involved in integrating large scale heat pumps into the grid, other regions around the world can embark on a similar transition. The collective effort in research, development, and implementation of these systems will, in turn, foster a consistent, reliable supply of sustainable heat that will benefit the environment and future generations – all while minimizing harmonic distortion in the grid.

Case study: Esbjerg's journey to sustainable urban heating

Esbjerg, a Danish port city, has set a remarkable example in transforming its district heating system to combat climate change. The city now boasts the world's most prominent seawater heat pump system that uses CO_2, which is safer for the environment, as the refrigerant. This initiative was driven by DIN Forsyning, the local utility company, aligning with their goal to stop using fossil fuels for generating heat. With the closure of the old coal-fired power plant, they have adopted an eco-friendlier approach that cuts down on the energy needed for heating by half.

ABB has been a crucial player in this transformation, delivering a complete set of electrical, control, and instrumentation equipment, including efficient motors and VSDs. This technology ensures that the new heating system runs smoothly and integrates well with renewable power sources like the offshore wind turbines in the North Sea.

This collaboration has set Esbjerg on a path to becoming carbon neutral by 2030. The city's experience shows how detailed planning and working together can lead to successful, sustainable heating for urban areas.

5 Common Air Source Heat Pump MYTHS DEBUNKED

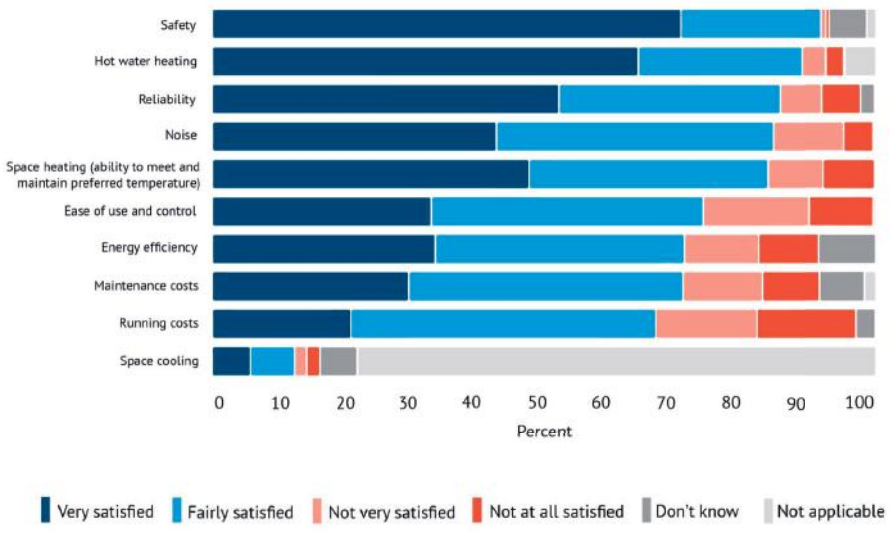
By Jack Hill, Secon Renwables

In the evolving landscape of renewable energy, air source heat pumps (ASHPs) have surfaced as a promising solution for efficient heating and cooling in residential and commercial spaces. Despite significant advancements in heat pump technology over the past two decades, persistent myths about their performance and cost-effectiveness deter many installers and homeowners from adopting this eco-friendly option. This article delves into the truth behind prevalent misconceptions surrounding heat pump technology, offering clarity on their capabilities and dispelling doubts. By unravelling these myths, we aim to empower individuals with accurate information, encouraging a more informed approach to embracing ASHPs as a sustainable heating and cooling solution. Join us as we navigate through the realities and potentials of heat pump technology, paving the way for a greener and more efficient future in energy consumption.

1 'Heat Pumps won't keep you warm'

According to a recent UK survey commissioned by Nesta, over 80% of participants expressed contentment with the performance of their heat pumps in delivering both space and hot water heating, a satisfaction level similar to households using gas boilers, as noted by Nesta. Moreover, a pan-European survey conducted in 2022 unveiled that 81% of respondents reported an elevated level of comfort after installing a heat pump. If designed and installed correctly, heat pumps can provide the same levels of comfort as a fossil fuel heating system, or more. These findings underscore the widespread satisfaction and comfort benefits associated with heat pump usage, highlighting their effectiveness in meeting heating requirements and improving overall living conditions.

Satisfaction table (Nesta)



2 'Heat Pumps only work in highly insulated buildings'

There's a common misconception that heat pumps demand impeccably insulated structures to operate effectively. However, the reality is that heat pumps can perform well in any building if appropriately sized, designed, and installed. During colder weather, buildings naturally lose heat through walls, windows, and the roof. Inadequate insulation exacerbates this heat loss, requiring a higher heat input to maintain a consistent indoor temperature. Consequently, in poorly insulated homes, a larger heat pump is necessary, similar to the need for a larger gas boiler to meet the required heat input. While sufficient insulation can improve the efficiency of a heat pump system by reducing heat loss, modern heat pumps are adaptable to varying insulation levels. They can still provide efficient heating and cooling solutions, even in less insulated buildings. Therefore, it's essential to consider multiple factors beyond insulation when assessing the suitability of a heat pump for a specific property.

3 'Heat Pumps devalue Properties'

There's a prevalent misconception that the installation of a heat pump can decrease the value of your property. Research conducted in the UK indicates that installing a heat pump could potentially increase the value of an average home by approximately 1.7% to 3.0%. Given the average UK house price as of December 2023, estimated at around £285,000, this implies a price uplift ranging from £4,800 to £8,600. Such a boost represents a significant portion of the initial investment needed for heat pump installation. This highlights the potential financial benefits homeowners can reap by embracing heat pump technology, not only in terms of energy savings but also in enhancing property value.

4 'Heat Pumps don't work when it's cold'

The Nordic countries of Sweden, Norway, and Finland are renowned for their chilly climates. Interestingly, they also boast the highest per capita heat pump sales in Europe. With over 40 heat pumps per 100 households in each nation, they top global charts in heat pump adoption. This trend highlights the effectiveness of heat pumps in addressing cold weather challenges and underscores the region's commitment to sustainable heating solutions. It also suggests that despite the harsh climate, heat pumps offer a viable and popular option for heating in these countries.

Some concerns arise regarding the performance of heat pumps in freezing temperatures. However, they actually perform exceptionally well in such conditions. Heat pumps maintain high efficiency even in sub-zero temperatures, outperforming gas boilers by more than double. While the coefficient of performance (COP) of heat pumps may decrease as the outside temperature drops, it remains notably high. Unlike fossil fuel boilers, which operate at around 85% efficiency, heat pumps utilize electricity to extract additional heat from the outside air or ground. This process typically yields at least 2 units of heat for each unit of input, resulting in a COP of 2 or higher, equating to efficiencies of 200%, 300%, or more, meaning you can stay nice and toasty even if the outside is bitter.

5 'Heat Pumps are too difficult to install'

Although installing a heat pump is undoubtedly more intricate than setting up a standard boiler, it becomes manageable under the supervision of a skilled heat pump engineer. Many challenges arise when unqualified individuals attempt installations. These individuals may purchase a heat pump from a wholesaler without fully understanding its complexities. Consequently, errors occur during installation, compounded by a failure to adhere to the correct design protocols or conduct necessary thermal assessments beforehand. These missteps show the importance of acquiring adequate training qualifications and purchasing a heat pump from a reliable renewables supplier that has a strong technical support system.

Summary

The misconceptions surrounding heat pumps are outdated, given the advancements in technology. Modern heat pumps have undergone significant development, effectively meeting the heating and cooling needs of homeowners and exceeding expectations. Concerns regarding their ability to maintain warmth in homes, noise levels, and performance in cold climates are no longer valid. Homeowners report high levels of satisfaction, coupled with substantial improvements in efficiency, showcasing the reliability and comfort provided by heat pump technology. Consequently, homeowners and installers can confidently adopt heat pumps as a sustainable and effective solution for their heating and cooling requirements, assured by their proven performance and reliability, as well as improved and more accessible technical support to help with installations.

Key success factors for high-temperature heat pump integration

High temperature heat pumps can provide greater options for building owners to decarbonise heat in existing buildings, but they should not be considered a silver bullet, says Baxi's Ryan Kirkwood.

Ryan Kirwwood

Investigative engineering and optioneering are key success factors for optimal heat pump performance and value.

As building owners review boiler replacement projects and the achievable options to decarbonise heat, a hybrid heat pump solution can nearly always be a fast, efficient and affordable approach. This approach can enable a large portion of the heat to be decarbonised while overcoming some key challenges such as budget and risk.

But what if the client brief is to move straight to full electrification of heat? Are high temperature air source heat pumps (HT ASHP) the silver bullet to a straightforward swap out of boilers for heat pumps in existing buildings?

Unfortunately, the solution is not as simple as it is sometimes made out to be.

Operating temperatures

The main challenge with decarbonising heat in older buildings is that older systems typically operate at flow and return temperatures of 82/71°C or potentially 80/60°C, with the emitters sized accordingly.

We know that the most modern of R290 (propane) ASHPs, like our own Baxi Auriga+ range, can deliver up to 80°C flow temperature. However, 80°C, which is at the very top end of the performance envelope, falls slightly short of the 82°C flow required by 82/71°C circuits. What's more, the coefficient of performance of HT ASHPs falls off at higher temperatures, affecting efficiency and subsequently operating costs. A further consideration is that most HPs prefer to operate in the 5-10°C ΔT range, making a straight swap on 80/60°C circuits not impossible, but challenging.

Understand the existing system

So how to ensure best performance and value from HT ASHPs?

Understanding the system fully before designing a hybrid or standalone ASHP system is key.

To do this, we need to know the actual heating demand at a system circuit level. As design information for dated buildings is limited at best, we recommend carrying out a significant amount of investigative engineering at the outset.

This should include (but not be limited to) the original design temperature and loads, any hydronic inefficiencies, changes to the building and/or heating system and any bounding constraints. Understanding electrical capacities, whether the budget allows for standalone ASHPs, and any factors that could offset the potential higher running costs, such as PV, will also influence the design.

At this point, installing ultrasonic heat meters, undertaking a full heat loss calculation where possible and utilising data such as gas meter readings will provide better insight into the building profile.

Optioneering

With real measured data, heat experts can engineer different solution scenarios. This optioneering is a valuable process that allows clients and designers to make the best choice for a specific building within the project parameters.

For example:

- Reducing flow temperatures by fixing hydronic inefficiencies
- Bracketing of the heating system to avoid running all circuits at 80°C or 82°C all year, improving running costs
- Solving spatial challenges by sizing real requirements through measuring and calculation.

Bracketing

Let's consider in more depth the bracketing option, which involves consolidating the heating system into frames of known and weighted data.

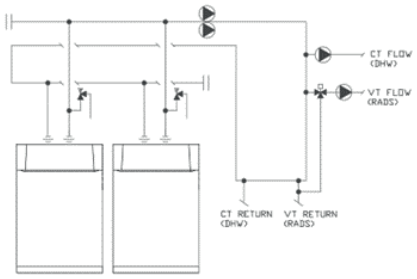


Figure 1

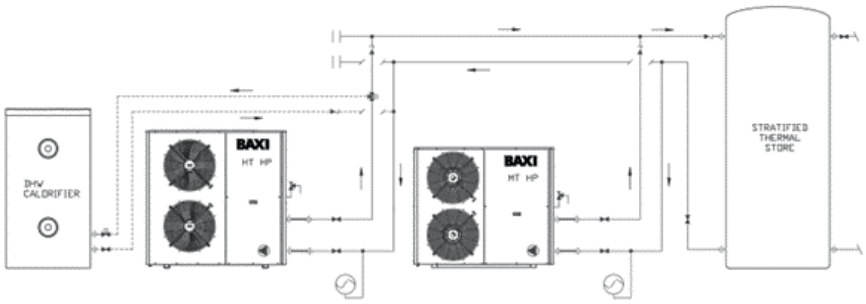


Figure 2

For example, if the survey data shows a sizable CT (constant temperature) circuit serving an air handling plant exclusively, one option might be to "bracket" this out of the overall heating system.

Serving it directly from its own heat pump plant would allow a change of the tempering or reheat coils to suit a 55°C flow temperature (or lower). This decision alone could increase the heat pump efficiency up to 150% from the current design temperature of circa 80°C.

The same principle can be applied to VT (variable temperature) circuits when the CT circuit is unable to deviate away from its current design flow temperature.

VT circuit bracketing can deliver considerable efficiency rewards as the weather compensation can now be done directly at the plant without the use of mixing valves.

With direct weather compensation on HT ASHPs, the flow temperature can now range from 35°C-80°C. If heat losses have been carried out, emitters may be changed when and if possible, to allow a more aggressive curve.

The portion of the year the HT ASHP(s) must remain at 80°C flow may be offset in terms of net efficiency by the portion of time that flow temperatures are not required at 80°C via direct weather compensation.

The weighted aspect of bracketing involves understanding the split in capacity required for each circuit. If VT equates to 80% of the overall load requirement, then addressing that purely in isolation with CT remaining on 80°C flow may impact the overall efficiency of the building sufficiently without the need to replace AHU coils.

Building up the solution

Figure 1 shows a typical 2 boiler reverse return header set up with a CT and VT circuit aligned to most 82/71°C legacy designs. Weather compensation is done directly to reduce plant load rather than overall primary generation temperatures. With HPs, standalone or hybrid solutions, the goal is always to directly weather compensate to reduce HP generation temperatures.

Even a modest reduction in flow temperature will ensure higher efficiencies.

Most HT ASHPs would achieve a coefficient of performance (COP) of approximately 2.2 at 65°C flow and -2°C ambient conditions.

High temperature requirements (DHW generation for example) should be isolated, when possible, to allow primary temperatures to track compensation curves directly.

Dropping the weather compensation to below 60°C will allow for a blend of Medium Temperature (MT) and HT ASHPs, potentially reducing any siting or budget complexities that a full HT solution may struggle to overcome.

In the blended MT/HT example solution shown in figure 2, the HPs are cascaded with a three port divert valve being used to deliver heat to the calorifier.

Typically, the MT ASHP(s) would act as lead for the directly weather compensated circuit supported by the HT ASHP(s) during peak demands. When higher temperatures are required for more challenging design conditions the HT ASHP can ramp the thermal store up to 80°C.

If figure 1. (reverse return) had been designed on a ΔT of 20°C, one solution is alternate cascading method shown in figure 3. This utilizes the thermal store lower and upper portions to cascade temperature rather than load, an identical philosophy used with most hybrid solutions.

Temperatures are still key, and with good weather compensation a blend of MT and HT ASHPs can still work. However, this solution is more suited to HT ASHPs as at higher design temperatures of 80/60°C MT ASHPs are unable to deliver any useful heat.

Perfect is the enemy of good

One area that has not been discussed until now is 'fabric first'. As space constraints are difficult to avoid, precision engineering is essential to ensure the HPs are not over-specified in terms of kW capacity. Considering fabric options at the outset of every heat decarbonisation project is therefore vital to reduce heat losses and heat demand.

Where fabric upgrades are not an option, designing a perfect solution that delivers in terms of performance and value is almost impossible without compromise. However, building an investigated and measured thermal profile of real usage allows for a clearer understanding of the impact that each of the solution phases will have.

At Baxi, we work closely with designers and engineers to break down the complexities associated with decarbonisation and provide complete engineered solutions and technical support to overcome the challenges each project brings.

Together we can provide our customers with the support they need on their journey to decarbonise heat.

www.baxi.co.uk/lp/baxi-auriga-air-source-heat-pump

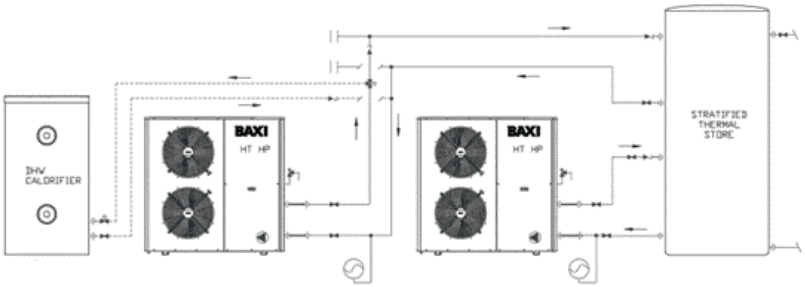


Figure 3

Heat pumps are not just for heating

'Selling' the concept of low carbon heating to the public is a challenge that could be made easier if the industry made more of the wider benefits of heat pump technology including its potential to improve air quality and reduce overheating, says BESA technical director Graeme Fox.

Graeme Fox

Heat pumps are gaining traction with homeowners and operators of commercial buildings because of their low carbon and energy efficiency credentials, but the current pace of the retrofit market remains frustratingly slow.

The built environment is the largest source of climate emissions apart from transport and we have around 28 million homes most of which will need some level of retrofit to meet our climate change targets.

UK built environment emissions did fall by 13% between 2018 and 2022, but that is six percentage points less than the 19% required to meet the UK's net zero commitments, according to a new report from the UK Green Building Council.

We are on the right track, but not moving fast enough, and will need to decarbonise the built environment twice as fast in coming years to hit the government's 2050 legally binding commitment.

Our social housing sector is a big target for improvements which is proving hard to transform at scale. The poor condition of many of these homes calls for a much wider ambition beyond cutting emissions and energy bills – namely to make them fit for human habitation.

Overheating

The building engineering sector has a responsibility for keeping people warm in the winter – but we also work on improving indoor air quality (IAQ) and reducing summer overheating, which is an increasingly important consideration as the planet heats up.

Heat pumps are not a silver bullet, but they do tick all these boxes.

Unlike traditional heating systems that burn fossil fuels they produce no direct emissions at the point of use. So, as well as improving energy efficiency they reduce our dependence on the fuels that

directly contribute to air pollution through harmful emissions.

Fossil fuel powered heating systems also emit harmful particulate matter (PM) which contributes to serious respiratory problems and cardiovascular diseases when breathed in. Heat pumps are combustion-free, so do not produce any PM emissions and, therefore, directly support better healthcare outcomes.

The transition to heat pumps is also part of a wider economic trend to invest in a cleaner energy infrastructure in line with the industry's wider goals to create a safer and healthier environment for all which includes tackling the growing problem of overheating.

The UK building stock is not well equipped to cope with our increasingly hot summers and milder winters. Heat pumps don't just heat, they can also provide cooling in the summer so could be a big part of the solution. This is a message that is often lost in the debate about transitioning from gas boilers, which tends to focus solely on the environmental aspects.

A report produced by the Environmental Audit Committee (EAC), which advises the UK government, recently warned that the country was poorly prepared to deal with the "silent killer" of overheating with vulnerable groups, including the elderly and the socially disadvantaged, at greatest risk.

Heat resilience and sustainable cooling said that both physical and mental health are affected by rising temperatures with suicide risk believed to be twice as high when the temperature reaches 32°C compared with 22°C.

The committee of MPs also said high temperatures cost the UK economy £60bn a year due to work-related accidents and lack of sleep. It said more than 4.6 million homes in England experience summertime overheating – underlining the huge scale of the potential retrofit challenge.

This puts a whole new complexion on the debate between retrofit and rebuild on the road to net zero. With the need to retrofit both residential and commercial buildings to improve energy efficiency already established as part of the UK's net zero ambitions, addressing overheating needs to be given greater prominence.

Reverse cycle heat pumps can switch from extracting heat from the outdoor air and transferring it indoors during the winter months, to removing heat from the indoor air and transferring it outside, effectively cooling the indoor space during the summer.

"WE ARE ON THE RIGHT TRACK, BUT NOT MOVING FAST ENOUGH, AND WILL NEED TO DECARBONISE THE BUILT ENVIRONMENT TWICE AS FAST IN COMING YEARS TO HIT THE GOVERNMENT'S 2050 LEGALLY BINDING COMMITMENT."

Ventilation

Deploying technology in this way complements the ventilation industry's efforts to improve the wider performance of buildings to safeguard human health and well-being. This includes keeping systems operating well throughout their operating life to find the right balance between energy consumption, effective ventilation, and cooling.

To that end, BESA recently introduced a new specification for ventilation hygiene which has been widely hailed as "a big step towards revolutionising air quality in buildings" and which also has important implications for energy saving.

TR19® Air 'Specification for internal cleanliness and hygiene management of ventilation systems' was designed to address an urgent need for better cleaning and maintenance of ventilation ducting, which has been highlighted by healthcare professionals as crucial to reducing building occupants' exposure to harmful airborne particulates and pollutants.

To support the new specification, the Association's training Academy also updated two of its air hygiene training courses designed so contractors could help commercial building clients meet health & safety obligations.

Better ventilation management allows the system to operate more efficiently and reduces wear and tear so is an increasingly important consideration when retrofitting buildings to achieve net zero and improve the health and well-being of occupants.

Healthcare specialist Dr Philip Webb, chief executive of Respiratory Innovation Wales (RIW), said this kind of facilities management was essential to address a growing "indoor environmental quality (IEQ) crisis" and reduce excess deaths related to respiratory, cardiovascular, and mental health conditions.

He called for a fundamental reassessment of the way public money and resources were allocated to tackling air quality, which he says is responsible for higher numbers of excess deaths than the Covid-19 pandemic, cancer, heart disease and mental health combined.

According to data from Public Health Wales, Covid-19 was responsible for 38 deaths per 100,000 of the global population, smoking annually accounts for 180, and cancer 278, but air quality is responsible for up to 1,400 excess deaths per 100,000 every year. However, it receives a tiny fraction of the public money and resources allocated to health and wellbeing services.

Webb also pointed out that there were 3,000 new occupational asthma cases reported in the UK every year linked to the air quality in workplaces.

"We are suffering from a legacy of poor building design dating back to the 1960s and 70s," he said. "If properly supported, facilities and building management systems could have a bigger impact on health and wellbeing than the whole of the global health and social care system."

This is a powerful message that should resonate with all building users including those currently less inclined to put up with the potential disruption of a retrofit transition to alternative heating systems.

Explaining that heat pumps are good for your health as well as your pocket and climate conscience should make for a highly persuasive argument that might just get the market moving more quickly.

TR19® Air costs £75 for BESA members and £150 for non-members and can be downloaded from the BESA website. Anyone booking onto one of the BESA Academy training courses will also receive a free copy. Details can be found here.

www.theBESA.com

WOMEN IN THE HEAT PUMP INDUSTRY

Emma Bohan, Managing Director of IMS Heat Pumps shares her journey into the Heat Pump sector with us.


Emma Bohan

How did you get into the heat pump industry?

By accident!

In a previous life I worked for a business development company called International Innovation Services (IIS). Back in 2001, the company started to focus on supporting new and innovative environmental and energy related start-ups.

Another company we supported was called ECO Heat Pumps, who we helped to grow their business until, back in 2008, they sold to a manufacturer. I remained friends with the people behind ECO Heat Pumps, and subsequently, in 2016, they persuaded me to come and join the heat pump game. I've been here since then, and part of IMS Heat Pumps since 2019.

What was your first job?

My first job was working for a banqueting suite called Baldwin's Omega, when I was 13 or 14 years old. It was for three afternoons (after school) and all-day on Saturday's. The role included laying and decorating the tables for the weddings and events they were holding. It was run by a formidable gentleman, Mr Baldwin, who was a stickler for delivering high quality with attention to detail – it's stuck with me ever since, although I do not miss polishing plates.

I went on to do silver service and bar work, and this led to my eventually heading to university to do Hotel & Catering Management.

What does your current role involve?

The day job is very varied; at IMS, we are 37 people and growing. With offices in Scotland and England so during a day I can cover everything from checking on our Health & Safety, holding sales meetings, discussing various marketing efforts, looking over operations, and/or completing inductions and reviews.

As Vice-chair of the GSHPA I am involved in promoting the work of our members and of course the benefits of the technology. So, it was great to be able to present the Ground Source Heat Pump awards at the recent National ACR & Heat Pump Awards in Manchester.

More recently, as the person behind the NESTA Installer Survey with Nathan Gambling of BetaTeach, I am currently spending time reviewing the data this has produced. Overall, it's such a positive message for the industry and I can't wait to get the data out there at InstallerLive in June.

What do you see as the challenges facing the industry?

To be honest, I think the biggest challenge at the moment is the fossil fuel lobby. Heat Pumps, when well designed and well installed, simply work. But that messaging is thwarted by the headline grabbing 'I'm cold, and it's the expensive heat pump that has ruined my life' being pushed out there. There are thousands of heat pumps out there working fine with happy homeowners who are saving money – IMS have been installing them since 1997 – but ironically, we have been here before with the transition to Gas. And as we overcame that, so we will overcome this, and like many of the Nordic countries, Heat Pumps will become the norm.

Do you have any mentor's or anyone in particular who inspires you? (Either in or out of the industry)

I am constantly inspired by the passion of the ladies I meet – and there are more of us than you think!

Two of the main Trade Associations are headed by Women – Charlotte Lee at the Heat Pump Association (HPA) - and Laura Bishop and Andrea Ellison at the Ground Source Heat Pump Association GSHPA - it's brilliant to see. But I reserve special props for Leah at Your Energy, Your Way and her dedication to supporting more women into the industry, truly trail blazing stuff.

What would you say to other women who are considering coming into the heat pump industry?

There are so many great people in the industry, and, as a woman in a male dominated environment, I have felt super supported and super welcomed. Almost without fail I have been helped, assisted, informed and inspired by the people I have met along the way.

The industry is still so relatively new, that outside of the construction aspect, which has some way to go in encouraging more female people into trades, the rest is very 'open arms' – we need all hands on deck!

What do you like to do outside of work?

Outside of work?

Like many people running a company the lines can get blurred between a work / life balance but at IMS we have worked very hard to ensure that everyone can have a happy life. So when the tools are down, I really enjoy cooking with my husband, who, as a third generation caterer, is convinced he is better than me, but we'll agree to disagree!

IMS England Team Photo

Clean Energy: Heat pumps are just one piece of the green technology puzzle

Paul Burnett, Head of Decarbonisation and Energy Strategy, Johnson Controls UK&I comments on Net Zero goals, energy efficiency, long term energy security and unleashing economic opportunity are not standalone goals.

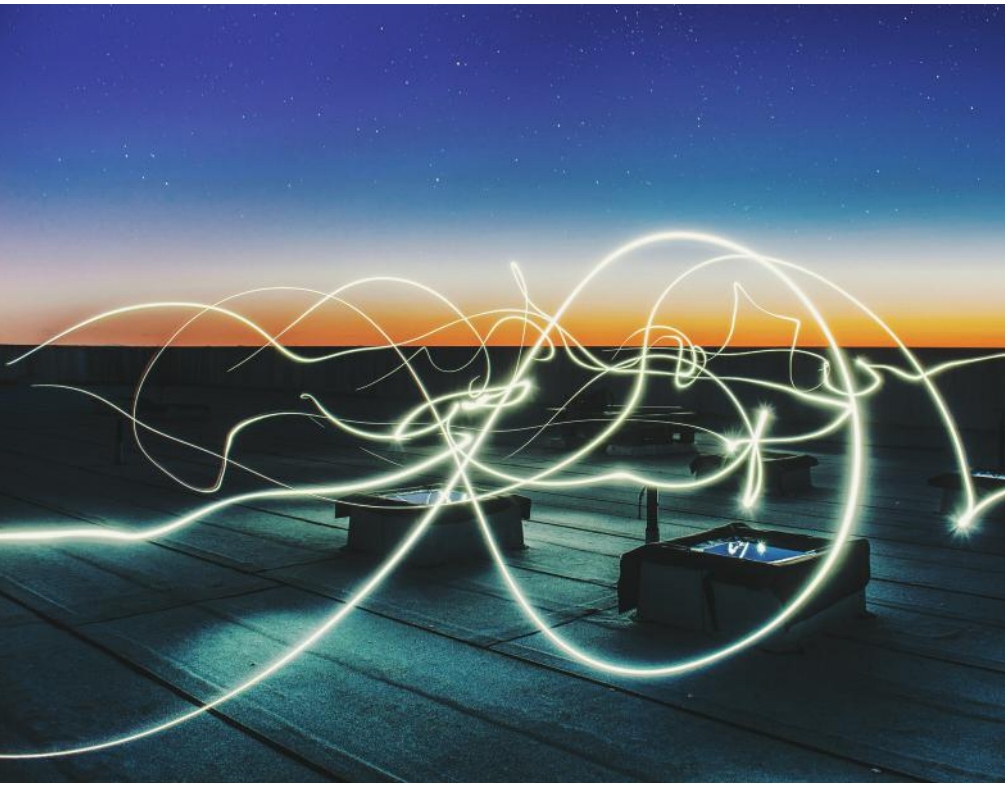
Paul Burnett

They're all highly interlinked and part of a unified drive to make our infrastructure fighting fit for a sustainable and profitable future. That's the message that's increasingly coming into focus. As businesses and governments continue to recognise the opportunities in the green technology sector, initiatives for ramping up the adoption of green technologies and cutting reliance on fossil fuels are increasing.

Against a backdrop of spiralling energy costs and the need to show decisive leadership, practical clean and efficient energy measures have come into the spotlight like never before. The case for sustainable tech is loud and clear. Yet, questions persist around which tools are the most practical, cost effective and within easy grasp.

The uncertainty questions

Although many don't know where to start when it comes to devising sustainable building strategies, it's worth taking the time to understand the full range of green tech options available. In a world where, according to the World Green Building Council, buildings are responsible for almost 40 per cent of greenhouse gas emissions and the IEA finds they consume at least 30 per cent of energy globally, discussing the solutions and establishing a pathway forward is imperative.



The UK's built environment may well be on the cusp of a major revolution. However, the relative newness of these technologies, paired with an ever-expanding green skills gap, has led to a lack of education on the genuine commercial benefits offered by different solutions. So, how do businesses understand which technologies will truly deliver return on investment (ROI)?

What's hype and what's meaningful

Heat pumps have long been heralded as the holy grail in energy efficient solutions. Taking a quick look at the figures makes it clear to see why the tech is becoming an obvious CO_2 cutting choice. The Carbon Trust found that heat pumps have the potential to deliver CO_2 savings of up to 70% compared to conventional electric heating, and up to 65% compared to an A-rated gas boiler.

They are clearly a smart investment but should be considered alongside the whole spectrum of green technologies available. To capitalise on the opportunity offered by new solutions – both commercially and sustainably – any gameplan for decarbonisation must be mapped out carefully. We need an approach that is individualised, taking into consideration

the unique challenges of each and every building and this includes its size, day-to-day functions, the needs of its occupants but also the overall mission and goals of the business.

The big switch

An unheralded success of previous investment into heat pumps has been the Public Sector Decarbonisation Scheme (PSDS). Thanks to this initiative, one borough in London was able to invest into air source heat pumps, seeing a 50% reduction in carbon emissions across its schools and public buildings as a result. Without such investment, legacy infrastructure and older gas heating models across the built environment would have made meeting net zero goals a considerable challenge.

Uptake in the private sector market could prove slower. The National Infrastructure Commission recently found that around eight million buildings will need to switch from gas boilers to cleaner alternatives by 2035 to meet the UK's 2050 net zero target. However, encouraging buy-in on a wider scale will be tricky given that gas is significantly cheaper than electricity at present.

Financial incentives and alternative finance models are going to be increasingly important in order for many businesses to meet ESG and global climate targets. Heat pumps might be the right choice to cut costs and emissions across specific buildings, but a 'one size fits all' approach isn't realistic.

Facilities managers need to look at the wider technologies and services on offer, such as hybrid systems - and ensure that visibility is inherent with any system that is deployed. When energy use is monitored in real-time, identifying areas for cost reduction becomes much more manageable.

The best use cases for heat pumps

Thanks to the rapid evolution of green tech, heat pumps can now function at higher temperatures. This means they are a viable option for venues like hotels, hospitals, and leisure centres where there is a high demand for hot water at peak times – negating the need to use a gas boiler. The challenge comes in choosing which HP model is right for your business. The decision is informed by a myriad of factors - overall economic case, operator needs, health, safety and environmental (HSE) requirements and external factors such as weather. In some cases, it might even be necessary to redesign mechanical building services to enable lower supply temperatures and invest into training to develop professionals who are equipped to maintain new systems.

It's important that businesses work with a partner who can offer recommendations on the portfolio of solutions available, effectively designing and installing solutions based on the business and building needs. The optimum solution is the one that provides the highest value in terms of cost and efficiency or return on investment (ROI), as well as providing an end-to-end consultancy and service. From initial inception, all the way through to maintenance once installed. Any good solutions provider will be able to support businesses on their efficiency journeys.

Combining heat pumps with other solutions for better outcomes

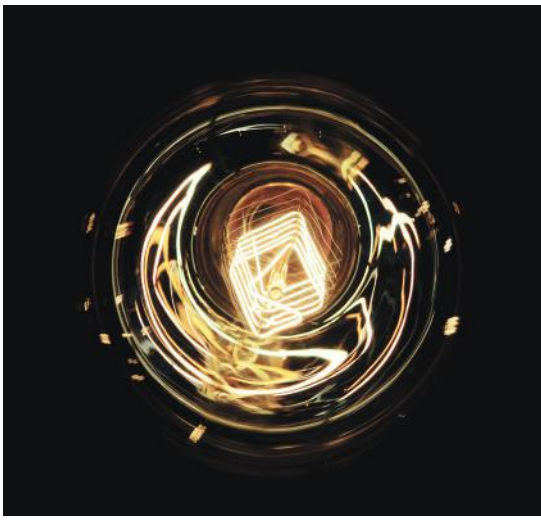
Effects of the weather?

As external temperatures and weather patterns become more unpredictable, wasted energy can be reused in a building by integrating both heat pumps and chiller systems. When there is a demand for heating or hot water, and cooling at the same time, the heat emitted from the cooling process can be extracted and reused for the heating process resulting in additional energy savings. This design is particularly useful for buildings that lack the space to install large scale heat pump and chiller systems.

Artificial Intelligence (AI) and Machine Learning (ML) models will be an important area for investment now and far into the future. When utilising a hybrid system, or monitoring energy efficiency across entire estates, collecting and analysing data becomes incredibly complex. AI and ML facilitate true interconnectivity across buildings and update facility managers in real-time on the 'health' of the building, as well as making recommendations to save on costs and energy emissions.

Using model predictive control, AI and ML can paint a picture of every possible scenario utilising a building's given data set. In this way, facilities managers are empowered with real-time insights and can understand the actual energy conversion rate for each element of the building.

AI constantly evolves as a wealth of information is fed in. Over time, it is able to identify any constraints or anomalies,



meaning managers can accurately use the data from the platform to preview optimum operating point. This is transformative because businesses can then understand exactly what improvements (and budget) will need to be implemented to deliver the energy in the most efficient way.

Accentuating the positive

There's much to be optimistic about when we consider the success of previous public sector heat pump schemes. With continued investment and buy-in to a wide range of green technologies, we can expand the scale and speed of development, driving up commercial and sustainable benefits in tandem. Heat pumps will be the right solution for some businesses to improve efficiency, drive down costs, and remain on track for carbon neutrality. But to make operations truly future fit and cost-efficient, we need to continually move towards better technologies, deployments, and set points to achieve improved energy efficiency.

Buildings can be our fastest and most significant sustainability win provided the right technology is deployed when and where it is needed the most. Tackling challenges, driving down costs and building improvements into an entire operation is at its heart an exercise in collaboration. By choosing a reputable partner to work with, businesses can implement systems across a whole suite of different buildings with different needs, including university campuses and hospitals. Despite the challenges we have an urgent priority to set a new standard through people, technology, and processes. Let's make sure we don't let the potential slip away.

www.johnsoncontrols.co.uk

Heat pump engineers are the key

Heat pumps will only take off when engineers are put front and centre says Jo Saxby Founder & CEO, Spruce

Jo Saxby

It's no secret that the UK's heat pump rollout isn't going quickly enough. The government's ambition for 600,000 installations a year by 2028 feels increasingly out of reach without pretty major changes. There are clearly a number of reasons for this – the UK's dubious accolade of having the highest spark gap in Europe, a concerted anti-heat pump campaign by certain elements of the press, and our historic reliance on oversized boilers and small radiators to heat leaky buildings.

The ~8000 current heat pump engineers in the UK are absolutely key if we are going to turn this around. There is simply no way to significantly scale the number of installations without their skills and experience, yet the challenges they face have been largely overlooked.

Working long hours

Running a heat pump installation business is hard. Engineers often work long hours, including evenings and weekends to be able to fit in all the admin whilst working long days on site, making sure the job gets done well. But, despite the huge amount of time invested, many installers can still struggle to make a significant profit at the end of the day.

This really matters. As well as making life difficult for installers, it hampers their ability to hire and train new engineers (something we desperately need them to do). And it reduces the time they can spend on marketing and growing their business. On top of this, the prospect of a high admin burden and low profit is putting off swathes of potential heat pump

engineers, many of whom currently have a much easier time installing gas boilers.

Engineer needs are vital

Prioritising the needs of heat pump engineers is vital if we're serious about hitting 600,000 heat pump installations a year in any meaningful timeframe. Thankfully there's a lot that can be done.

When speaking with installers, we continually hear the same set of issues being raised. A huge amount of time is lost dealing with potential customers who reach out for information or quotes but ultimately do not proceed with the installation. Our analysis indicates that installers around the UK are on average spending 2 hours dealing with each enquiry, but only convert 10% of these into paid work. That equates to 20 hours dealing with enquiries for every job that goes ahead.

On top of this, the process for collecting all the necessary information from the home remains time-consuming, particularly when much of the data then needs to be copied across into 2 or 3 other systems to complete the design, create a quote, and produce an MCS-compliant proposal for the homeowner.

So much paperwork!

And then there's the paperwork. There's the DNO application or notification, BUS voucher application, handover pack, MCS certificate, and building compliance certificates. Each of these require the installer to repeatedly dig up and manually enter a similar set of information.

While there are several software solutions available to help, the main issue is that they each only address one part of the installation process. Engineers still need to manually transfer data between different systems which is boring, error-prone, and a waste of their time. What's really needed is an integrated, end-to-end software solution that covers everything from initial customer enquiry through to final installation and commissioning. This is what we're building with Spruce.

We think data should be entered once, ideally automatically, and then flow through to all the necessary forms, reports, and compliance documents, without the need for manual intervention. We also think software should enable engineers to leverage their expertise, not force them through a blinkered, box ticking process. With less time spent on mind-numbing admin, engineers can spend time designing the optimum system for the home and customer's needs.

"RUNNING A HEAT PUMP INSTALLATION BUSINESS IS HARD. ENGINEERS OFTEN WORK LONG HOURS, INCLUDING EVENINGS AND WEEKENDS TO BE ABLE TO FIT IN ALL THE ADMIN WHILST WORKING LONG DAYS ON SITE, MAKING SURE THE JOB GETS DONE WELL."

More challenges

But software alone won't solve all the challenges faced by heat pump installers. Reducing the overall paperwork burden by streamlining and standardizing compliance requirements would be a major step forward. This could involve consolidating the various forms and documents required for MCS certification, Building Regulations compliance, and DNO notifications into a single, simplified process. Even just aligning the process for submitting data to each of the DNOs would be a good start!

Another way to support heat pump installers and improve the quality of boiler installations would be to enforce Part L of the Building Regulations more stringently for gas boiler installs. This would reduce oversizing of systems, give homeowners more information about their properties, and help them begin the journey towards low temperature heating. It might even encourage more installers to consider transitioning to heat pumps, as the difference in compliance requirements wouldn't be such a leap.

Finally, addressing the underlying issue of the spark gap is crucial for making heat pumps more financially attractive for both installers and homeowners. Bringing the relative costs of electricity and gas more in line with the rest of Europe could make heat pumps a financial no brainer, taking them beyond carbon-conscious early adopters and bringing them into the mainstream. The energy companies seem to be starting to address this with a number of special heat pump tariffs, the best of which is OVO's 15p/kWh, but there's still a long way to go.

The UK's heat pump rollout is at a critical juncture. By putting the needs of heat pump engineers at the heart of the UK's strategy and addressing the technological, regulatory and financial challenges they face, we can create a more supportive environment and dramatically accelerate heat pump installations.

If you're interested to learn more about what we're building – or simply want to share your expertise, please reach out to us on hello@spruce.eco or via our website.

www.hellospruce.com

Retrofit and decarbonisation for social homes and public sector buildings

Experts sought for framework to deliver carbon net zero ready social housing and public sector buildings. A new framework to support the retrofit and decarbonisation of the UK's 6.1 million social homes and public sector buildings is now open for applications.

LHC Procurement Group (LHC) is seeking consultants and specialists in energy efficiency, heating and ventilation, renewables, electric vehicles and solar PV, for its new Retrofit and Decarbonisation (N9) framework.

Launching in Autumn 2024, N9 will offer suppliers a significant pipeline of public sector work to support local authorities and social housing providers with net zero delivery and energy efficiency compliance.

It aims to drive essential retrofitting works across the sector's 4.4 million properties and help local authorities and social housing providers deliver urgent upgrades for warmer, more efficient homes. This will be crucial to meeting net-zero objectives and supporting residents grappling with the cost-of-living.

Meanwhile, local authorities will also be able to use the framework to ensure they meet the government's target to cut 75% of carbon emissions by 2037 across 1.9 million[1] non-domestic public buildings.

Clive Feeney, group managing director of LHC – a not-for-profit built environment, compliance and consultancy framework provider delivering exclusively for the public sector – said: "Retrofit and decarbonisation is a huge task for the public sector and social housing providers and requires a skilled workforce who can meet the complexities of this challenge.

"This framework will deliver the expertise needed and offers a huge opportunity for specialists and consultants to make a difference to communities throughout the UK, delivering projects for years to come.

"Housing represents 28% of the UK's carbon emissions and the government's Clean Growth Strategy is targeting all social housing to meet EPC C by 2030. Meanwhile, public buildings emit 2% of carbon emissions – a significant figure at an estimated 7.66 million[2] tonnes of carbon dioxide equivalent (MtCO2e). LHC frameworks are already relied upon by the public sector to deliver a pool of pre-approved suppliers and consultants, and they are now looking to N9 to provide experts who can ready housing and building stock for carbon net zero and a decarbonised grid."

Government and energy company schemes

N9 will also help to deliver work required by a mix of government and energy company schemes including the Social Housing Decarbonisation Fund (SHDF) and Home Upgrade Grant (HUG). Together, the schemes are worth £1.4 billion, with match funding from social housing from local authorities, social housing providers, and charities adding £1.1 billion. It can also support improvements to social housing with an EPC of band D-G under the Energy Company Obligation (ECO).

The framework can also be used by hospitals, schools, leisure centres, museums and universities to source experts in low-carbon heating, renewable energy and energy efficiency measures under the £400 million Public Sector Decarbonisation Scheme.

Nick Beard, LHC technical manager, said: "N9 will go live later this year and runs until 2028, so it perfectly aligns with peak public sector demand for expertise in energy efficiency and low-carbon heating solutions.

"At LHC we are very proactive in our work to attract smaller and more local businesses and underrepresented groups to apply to be part of our frameworks, and the tender process has been adapted with this in mind.

"For example, to access many of the government funding streams, installers must be PAS 2030 certified. Part of our process will be to support appointed companies in achieving these standards within two years of joining the framework, if required.

"Ultimately, we want to hear from and work with hard-to-attract organisations that have never been appointed to public sector projects before and create new opportunities for the market."

Availability

N9 will be available nationwide through the Group's five business units: London and South East (LSE); Consortium Procurement Construction (CPC); South West Procurement Alliance (SWPA); Welsh Procurement Alliance (WPA); and Scottish Procurement Alliance (SPA).

The six workstreams cover: consultancy; multi-disciplinary works; building insulation and performance (passive); heating systems; control and management systems; and electrical. They cover a range of expertise from heating and ventilation to EV and Solar PV, as well as integrating renewable energy solutions and PAS 2035 and 2038-compliant guidance.

Throughout the tender submission period applicants can ask questions, and a full tender response pack, templates and guidance information will be available.

Tender documents are available via **www.lhcprocure.org.uk/itt-n9**, where you can register your expression of interest today.

Retrofit and Decarbonisation (N9) Framework workstreams and lots:

Workstream 1 – Consultancy
Lot 1 - Energy Policy & Strategy Development and Grant Funding Support
Lot 2 - Management Agent / Multi-Disciplinary Consultancy
Lot 3 - PAS 2035 (Domestic Building Audits & Heat Decarbonisation Plans)
Lot 4 - PAS 2038 (Commercial Audits & Heat Decarbonisation Plans)

Workstream 2 - Multi-Disciplinary Works
Lots 5-7 - Multi-Disciplinary Works

Workstream 3 - Building Insulation & Performance (Passive)
Lots 8-12 - insulations
Lot 13 - Rainscreen Cladding

Workstream 4 - Heating Systems
Lot 14 - Domestic Boiler Based Heating Systems
Lot 15 - Domestic Renewables Space Heating Systems

[1] Climate Change Committee figures
[2] Latest analysis from Carbon Brief

Why low-carbon heating requires smarter controls

By Ian Rose, Sales & Strategy Director at Passiv UK


Ian Rose

For the last 40 years, most homeowners had a gas boiler. Life was simple. They were easy to install, they were reliable, they heated homes quickly, and they could be turned on and off with a thermostat at will.

Then we got smartphones. What! Why can't I control my heating on my phone? But I control my entire life on my phone! Welcome to the dawn of the smart thermostat. Consumers can now do exactly what they did before with their heating, but they can do it without moving from their chair, or being anywhere near their home, offering peace of mind that they're not pointlessly heating an empty space.

New technology

But what's this coming along? Heat pumps? A 'new' technology, using a different fuel source and entirely different heating characteristics to that good old boiler. But it's low carbon, it's the future, so maybe everyone should get one.

These are the sorts of consumer challenges that we hear all the time.

This is where the challenges start. People really liked the instant gratification of turning up the thermostat, they liked the ease of use, and they loved bills that were reliably consistent, regardless of when they used their heating.

Challenges

These challenges have been front-of-mind for the industry for years and the need to develop innovative solutions to combat these challenges has been our focus for over a decade. The rise of smart technologies across all industries is as such that there is a natural appetite for these types of technologies when dealing with solutions that are owned and managed by consumers.

It's for this reason that smart controls, designed purely for heat pumps, play a major role in the UK's drive towards a net zero future. The application of artificial intelligence for domestic heating, the optimisation of heat pumps for improved efficiencies, and the integration of heat pumps into our low-carbon energy system – it's a no-brainer, right but why?

Great seasonal performance

Heat pumps love a low flow temperature. It allows them to deliver a great Seasonal Performance Factor - the ratio between the annual heat energy output and the annual electric energy input. And, that's what every consumer wants because that means lower bills. Setting this flow temperature is usually in the hands of the commissioning agent to get the heat curve right. That's a tough job when we know that the current tools used to calculate the thermal performance of the building envelope are best described as crude. Smart controls can solve this problem by learning the thermal performance of the building and amending the flow temperature appropriately. And the controls do this constantly, so whatever happens to that building, the heat pump is optimised and can do its job to the best of its ability.

Consumer benefits

That's great news for consumers, as it means they are receiving the lowest bills possible. Except...what's this? Electricity costs more in the evening than in the middle of the day. But consumers want to heat their homes in the evening. Unfortunately, this is our energy future – we no longer have a readily storable fuel like gas for our heating, available whenever we need it. But electricity that is increasingly generated by renewables such as wind and solar and constrained

by the size of the wires connecting that generation to homes. Electricity can be cheap (sometimes they will pay you to take it!) when the wind is blowing and nobody else wants it. Sadly, this simply isn't the case on a cold winter's day when the wind is absent.

This is where the new generation of smart controls come in. Not only can consumers have all the convenience and benefits that they expect from smart, connected controls delivering the most efficient heating outcomes possible. They can also connect their heating systems to the low-carbon energy system, which means they can use energy when it's lowest cost and avoid using energy when it's more expensive.

This is when things start to get complicated. It's easy to turn the heating off when the prices are high. It's easy to turn it on when prices are low. Sadly, that delivers terrible results for consumers. To manage this challenge, you need to know what the price of electricity is doing in advance, to understand the opportunities for cost avoidance. You need to understand what the weather is going to do, to ensure homeowners don't risk being unable to get their property warm without destroying the heat pump's Seasonal Performance Factor. You need to understand when the consumer wants to be warm. And you need to understand what happens to the heat when you deliver it into the building. Then taking in all that information, you must figure out what you're going to do. Every minute of every day.

Sounds complicated, doesn't it?

The good news is that this is exactly what some smart controls do. They take on the challenge of operating a complex heating system in a dynamic energy environment and tailor heat delivery for every user in their specific home environment. No fuss. No inconvenience. No discomfort. Just lower bills and a great experience.

Some controls will also optimise a homeowner's heating against the solar panels on their roof, plug into their time-of-use energy tariff, and participate in the National Grid Demand Flexibility Service so they get paid for their heat pump pleasures.

Smart controls can deliver savings of up to 30% on heating bills and improve the Coefficient of Performance of a heat pump by reducing flow temperatures. The world of heat pumps just got simpler and cheaper. Maybe the next 40 years on our net zero journey won't be so painful after all.

www.passivuk.com

The Innovation Zone

The guide to what's new for Heat Pumps Today readers, offering vital industry news.
To advertise your product in 'The Innovation Zone' section please contact **victoria.brown@warnersgroup.co.uk**

Heat Pumps on the move

Lite Work Designs Ltd is launching its new Heat Pump Mover at the Birmingham NEC Installer Show, 25-27 June with a special launch price of £195.00, free delivery and no VAT.

The Heat Pump Mover is designed to help installers maneuver pumps around building or customer sites.

Is it SAFER?
The Mover was tested to ensure compliance to Health and Safety at Work Regulations and HSE Manual Handling Process. The majority of the weight is now on the Mover, leaving the installer to easily maneuver the pump with significantly less chance of personal injury or damage to the pump.

Is it EASIER?
The pump slots in and is secured to the Mover Baseboard making the Mover an extension of the pump to enhance maneuverability.

Is it MORE EFFECTIVE?
Working with 2-3-4 people or a forklift takes time to arrange; time better spent installing. The Mover is designed for a lone worker to unpack, mount and position the pump.

Is it MORE PROFESSIONAL?
Installers say "great investment, makes moving the pump a breeze" another saying "I saw the Mover on YouTube and didn't believe it could be that simple... but it is"

www.heatpumpmover.co.uk

Thunder: Clivet presents the full inverter reversible heat pump from 40 to 85 kw with natural refrigerant r-290

Thunder is an innovative solution since it is designed with full-inverter technology on latest-generation scroll compressors and axial fans.

It offers maximum energy efficiency and thanks to the use of R-290, a natural and ecological refrigerant (GWP = 3) that can be used in the long term as it is fully compliant with the European regulation on fluorinated F-Gas (517/2014), it contributes to the reduction of the direct and indirect greenhouse effect.

Thunder is available in the 40 to 85 kW capacity range and is characterised by high performances, application versatility and extended operating limits.

www.clivetgroup.co.uk

Aira launches state-of-the-art heat pump with smart home energy solution

Swedish clean energy-tech champion, Aira is today launching the Aira Heat Pump, complete with the latest smart technology to take Europe off gas and accelerate the electrification of home heating.

The Aira Heat Pump and complete service offering is set to disrupt the industry, with an affordable monthly payment plan, zero upfront costs and a 15-year 'Comfort Guarantee', which is inclusive of performance, product and installation warranty.

With this approach, Aira is making the next generation of clean energy-tech accessible to millions, saving customers up to 25% on their heating costs from day one, whilst reducing household CO_2 emissions by at least 75% - with emission savings rising to 100% if the heat pump is powered by green energy electricity.

The Aira Heat Pump takes a digital first approach, removing displays and putting customers in control of all settings via a thermostat and smart app that they can control anytime, anywhere. The system is always improving thanks to 'Aira Intelligence', a set of smart, connected features that continuously learn the customer's routine and household habits to precision plan heating and hot water.

While new to market, Aira has a strong foundation of heat pump knowledge due to its Scandi heritage and roots in Sweden, where heat pump penetration is at 60% and only 1% of the country's total CO2 emissions come from residential heating.

The product and engineering team have been working on heat pumps for over 20+ years and have used their expertise and deep understanding of the technology to create the new Aira Heat Pump.

Aira is backed by leading climate tech investors across Europe, the US and Asia, helping to accelerate Aira's strategy to drive the much-needed decarbonisation and electrification of residential heating across Europe. The funding has helped to fast-track the development of Aira's clean energy-tech portfolio, an ecosystem of products to complement the Aira Heat Pump.

www.airahome.com

Copeland, has recently launched a new R-290 variable-speed scroll compressor for commercial heating applications

The Copeland YHV119 variable-speed scroll compressor. This launch expands Copeland's R-290-compatible product portfolio of compressors for heat pumps and reversible chillers.

The new Copeland YHV119 variable-speed scroll compressor has a heating capacity up to 42kW at maximal speed. Its design is not only compact with a reduced footprint and weight easing system's design, installation, and maintenance but it is R-290 optimized enabling a low superheat capability of <5K. With its unique scroll axial and radial compliance for increased reliability and efficiency, this compressor perfectly fits commercial heat pumps and is particularly advantageous in transient conditions with reversible systems. The YHV119 variable-speed scroll compressor is the first model in a future series that will be expanded to a larger capacity to serve the various application requirements of the commercial heating sector.

The shift to low GWP refrigerants, combined with the need to maximize energy efficiency, is driving the HVACR market towards more sustainable choices. This trend is further reinforced by the demand from end users to reduce energy consumption and operating costs.

Higher efficiency

Copeland's YHV119 variable-speed scroll compressor is closely coupled with the new ED4 drive family: this package is fully certified in accordance with the EN 60335-2-34. This facilitates system design, higher efficiency and reduces development time and costs on the OEM side. Copeland's controls and electronics complete an R-290 application-ready solution, further ensuring faster time to market and increased performance through Copeland's cross-functional expertise.

These compressors offer a heating capacity of 22 to 37 kW, and can be used in single, tandem or trio configurations. These Copeland-qualified tandem and trio solutions provide OEMs with greater flexibility in system design. A trio configuration enables a system capacity of up to 111kW. The R-290 fully hermetic design comes with an IP65 or IP54 terminal box ensuring compliance with all required regulations. The reliability of Copeland R-290 YH-K1G fixed speed scroll compressors is optimized by its unique scroll double compliance and the low superheat capability of <5K.

This new compressor lineup is manufactured in Europe for European customers to help meet the growing regional demand for R-290 heating and reversible chiller solutions.

www.copeland.com.

Fernox expands its renewables range with new TF1 Antifreeze Valves

Fernox, who were established in 1964 and now celebrating 60 years, has introduced new TF1 Antifreeze Valves to its extensive portfolio of renewable products. Available in two sizes suitable for both compression and BSP fittings, the high-performance valves have been specifically engineered for heat pump applications, to prevent ice forming in heating and cooling systems and damaging the heat pump itself.

When temperatures drop, systems that are not treated with a glycol-based fluid can freeze within the heat pump circuit, which can result in harmful and costly damage to vulnerable components and pipework. The Fernox TF1 Antifreeze Valve reduces this risk thanks to its internal sensor, which detects when the fluid in the system is close to freezing to initiate protective action.

Specifically, when the circuit temperature drops to 3°C, typically in the event of the heat pump ceasing to circulate fluid due to a power outage or other external factor, the valve opens to discharge a small amount of fluid, allowing the circuit to drain until it returns to a temperature above 3°C, at which point the valve closes. Critically, this action prevents potential damage to the heat pump and pipework caused by the formation of ice in the system.

Manufactured from brass for a robust, durable and long-term operation, the valve is available in two sizes to suit the application – either 28mm Compression or 1 1/4" BSP. In addition, the 1 1/4" BSP TF1 Antifreeze Valve is also manufactured with a 1" BSP female connection for ease of installation on the flow and return pipes. The TF1 Antifreeze Valve features a new technology dual sensor thermostatic module for fast and accurate water temperature monitoring, so that the TF1 Antifreeze Valve responds to actual water temperature, not the effects of wind chill.

The new TF1 Antifreeze Valves join an expanding line up of water treatment products for renewable systems from Fernox, which includes the recently launched, award-winning heat pump filter – the TF1 Sigma HP, and a range of transfer fluids and cleaners.

www.fernox.com

New modular Water to Water Heat Pump launched by Daikin Applied UK

Available from April 2024, the new EW*T-Q-X-A1 features a new modular approach to system design, which introduces additional flexibility in configuration. Breaking away from the more traditional 'package' solution, the modular approach allows the required capacity to be reached by combining smaller units piped together and controlled as a single one. Modular construction offers significant benefits in siting and installation, making units easier to transport, handle and position up to a fully plug & play solution by including the Daikin Manifold Kit and Pump module.

Extensive application flexibility

The new water sourced EW*T-Q-X-A1 heat pumps can ensure heating or cooling operation under many different conditions. Hot water can be produced up to +60°C; whilst chilled water is supplied in the range from -15°C (water-glycol mixture) to +30 °C evaporator leaving water temperature.

Hence, the range of applications that can be covered is wide and including comfort heating, space and process cooling, heat recovery.

Composed of three base modules offering 100, 125 and 160kW capacities, the range features scroll compressors and is available in two sound versions including a reduced sound variant which is suitable for outdoor installation and noise sensitive applications as condominiums, hotels and hospitals.

THE BENEFITS OF MODULARITY

Scalability

Thanks to its modularity, the new EW*T-Q-X-A1 offers the potential for scalability, reducing initial investment costs while opening up the possibility for future expansion with additional modules installed as building occupancy increases. The introduction of a common scroll layout ensures greater compatibility, helping to promote system longevity and making future system upgrades effortless. The modules can be combined as a side-by-side array or stacked to minimise space requirements, especially useful for retrofit applications.

Compactness

Each of the different module is very compact and can be easily transported and positioned on to the installation space. Being the single module 120 centimetres wide, 130 cm depth and 100 cm height, it can be easily handled with a forklift, without the need of a crane to move an entire package chiller.

Plug & play installation

Installation can be further simplified by employing the Daikin Manifold Kit, designed to connect modules on water side, as it includes the piping between the units. As well, each manifold is equipped as standard with manual isolation valves for all connections. This allows to exclude each single module from the circuit in case of maintenance without the need to stop the entire system.

Moreover, a dedicated Pump Module can be easily added to the array of modules. It is equipped with inverter pumps for full flexibility, and includes an expansion tank of 18 litres volume.

Lower operating costs

Thanks to its modular design, the new EW*T-Q-X-A1 can closely follow the cooling and heating load profile of the building. This is particularly relevant, as it ensures low operating costs of the HVAC plant at part load conditions, which represent most of the working time. The same is not true for traditional package chillers, as in part load conditions the package chiller cannot deliver the required load according to EN14825. This means that chiller would have to perform a series of on-off cycles introducing inefficiency in the operation.

www.daikinapplied.uk

Hydratech

Unrivalled Heat Transfer Fluids & Expert Engineering Services

A key objective since Hydratech's formation in 1998, has been the establishment of technical partnerships with industry leading renewable energy consultants, contractors, and installers. Working with those responsible for heat recovery system design, installation and operation, Hydratech's engineers, chemists and analysts implement a fully integrated approach to thermal fluid selection and management - which in turn, maximises performance, reduces operational costs and delivers significant return on investment.

Hydratech Products

Specified by industry experts, Hydratech's innovative non-toxic heat transfer fluids and water treatment products are at the heart of the UK's leading housing, manufacturing, and agricultural renewable energy projects.
Hydratech's antifreeze solutions have been formulated to optimise thermal efficiency, reduce pumping energy, extend operational life, and provide effective frost protection - for all industrial, commercial and domestic projects.

Hydratech Services

The Hydratech Services division provides specialist engineering and maintenance services to customers installing, commissioning, operating or optimising heat pump systems.
By combining expertise in water treatment chemistry, fluid thermodynamics and mechanical engineering, Hydratech Services delivers a fully integrated fluid selection - fluid monitoring - fluid management approach to process and hydronic system optimisation. This in-turn helps to ensure long-term system efficiency and deliver significant energy savings.

Thermox DTX

A non-toxic fully inhibited heat transfer fluid, with antifreeze function. DTX represents a major step forward in heat transfer and pumping efficiency, providing >10% reduction in operating costs when compared with propylene glycol based fluids.

Contact us today

find out how Hydratech can help your business improve system efficiency and save energy.

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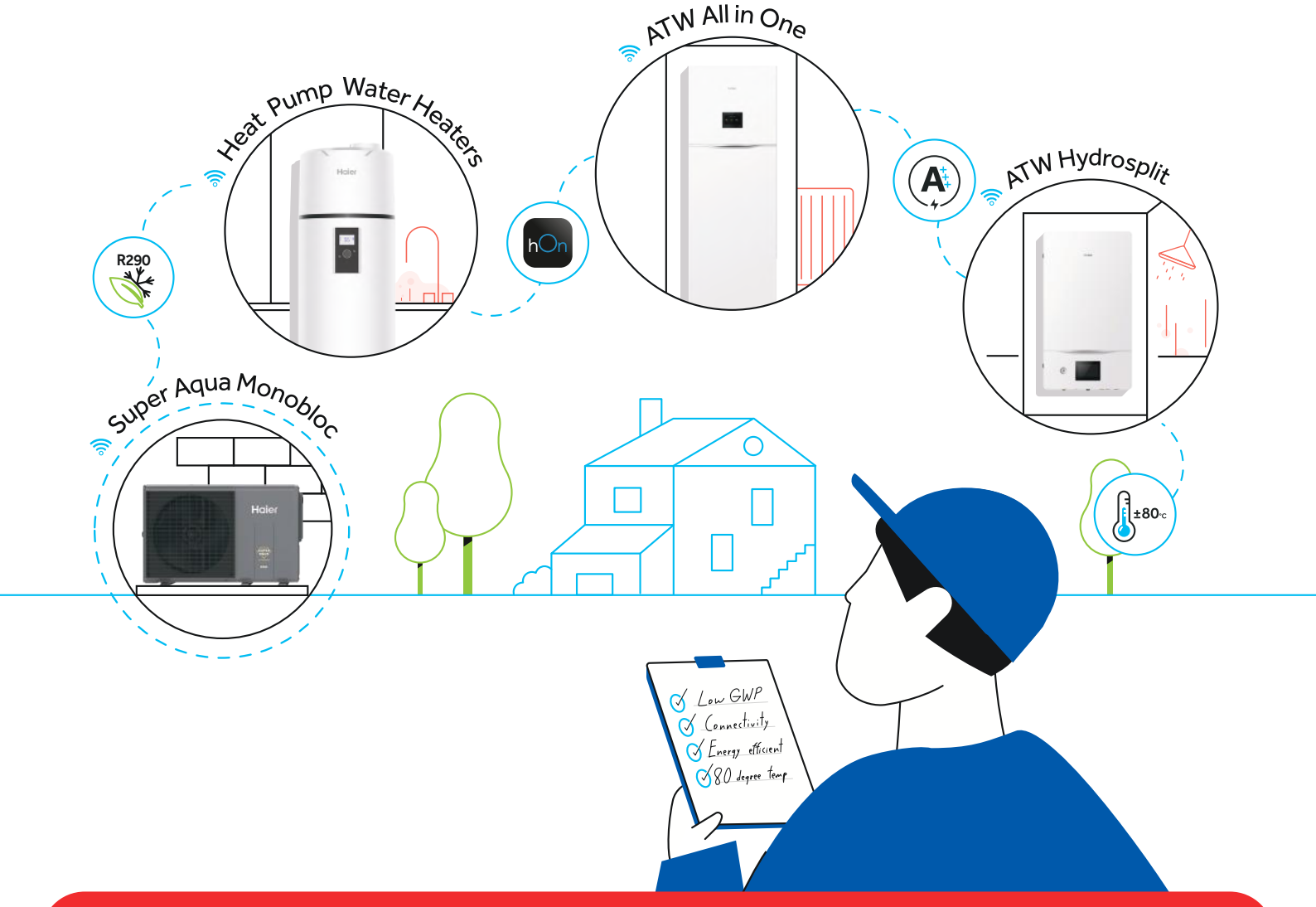

Introducing the **NEW R290 Heating Range from Haier**. A full portfolio of solutions for space heating & domestic hot water. The range includes the new R290 A2W Monobloc, Hydro Split and All in One solutions to suit wide applications. Joining this range is the new R290 M7 Floor Standing and M8 Wall Mounted Heat Pump Water Heaters ranging from **80L - 250L.**

This new heating range from Haier delivers **A+++** market leading energy efficiencies as well as **80°C** high leaving water temperatures. Encompassed by an environmentally friendly refrigerant and full connectivity via the **hOn** application. A range that dedicates itself to providing the right solution for a variety of needs – setting the standard for **the future of sustainable heating.**

R290 hOn A+++ ±80°C

For more information and where to buy, scan here
haierhvac.eu