

Tackling Heat Decarbonisation Challenges Head-On

Decarbonising heat continues to pose a significant hurdle for many organisations. Five energy management professionals explore these challenges through the lens of individuals involved in organisations' heat decarbonisation efforts.



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What are the barriers to heat decarbonisation in your organisation?

Andrew Creamer

One of our biggest barriers is decarbonisation of heat for cooking. We use quite a lot of steam and finding a suitable solution to provide steam, even though there are some good heat pumps which can do that, is still a challenge. One of the solutions we are exploring is importing tankered hydrogen as a liquid from an ammonia production plant.

Brian Troddyn

There's a number of barriers that we are facing at the moment. A big barrier is the Spark Gap. The gap in cost between gas and electricity in the UK is quite wide, so trying to get electric based heating system to match up the running costs of a gas one can be quite tricky. It is doable, but it's challenging, and I think that needs to change.

Another barrier is the variety and size of our buildings' portfolio. We operate about 3,000 buildings across the UK that range from the 1860s to right up to modern times. They all have their own individual challenges in terms of us trying to retrofit in existing buildings, which is a big challenge. Part of the problem is *(continues on next page)*

Lowell Lewis

Public sector organisations generally have a wide ranging portfolios of buildings, which can include everything from listed buildings to brand new modern office blocks and school infrastructure. The biggest barriers for public sector organisations, has been the capital cost of decarbonising buildings. The public funding that has come through various schemes has alleviated this barrier to some extent. However, there's still the cost impact, which means that even when organisations are given a free heat pump, they have to find the budget to pay for the electricity to go into it. Generally, combining with other measures, like solar and LED lighting, *(continues on next page)*

Richard Capper

Technology and alternative fuels are the biggest barriers for us. Our kilns and dryers use a large amount of energy with around 86% of our consumption being on natural gas, which we use for the firing of our bricks. We are looking at alternative fuels and there are some trials taking place at the moment with Glass Futures trialling a hydrogen kiln. However, in terms of grid connectivity, we would be probably looking at another ten years, at least, before we can get hydrogen into our sites. We are exploring the potential of off-grid solutions and other fuels, but these come at a large cost and a long timeframe as well. Finding funding options for any of these *(continues on next page)*

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also the lack of understanding of the challenges of decarbonising buildings amongst non-energy management personnel. Organisations with big estates especially do not realise the challenges and size of the associated investment needed to achieve already set targets.

As a final point, I would mention the shortage of the skills' base, which is slowly getting better, but it still has some way to go to get bigger and improve the market needs. Especially around commercial heating installations around low carbon for buildings.

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can help to alleviate those budget pressures, but it makes a business case just that much more difficult.

Another barrier that I've seen is linked to behaviour change. People are used to seeing, touching and feeling something, so one of the things I have noticed is that people think their heating isn't performing because the radiator is not as hot as it used to be. So, it's about informing and educating stakeholders about the changes to the buildings, their room and its temperature, which is still the same even though the radiator is not hot.

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solutions is also a barrier, which plays a crucial part in our heat decarbonisation plans.

Another barrier is that certain alternative fuels are not recognised under certain schemes. For example, we could consider a biogas solution; however, we fall within UKETS, which considers biogas as a fossil gas, so to get that reduction in carbon from that point of view becomes even more difficult.

What pitfalls have you encountered in heat decarbonisation in your organisation?

Richard Capper

The lack of available solutions at the moment. We have a 2030 carbon reduction target to achieve 40% carbon reduction and our net zero target by 2040, which means that we need to move quicker than the grid is moving. We are focusing on energy efficiency of the way we run our kilns and dryers; however, that will get us only so far, and it certainly won't get us to our targets that we've committed to.

Other pitfalls are around the organisation's cultural change, changing how the business operated historically and associated expectations from people who have been with the business for a long time, and are used to operating in a certain manner. We need to inform, re-educate and convince our stakeholders about certain changes. For example, that our top temperatures don't need to be as high, that we don't need to have gas leak surveys on an annual basis because we do so much servicing

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of our burning burnes within the kilns that gas leaks become apparent and more frequent, or that we also need to do thermographic surveys of our kilns and dryers to be able to reduce heat losses through the insulation.

Brian Troddyn

The one I would mention from my own experience is: "don't over-engineer solutions". I inherited a plant room in a previous role that had three different heating systems running. It was not a very big site, so it seemed like the design engineer had a great time designing it, but didn't think about the maintenance or issues that would come down the road.

Lowell Lewis

One that comes to mind is that the equipment might be there, but it doesn't come with the information that the distribution network operators want to allow you to connect it quickly.

Another pitfall, from a public sector point of view, is linked to the impact of cold weather on some of the decarbonised systems. When there is a cold snap or a power outage, local authorities are expected to support the wider society with a warm space to go. However, if the decarbonised heating system is also struggling in -10°C weather, it doesn't enable the councils to continue in the same way it used to with a gas boiler system in place.

What solutions are you considering for heat decarbonisation in your organisation?

Lowell Lewis

I have been trying a whole range of products across various projects to try and see what works, and what works best. I suppose the majority forms air source heat pumps, but also infrared heating, electric boilers and smart electric panels. However, the main one is district heating. There is quite a range of heat technologies out there and each of them have their own challenge.

Andrew Creamer

We're looking at combined heat pumps with our engines to generate electricity. Our solar capacity is only about 35% of our consumption on sites, so whilst solar is a good solution, solar and battery combination is a better one, and solar and some form of generative engine, whether it be CHP or ORC, would be that much more use.

Brian Troddyn

Each building is different and comes with its own challenges, so it is important to take a whole system approach. It is crucial to have a good control strategy.

We are looking at how we are controlling the heat, delivering the heat and the efficiency of the system throughout, not just the actual heat plant, but the actual heat delivery system across the building.

We also consider the building's fabric, so it is really looking at the whole building, its levels of performance, age and how it operates. That's what we're trying to do with our programmes and we're starting to come up with a package of measures that will really allow us to get away from gas in the most efficient way, lowest carbon way and cost effective way. It means doing more than just changing out the heat. It's a whole package of measures.

Jeremy Gould

For us, it's mainly innovation on smaller buildings with solar thermal for heat, which does not do a whole building, but it's part of a solution. Especially leisure centres with large swimming pools, where there's a big heat sink, need to be looked at with a whole systems approach of how we can implement a heat pump with some other backup, without overcomplicating the system with too many heat sources. So, we have looked at preheating using the solar thermal and then the heat pump sort of takes up.

The other solutions we're exploring is waste heat recovery from data centres and small scale data centres, which need their computing power to go somewhere and at the same time need a lot of cooling. A swimming pool can provide a good baseload, we can take the heat and help them with their cooling.

How are policy measures overcoming barriers to heat decarbonisation?

Jeremy Gould

The Public Sector Decarbonisation Scheme (PSDS) has helped to alleviate the cost barrier of decarbonising the public buildings we operate. As a large leisure operator we work with local authorities and other partners. We're a social enterprise rather than a public sector body, so we are not eligible ourselves, but we work with partners to draw down funding from the scheme.

One policy that would be helpful is a clearer policy on hydrogen. I don't think there's enough certainty around the future of hydrogen, which complicates short and long-term strategies. Whilst it might never be the only solution, it might help to have some direction of travel on it.

Richard Capper

I am not aware of any policy measures that would be helpful to us in overcoming the key barriers for heat decarbonisation at the moment.

As I mentioned, funding is a big barrier for us and getting the funding isn't as easy as many people would say. For example, the Industrial Energy Transformation Fund (IETF) funding we applied for last year to help fund some alternative fuels had over 130,000 applicants, so trying to get hold of some funding to do these projects isn't easy.

Brian Troddyn

We have a domestic estate and a housing association subsidiary, which I am not involved in directly, but I am aware that they are accessing the latest wave of the social housing funding for their Energy Performance Certificate (EPC) works.

We are looking to do some EPC works on our domestic estate. I know there's the ban coming in 2025 for new fossil fuels and new builds, and then for existing builds in 2035. A ban can sometimes be a bad word, but if it's going to help the market start increasing the installations of low carbon heating systems, then it's a good thing because we need the market to really push ahead. If you look at the number of installations across Europe, we're behind in the UK.

In terms of EPCs, there are changes coming down the line regarding the Minimum Energy Efficiency Standards (MEES) regulations, so from our buildings' point of view as assets owner, we are going to start looking at our EPC levels and try to improve them. The EPCs will also be undergoing some changes with the introduction of the Home Energy Model (HEM), which will favour more environmental impacts and the ratings, so we will take a strategic view when we look at EPCs and get them ready for low carbon down the road.

Lowell Lewis

There is a great need for consistent policies, which will give people the confidence that they can work towards a certain date, which is not going to suddenly change two years later or when you're halfway towards a programme of works. Other than a national policy, there's also the internal policy that is key. It's about having your own policy measures, processes and strategy in place.

For me, the biggest part has been bringing on a whole life span assessment process and policy. It is not about just making the decisions that are going to give us the best capital decisions today in terms of minimal spend right now, but these buildings will be around for the next 25+ years, so why not consider the 25 years, and all of a sudden that starts to unlock some alternative discussions around heat.

The same is with policy, I prefer to take the whole building approach, which is not just looking at heat. The heat might be the primary driver, but what else can be done, what else can be done around service delivery, can other pots of money be used to support the heat decarbonisation? It could be a deployment of renewable technology or changing how to use service. For example, many organisations are now using more remote working, so can the office space be compressed to use less heat? The shifts and patterns of work can be changed to make sure that when the building is kept warm there are people using it. It's going to be those internal policy decisions, which are in our control, that will help us weather the variance that comes from national policies.

What are the plans for this year?

Jeremy Gould

For us, energy efficiency as a whole is key, we are not putting in solutions for today's energy use only, and there are many considerations.

We have a number of heat pumps in place and we will continue on the decarbonisation rollout whilst looking at the efficiency of heat pumps, and where they work best. I think heat pumps get a bad name when used in old buildings without decent insulation and no other measures. Each building is different
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Brian Troddyn

We will be embarking on some fairly large programmes of works over the next few years, so this year we are looking to do some pathfinder projects.

We will run trial projects on some buildings which are typical for our portfolio to find common threads and a way to draft up standard specifications that we can roll out across whole parts of our portfolio. We will be taking into account the whole systems, which I think is
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Richard Capper

We will continue exploring our options for alternative fuels and looking at ways of funding them. We will also be having a closer look at air source heat pumps as a way of recovering some of the waste heat from our pre-burners and we will continue our drive with energy efficiencies.

There's still a lot we can do to eliminate our consumption before we look at alternative fuels.

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and may need different approaches, whether it be insulation measures, solar, triple glazing or building fabric depends on a variety of factors. It's about reducing the heat load as much as possible, so the loading on the heat pumps is reduced and it performs better.

We are also keen to explore the possibilities of heat pumps with sewage water or wastewater. It will not be easy, but sewage water has an element of heat in it, we have the same from the backwash water from our swimming pool, so trying to divert it as a preheater to reduce the overall load is something that we would like to explore.

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important from an efficiency point of view, a cost efficiency point of view and down the road a maintenance point of view as well. Maintenance also plays a key role that we need to think about. Lot of these technologies are new to the organisation and the wider property and maintenance teams, so it's important to consider not only how it will be used by the building's users but how it will be maintained as well.

Andrew Creamer

We have a looming target to reduce 46% of our consumption by 2030, so the next couple of years we will be really looking to start a variety of projects that will help us deliver on this target.

We use a lot of natural gas, electricity and diesel so will be looking at heat pumps, solar, ORC engines, AD biogas for CHP, amongst some of our considerations.

Authors' profiles:**Andrew Creamer, Group Energy Optimisation Manager, Grencore Group plc**

Andrew has worked in energy management for the past 10 years. In his current role, Andy is responsible for all facets of energy management and decarbonisation in a large food business. The portfolio consists of 16 operational production sites and 16 transport and logistics sites. Current initiatives include a wide ranging number of projects, for example heat pumps for heat and steam, solar PV, voltage optimisation and sub-metering.

Brian Troddyn, Sustainability Manager, The Salvation Army

Brian has worked in energy and sustainability roles since 2013 and currently leads on the Salvation Army's Net Zero and Environmental Sustainability Programmes. He holds an honours degree in Environmental Science and post grad in Energy Management. Throughout his career Brian has developed strategies for energy and carbon reduction for several organisations both in the public and third sector. Delivering projects covering renewable energy generation and heating, energy efficiency, sustainable transport, resource consumption and behaviour change.

Jeremy Gould, National Sustainability Manager, GLL

Jeremy has 25 years of experience in the Leisure Industry, with the last 15 years focusing on energy management and sustainability in his roles. In his current role, he is responsible for driving GLL's energy, carbon and sustainability strategies through the delivery of energy reduction and renewable energy projects. Jeremy is also leading on environmental reporting and compliance obligations, working with partners to achieve joint decarbonisation goals through PSDS funding, and analysis of real time and historical energy data.

Lowell Lewis, Member of the EMA Steering Group, offering experiences from his roles in the public sector

Lowell has worked in energy and sustainability roles since 2015, delivering improvements to the sustainability performance of a variety of public sector and private sector organisations through improved facility management. His current remit includes utility management, EV infrastructure development, renewable energy deployment, energy efficiency retrofit and energy innovation projects. He also offers support with winter affordable warmth and policy around heat networks.

Richard Capper, Group Operational Energy Manager, Ibstock

Richard joined Ibstock in March 2023 following a 25-year tenure at Marshalls, where he held various roles with energy management responsibilities. In his current role, Richard's focus is on the delivery of Ibstock's energy reduction and support of the 2030 carbon reduction target to achieve 40% carbon reduction and 2040 net zero target.