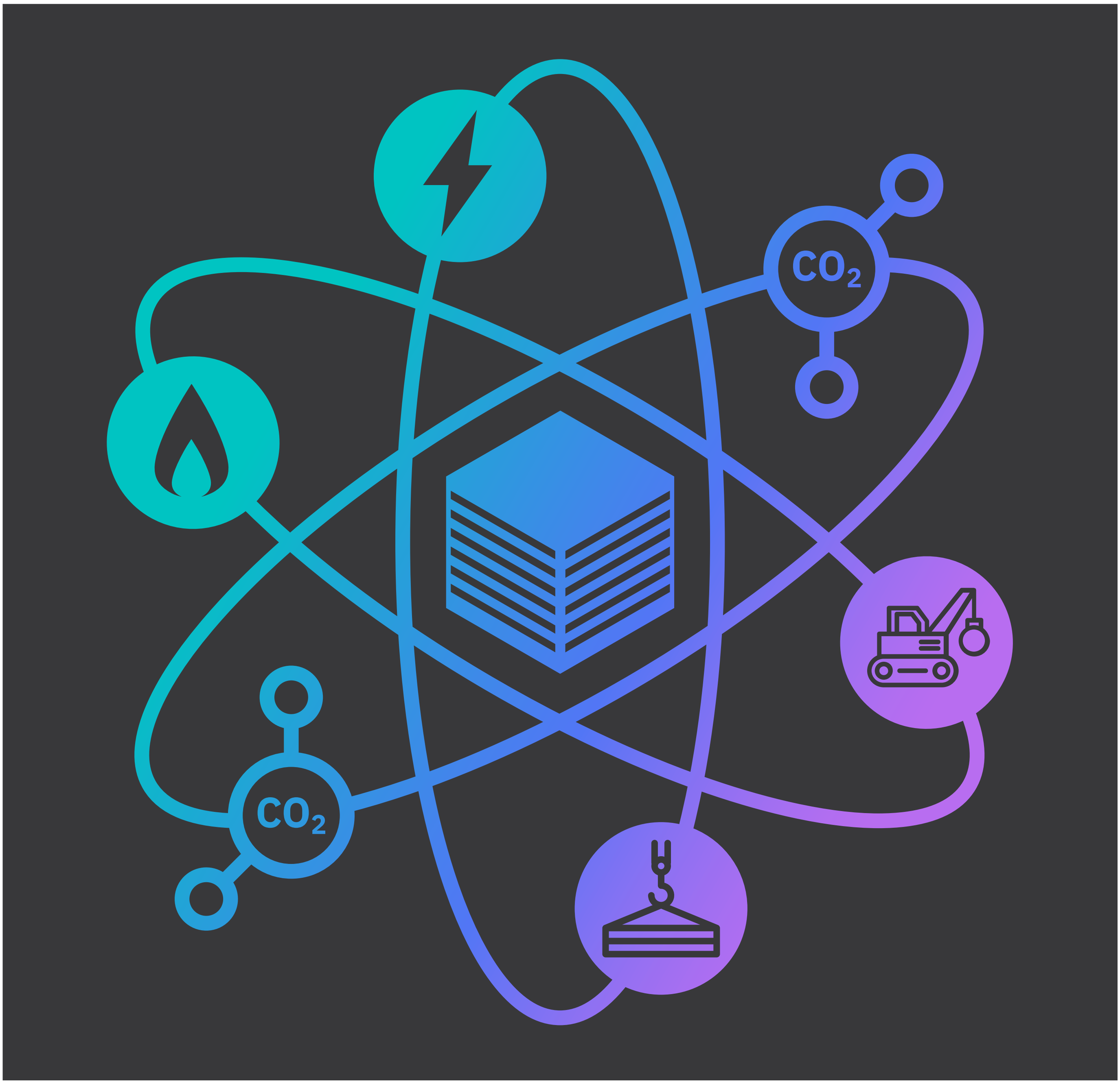
Whole Life Carbon in the Built Environment:

A White Paper from Mitsubishi Electric



Introduction and background

Why we must consider carbon in the built environment

In 2019 the UK made a legally-binding commitment to reduce its greenhouse gas (GHG) emissions to net zero (against 1990 levels) by 2050.

There are interim targets of 68% by 2030 and 78% by 2035.

1

The Climate Change Committee (an independent body established by the government in 2008) sets a five-year ‘carbon budget’. The CCC then monitors progress and reports to Parliament. In June 2023, the CCC report noted that the UK has achieved a 46% reduction in GHG emissions.

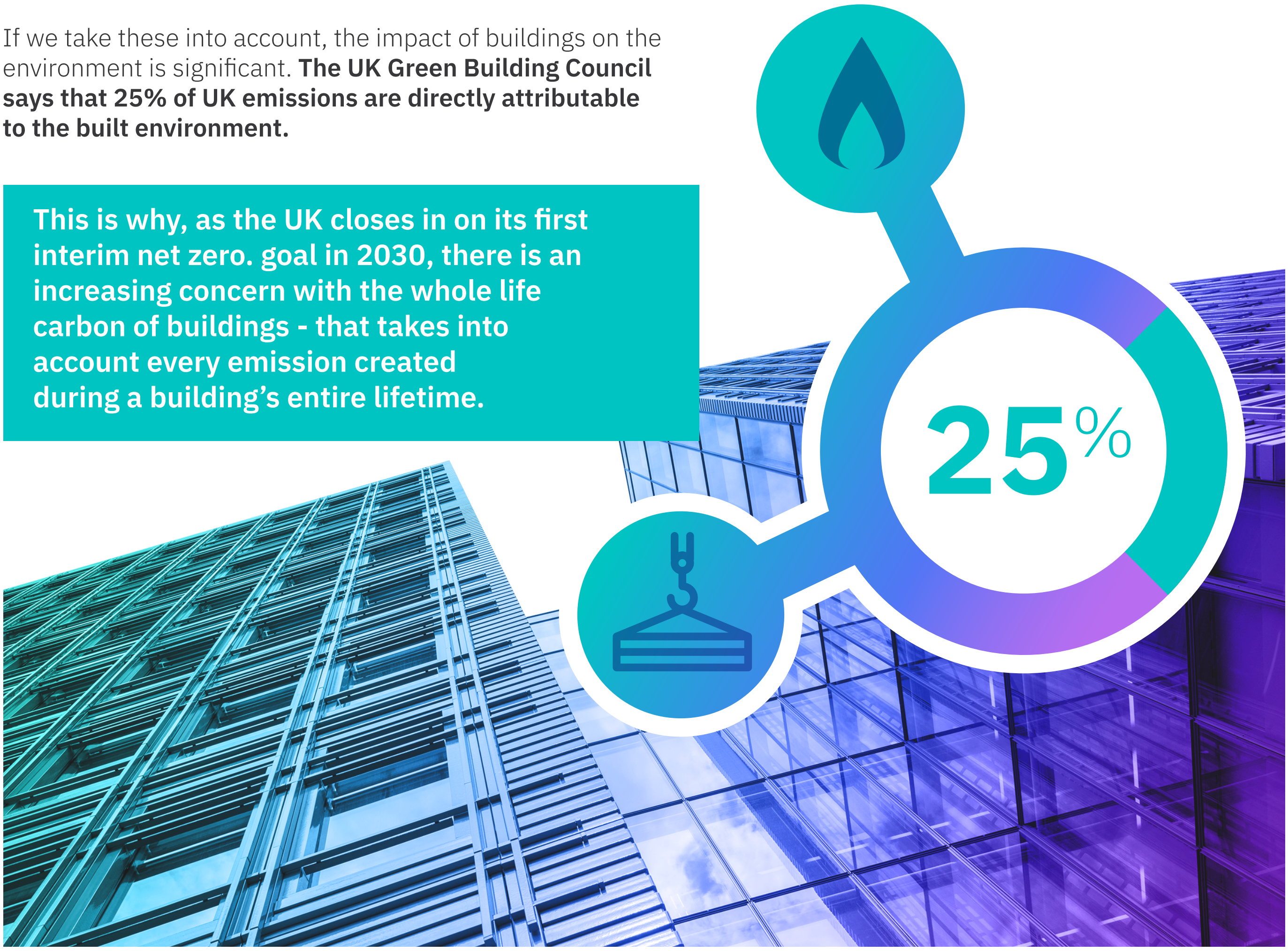
One of the big contributors to the UK’s progress to date has been the ‘greening’ of the electricity grid. Switching off most coal-fired power stations and increasing wind generation has made UK electricity a more carbon-friendly energy source. But there is a long way to go, and we cannot rely entirely on wind, solar or nuclear to get us to net zero.

The built environment has an enormous impact on the UK’s emissions. The CCC 2023 report stated that buildings account for 17% of emissions. These are mainly from burning fossil fuels (gas or oil) for heating, and from the use of electricity in buildings (since our grid still relies on gas for generation).

But buildings are not only responsible for emissions produced during their operation. Construction, maintenance and even demolition create carbon emissions too. The equipment used in buildings creates emissions during its manufacture and transport; maintenance teams travelling to site also create emissions.

If we take these into account, the impact of buildings on the environment is significant. **The UK Green Building Council says that 25% of UK emissions are directly attributable to the built environment.**

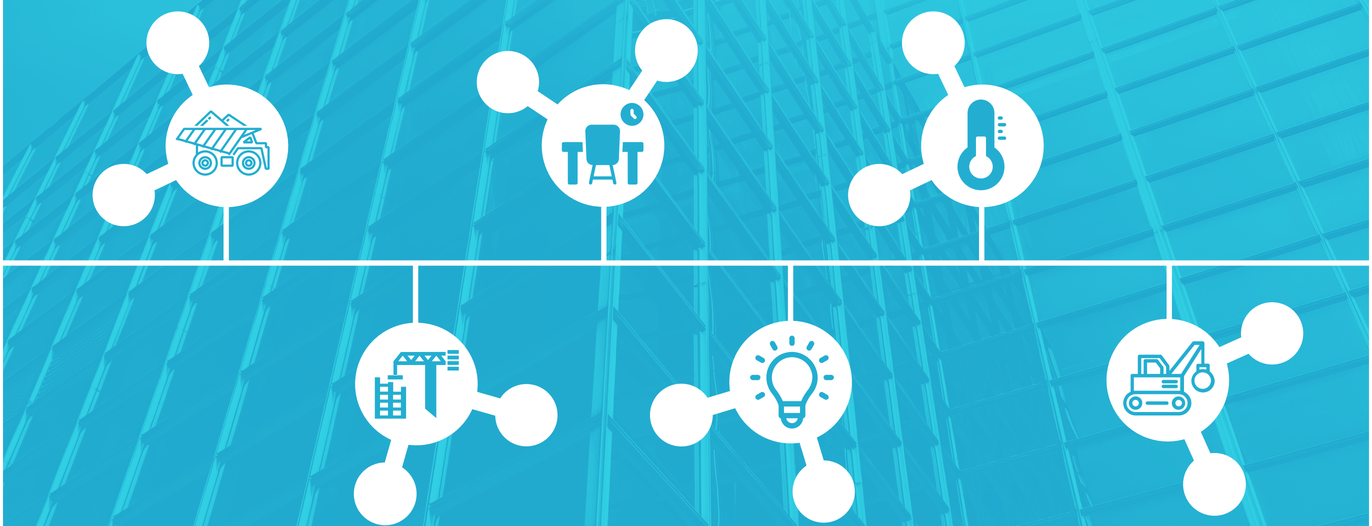
This is why, as the UK closes in on its first interim net zero. goal in 2030, there is an increasing concern with the whole life carbon of buildings - that takes into account every emission created during a building’s entire lifetime.



Whole Life Carbon
in the Built Environment

What do we mean by whole life carbon in buildings?

Whole life carbon emissions are the sum total of all asset related GHG emissions and removals, both operational and embodied, over the life cycle of an asset, including its disposal.



2

Work carried out by CIBSE and LETI (Low Energy Transformation Initiative)[1] has provided some useful definitions. For example, a net zero whole life carbon building is one where:

> **“The sum total of all asset-related greenhouse gas emissions both operational and embodied, over the asset’s lifecycle, are minimised, meet local carbon, energy and water targets and with residual ‘offsets’ equals zero.”**

We can see from this definition that WLC consists of two key elements: **embodied carbon and operational carbon**.

1. Embodied carbon

This measures the carbon emissions resulting from the manufacture, transportation and installation of materials and equipment used in a building.

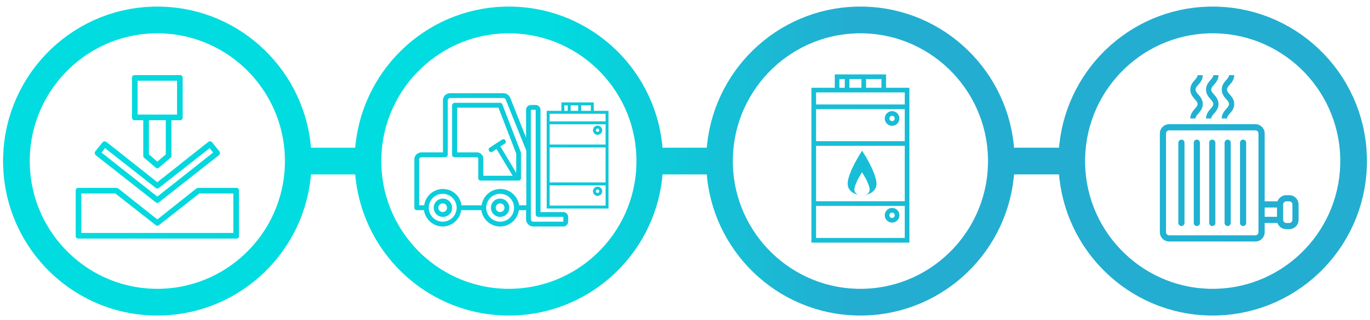
Embodied carbon also includes emissions created during maintenance, repair and replacement of any part of the building (or equipment) as well as during dismantling or demolition. The impact of product choice on whole life carbon.

2. Operational carbon

Refers to direct and indirect emissions produced when the building is in use. Direct emissions may include the use of on-site fossil fuels (e.g. gas or oil boilers).

Indirect emissions are the result of energy use in the building. This is an important measure that links WLC to the energy efficiency of a building.

In the UK, around 38% of electricity is generated using natural gas, a fossil fuel. However, the government policy is to reduce reliance on gas and increase our use of low-carbon electricity generation such as wind and nuclear. As a result, we should see a falling ‘grid factor’ - the carbon emissions linked to the use of electricity in buildings.



Whole Life Carbon
in the Built Environment

Measuring whole life carbon

In recent years, the UK construction industry has been working on definitions for embodied, operational and whole life carbon.

The focus is on devising industry-wide methods for measurement that can be used by designers and understood by clients. Organisations such as CIBSE, RICS and LETI (Low Energy Transformation Initiative) and others are collaborating on a way forward.

One of the most widely accepted approaches is the RICS Whole Life Carbon Assessment of Buildings, which has been regulated by RICS since 2018. It breaks down the life cycle of a building into modules, with information on assessing and measuring carbon emissions at each stage and in every part of the building.

The carbon footprint of HVAC

It's clear that heating, ventilation and air conditioning systems affect building energy use, and therefore operational carbon. However, HVAC systems also have an impact on embodied carbon.

Equipment from AHUs to pipework and ventilation ducts are manufactured and transported to site, creating carbon emissions before installation. Furthermore, HVAC systems are regularly maintained, repaired and replaced. These steps increase embodied carbon. Estimates are that HVAC can account for around 20% of a typical office building's embodied carbon.

The specification, design and installation of HVAC systems must therefore take whole life carbon into account, balancing embodied carbon considerations with operational emissions.

The focus on whole life carbon

Whole life carbon is an increasingly important consideration for professionals involved in the built environment.

From the design stage to construction through to operation, WLC is an issue for engineers, installers and building management teams.

The most significant driver is the UK's net zero 2050 objective. To achieve that goal, the UK must reduce emissions from the built environment. This is an urgent requirement, as the Climate Change Committee (CCC) June 2023 report on progress noted:

> **"Buildings remain the UK's second-highest emitting sector, accounting for 17% of total emissions."**

The drive to net zero carbon buildings is therefore becoming more intense, and the CCC regards the next ten years as a crucial period in which to decarbonise buildings. We should expect to see further legislation on this aspect of building design and operation.

Even though WLC measurement and targets are not currently covered by the UK Building Regulations, some local planning regulations are introducing WLC considerations. For example, the London Plan (Policy SI 2) sets out a requirement for development proposals to calculate and reduce emissions as part of a WLC assessment. Similarly, the City of London expects that all major development proposals undertake a WLC assessment and show how they: **"Maximise the reduction of carbon emissions"**.

The result of the increasing importance of embodied carbon in the built environment has resulted in the demolish-and-rebuild approach becoming less popular with planners.

Re-use and refurbishment of existing buildings is now far more common, and even larger projects in London are making use of significant portions of an existing building where possible.

In addition to national and local government, clients in the commercial building sector are also increasingly interested in issues of embodied and operational carbon in the buildings they own or occupy.

Corporate ESG (environment, social, governance) policies are partly behind this trend. Large firms are looking closely at their buildings to examine their long-term viability for a low-carbon future. Concerns are not only around building materials and energy use but also in climate change mitigation - ensuring that buildings are suitable for rising temperatures in the UK, for example.

As a result, voluntary assessment schemes such as BREEAM, WELL and NABERS are popular with clients who are aiming for targets above those currently required by building regulations. The UK Net Zero Carbon Buildings Standard is another important development by a group of industry organisations, including CIBSE, RICS, RIBA, UKGBC, BRE and LETI. Its goal is to establish definitions around the terminology of net zero while establishing the metrics used to determine net zero carbon performance for buildings. This is essential work, as it will give clients and the construction industry a ‘common language’ around net zero buildings, which is currently lacking.

The proposed Standard will also include performance targets likely to include energy use, embodied carbon and lifecycle embodied carbon. The NZCBS group also wants to develop benchmarks for operational energy use and embodied carbon in today’s buildings to set future targets for a decarbonisation strategy. Given that the government is keen to introduce legislation around the issue of embodied carbon, construction professionals must be aware of this important topic and start to consider how they will achieve the balance between operational and embodied carbon in building services.

Specifiers and installers should therefore bear these trends in mind when specifying products for new-build or refurbishment projects. Clients are more open to the option of low-carbon technologies for their projects, and it is important to be ready with suggestions that can deliver on WLC targets.

Future carbon legislation for buildings

The increasing importance of measuring and reducing whole life carbon in buildings means that its introduction into legislation is increasingly likely.

A proposed Carbon Emissions (Buildings) Bill[2] which was introduced in November 2022, reached a second reading in Parliament in December 2022.

The Bill, as introduced, will: **“Require the whole life carbon emissions of buildings to be reported; set limits on embodied carbon emissions in the construction of buildings”**. However, while the government has also acknowledged that the Bill is necessary, it has delayed introduction to bring clarity around definitions and mechanisms.

Whole life carbon and HVAC

Whole life carbon considerations add an extra dimension to the specification, design and installation of HVAC equipment and systems.

It means that it's vital to take into account the embodied and operational carbon of products early in the process.

4

Embodied carbon of HVAC products

The embodied carbon of a building remains the same over its lifetime. So it's vital to focus on minimising the impact of building services systems from the early stages of a project, both new-build or refurbishment. Focusing on embodied carbon emissions at the start makes WLC easier to achieve.

There are two main approaches to assessing the embodied carbon of building services equipment.

The first is an Environmental Product Declaration (EPD).

These are provided by manufacturers and are a standard way to express embodied carbon and other environmental impacts throughout the lifecycle of a product. However, there is currently no legal requirement to produce these declarations, so they may not always be available.

The alternative is to use TM65 Embodied carbon in building services: A calculation methodology (2021):

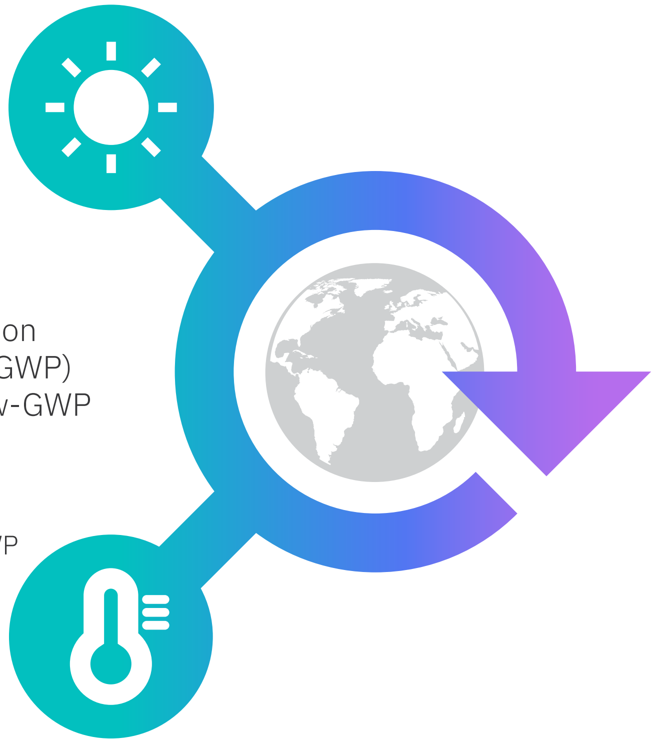
It gives engineers guidance on how to calculate the embodied carbon of MEP (mechanical, electrical, public health) products, including how to collect data for the calculations.

Mitsubishi Electric has produced TM65 data tables for a wide range of its products, which can be found in our publication:

Embodied Carbon: An Overview

Click here to download

Whole Life Carbon
in the Built Environment



Refrigerants and embodied carbon

One important factor impacting the embodied carbon of HVAC systems is the Global Warming Potential (GWP) of refrigerants. TM65 highlights the selection of low-GWP refrigerant systems as an important approach to reducing embodied carbon.

R32 (with a GWP of 675) is probably the best-known low-GWP on the market today. Mitsubishi Electric offers R32 products including VRF and heat pump systems. We have also developed chillers that make use of hydrofluoroolefins (HFOs) such as R1234ze with a GWP of 7. Our **QAHV air source heat pump** uses CO_2 as the refrigerant with a GWP of 1.

Another approach is to reduce the amount of refrigerant in the system. Mitsubishi Electric's **Hybrid VRF** does this by limiting refrigerant pipework installation to between the outdoor unit and branch box. It then uses water to transfer cooling or heating energy around a building. This means that indoor piping can be plastic, which is lightweight and does not require welding.

Different types of refrigerants impact the performance of a product, so it's vital to ensure that you are working with a manufacturer who can provide clear information on the impact of refrigerant choice on your system design. Mitsubishi Electric has extensive experience working with low GWP refrigerants and our experts can provide their insights and advice from the design stage.

Click the icons for more information

Mitsubishi Electric's Hybrid VRF System

City Multi VRF & Hybrid VRF Air Conditioning Systems Brochure

Mitsubishi Electric Hybrid VRF: An Application Animation

Operational carbon of HVAC products and systems

Operational carbon and energy efficiency in HVAC systems are closely related. Achieving an energy efficient heating and cooling system means reduced carbon emissions over the lifetime of the system.

The added benefits are lower energy costs for building operators and occupiers. In addition, a more efficient system that is well-maintained should have a longer lifetime, reducing replacement requirements. This not only reduces building operation costs, but also optimises the initial embodied carbon footprint of HVAC equipment - bearing in mind that every piece of new, replacement equipment will have its own embodied carbon.

In addition, the CIBSE-LETI definition of a Net Zero Operational Energy building includes **removing the use of on-site fossil fuels, or fossil fuel-powered district heating schemes**. The decarbonisation of heating and hot water is therefore a significant step in lowering a building's operational carbon.

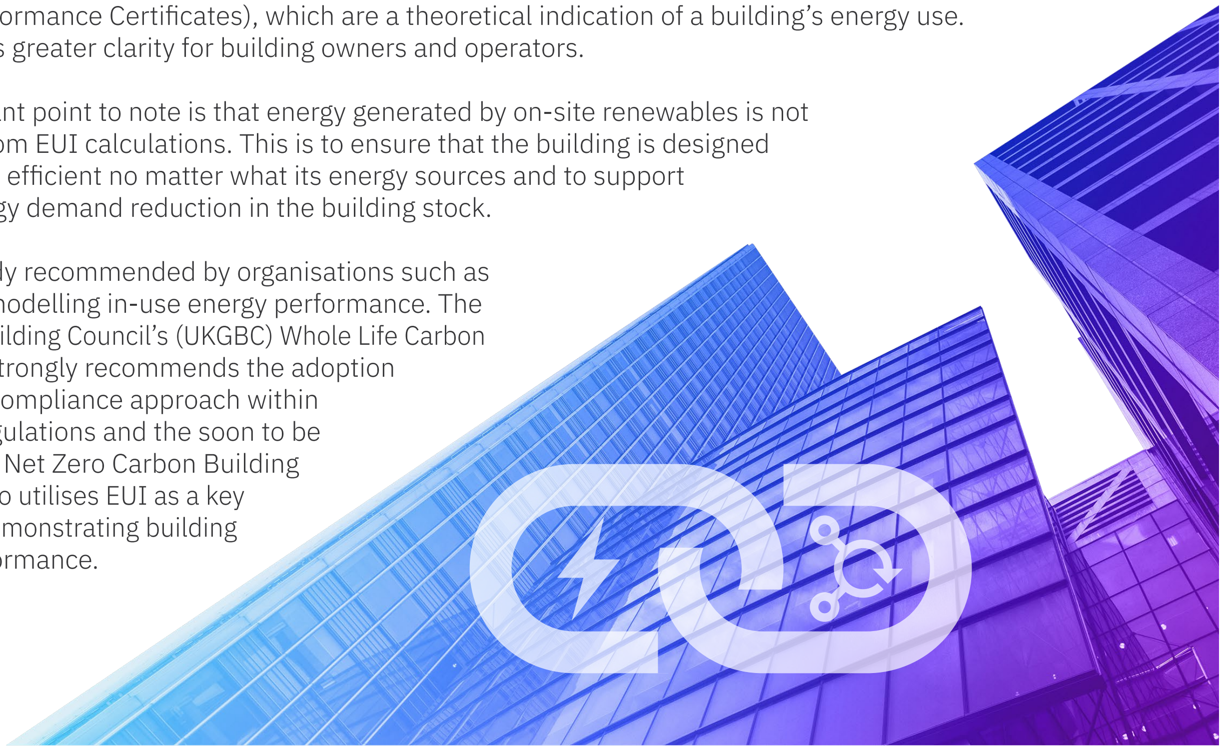
Measuring energy use for carbon calculations - EUI

The link between energy use and operational carbon means that it's vital to achieve accurate measurement. Energy use intensity (EUI) is becoming a widely-adopted measure across the property sector.

EUI is expressed as kWh/m^2/year. One of the benefits of EUI is its accuracy because it is based on metered energy use and therefore captures both regulated and unregulated energy use. This compares favourably to EPCs (Energy Performance Certificates), which are a theoretical indication of a building's energy use. EUI provides greater clarity for building owners and operators.

One important point to note is that energy generated by on-site renewables is not deducted from EUI calculations. This is to ensure that the building is designed to be energy efficient no matter what its energy sources and to support overall energy demand reduction in the building stock.

EUI is already recommended by organisations such as CIBSE[3] for modelling in-use energy performance. The UK Green Building Council's (UKGBC) Whole Life Carbon Roadmap[4] strongly recommends the adoption of EUI as a compliance approach within Building Regulations and the soon to be released UK Net Zero Carbon Building Standard also utilises EUI as a key metric for demonstrating building energy performance.



Operational carbon of HVAC products and systems

Specifying the right HVAC equipment for a project with a focus on operational carbon reduction requires careful consideration of several factors.

Important questions for specifiers include, at what point does the equipment's operational efficiency outweigh higher embodied carbon? Or how long does a high-efficiency product with high embodied carbon have to operate before its WLC balances against a lower-efficiency product with lower embodied carbon? In addition, there are grid emissions to consider as the UK increases its renewable generation over time.

Mitsubishi Electric has considered these questions in-depth in our CPD Guides to Operational, Embodied and Whole Life Carbon. These guides include worked examples that compare products to show how engineers might approach these decisions.

Click guide title to download

Embodied Carbon CPD Guide

Whole Life Carbon in the Built Environment CPD Guide

Operational Carbon CPD Guide

However, some challenges are easier to tackle.

For instance, decarbonising heating and hot water is increasingly straightforward with advances in heat pump technology.

Mitsubishi Electric's QAHV heat pump can produce hot water up to 90ºC, making it ideal to replace on-site gas boilers even in high-demand facilities such as hotels, gyms and student accommodation. The **Ecodan R290**, with its low global warming potential (GWP of just 3 - down from 675 in a previous model) refrigerant, is a major step towards more sustainable home heating. The Ecodan R290's embodied carbon calculation, using the trusted CIBSE TM65, is just 611.3 (kg CO_2e). Setting new standards for performance and sustainability, the Ecodan R290 air source heat pump uses a R290 hydrocarbon refrigerant, it has an A+++ efficiency, is zero carbon ready, and can provide residential heating and hot water systems with high water temperatures of up to 75°C.

Click the below products for more information

Ecodan R290

Ecodan QAHV

Systems thinking for whole life carbon

Achieving a net zero or low whole life carbon building requires a whole building approach, and that includes the HVAC systems.

Individual equipment such as heat pumps, VRF and chillers play a significant role in meeting targets, but thinking about how energy in the form of heat moves around the building can achieve more.

Re-using heat through energy recovery can save energy and reduce the building's operational carbon footprint - while providing an excellent indoor environment and lower energy costs. Heat recovery works particularly well for mixed use projects, or large offices, where heat profiles are diverse.

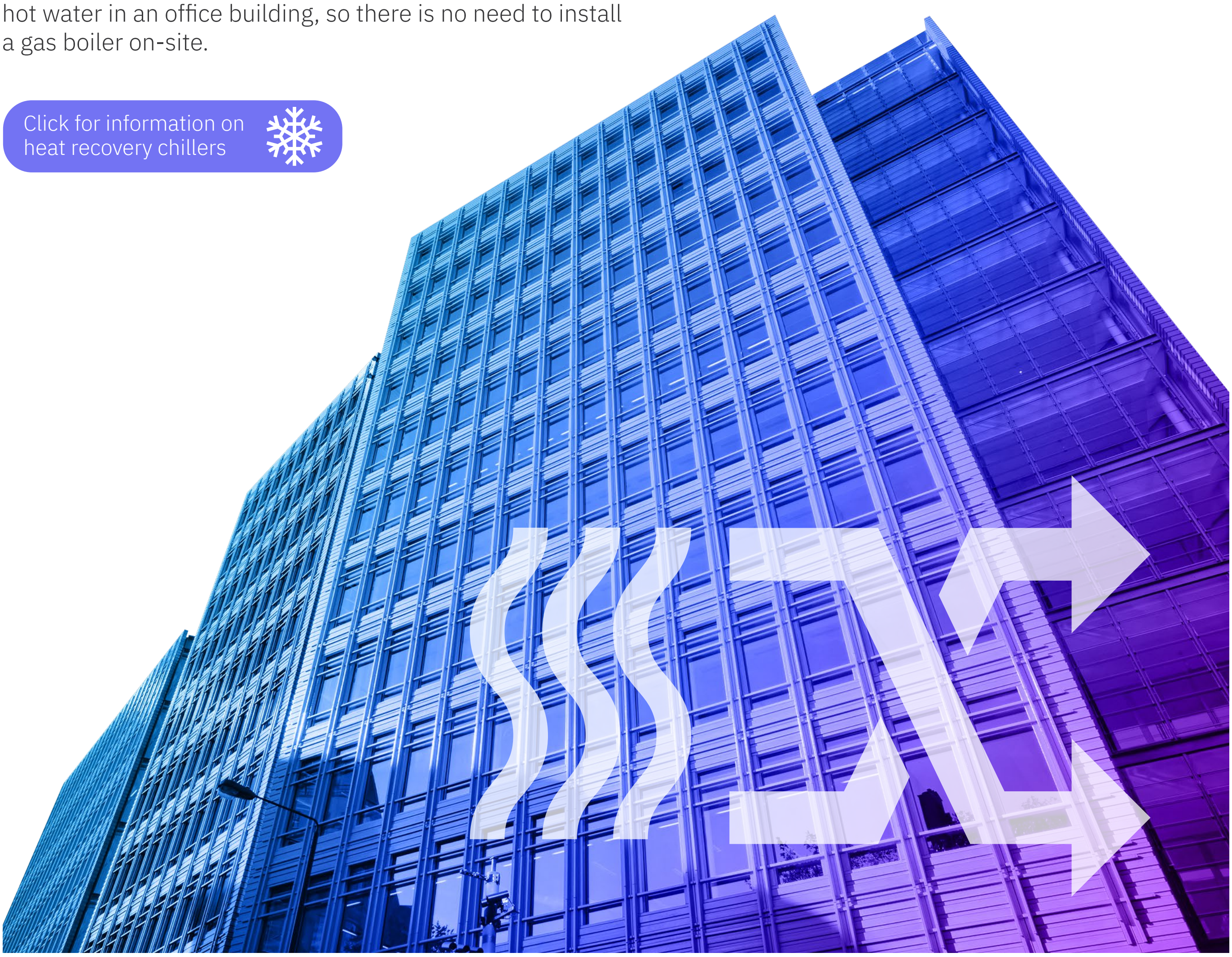
Mechanical ventilation with heat recovery (MVHR) is an excellent example. Mitsubishi Electric's Commercial **Lossnay units** can recover up to 90% of heat energy while delivering localised ventilation.

Click for information on Lossnay

Heat recovery chillers are another technology that can move 'waste' heat from one area of a building and apply it to another. Heat recovery chillers work particularly well for mixed use projects, or large offices, where heat profiles are diverse. For example, the Mitsubishi Electric Integra chillers provide simultaneous heating and cooling.

The 'waste' heat from cooling can also be used to provide domestic hot water in an office building, so there is no need to install a gas boiler on-site.

Click for information on heat recovery chillers



The guidance on low WLC carbon buildings is that decarbonisation excludes connection to heat networks that rely on fossil fuels (e.g. gas boilers) as the main heat source.

However, modern heat networks that operate at lower temperatures can utilise heat pump technology and more recently the adoption of a new type of even lower temperature networks called **“ambient loops”** are gaining ground. These are known as balanced energy networks or fifth generation heat networks and, in place of a central energy centre that pushes heat energy out into the network, there is an ambient temperature energy loop. Water is pumped around the loop and used as a heat source or a heat sink by water source heat pumps in each building or apartment on the network.

The key difference with this new approach is that network temperatures are much lower than the traditional heat network, between 10ºC and 30ºC as opposed to up to 70ºC-80ºC.

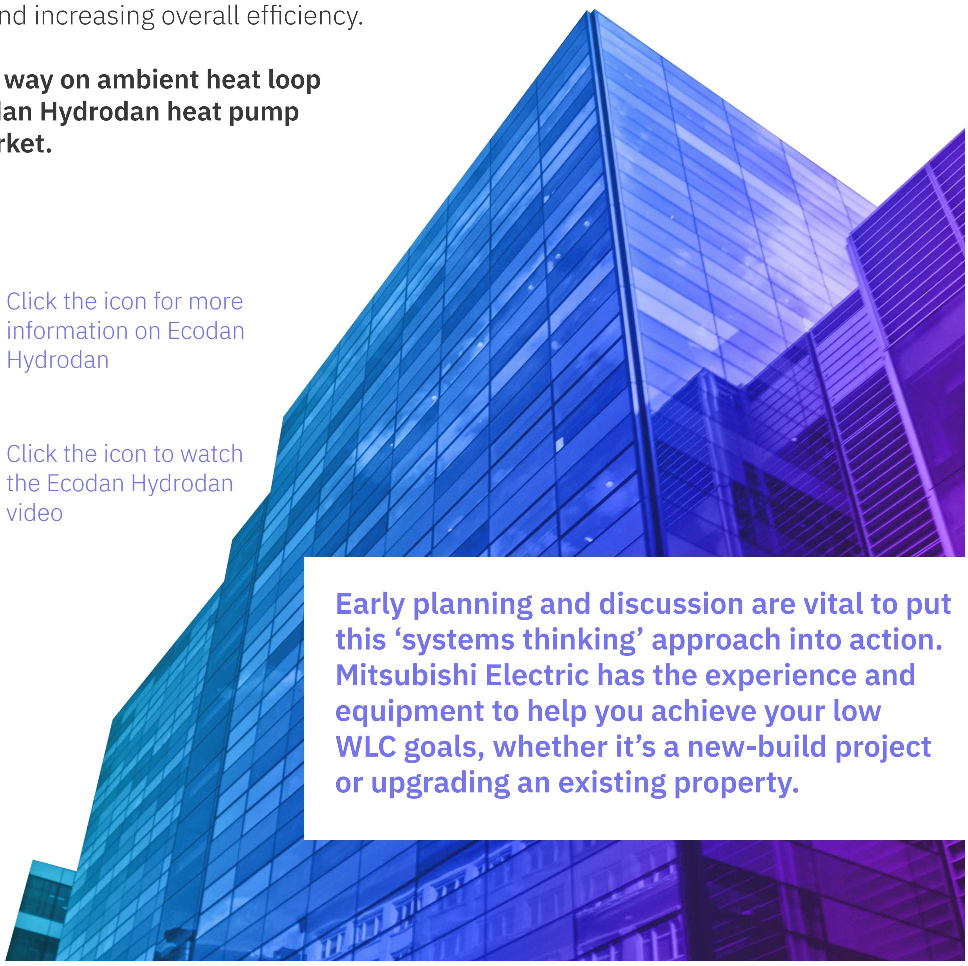
The important difference for designers is that the ambient loop approach must focus on balancing the system temperature. Where heat is taken from the loop, it must also be added somewhere else. While this creates its own design challenges, the benefit is that the loop can use heat rejected elsewhere.

For example, in a mixed-use building with apartments over some retail outlets and a gymnasium, the ambient loop runs throughout the building as a heat source or sink. Heat pumps in each apartment provide space heating and hot water. A water-source VRF uses the heat network to provide cooling in the shops and gym. Heat rejected from the VRF can be added to the loop reducing the need for heat energy to be added by another source saving energy and increasing overall efficiency.

Mitsubishi Electric is leading the way on ambient heat loop development, including our Ecodan Hydrodan heat pump designed specifically for this market.

Click the icon for more information on Ecodan Hydrodan

Click the icon to watch the Ecodan Hydrodan video



Early planning and discussion are vital to put this ‘systems thinking’ approach into action. Mitsubishi Electric has the experience and equipment to help you achieve your low WLC goals, whether it’s a new-build project or upgrading an existing property.

Whole Life Carbon
in the Built Environment

Specifying with carbon considerations: Worked examples

Specifiers face a significant challenge when specifying with embodied, operational and whole life carbon in mind.

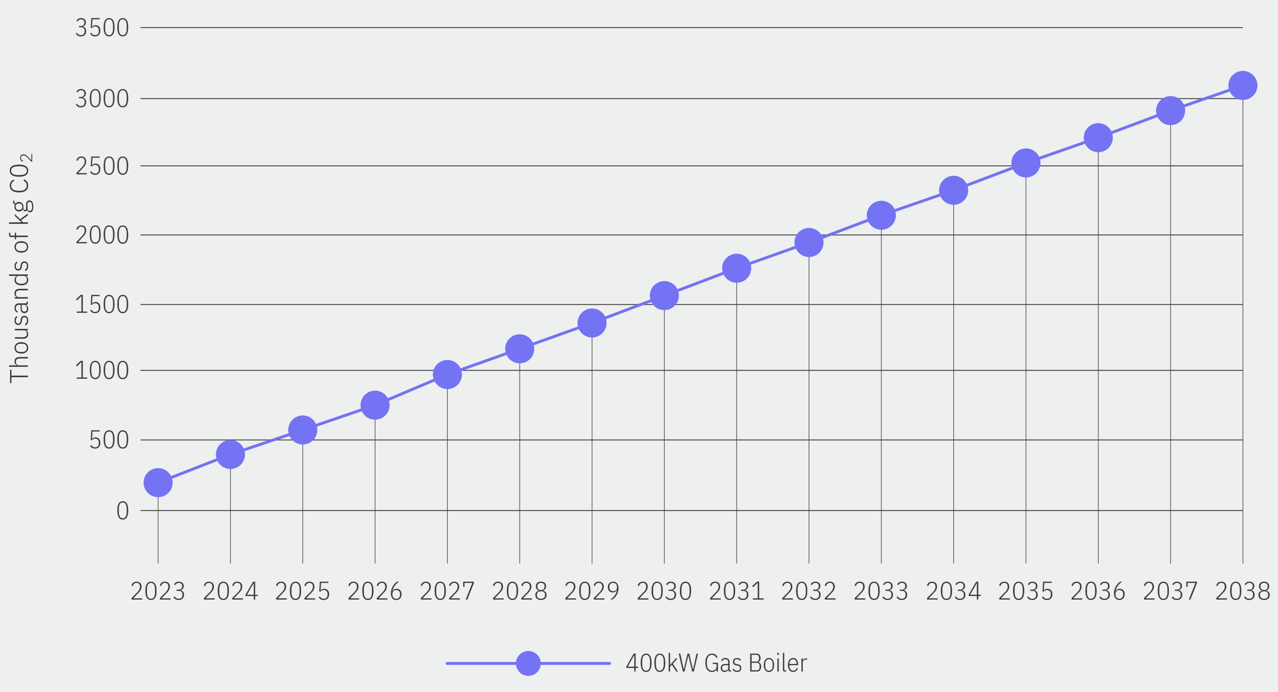
More information on product performance is required, and some long-term thinking is needed to assess what the implications are of any system choice.

The worked examples here demonstrate the different results if we consider the whole life carbon of a gas boiler compared with an air source heat pump. Figures for the ASHP are based on information on the embodied carbon and energy performance of Mitsubishi Electric products.

It is important to note some general assumptions made when considering these worked examples:

- Annual heat delivered is calculated in accordance with EN14825 at 826,400 kWh/annum (FLEQ of 2066).
- Grid emission factor for gas is assumed at 210g CO_2/kWh.
- Grid emission factor for electricity assumed in accordance with UK Greenbook, decreasing over time.

Graph 1: **400kW Gas Boiler**



Assumptions: Gas boiler embodied carbon

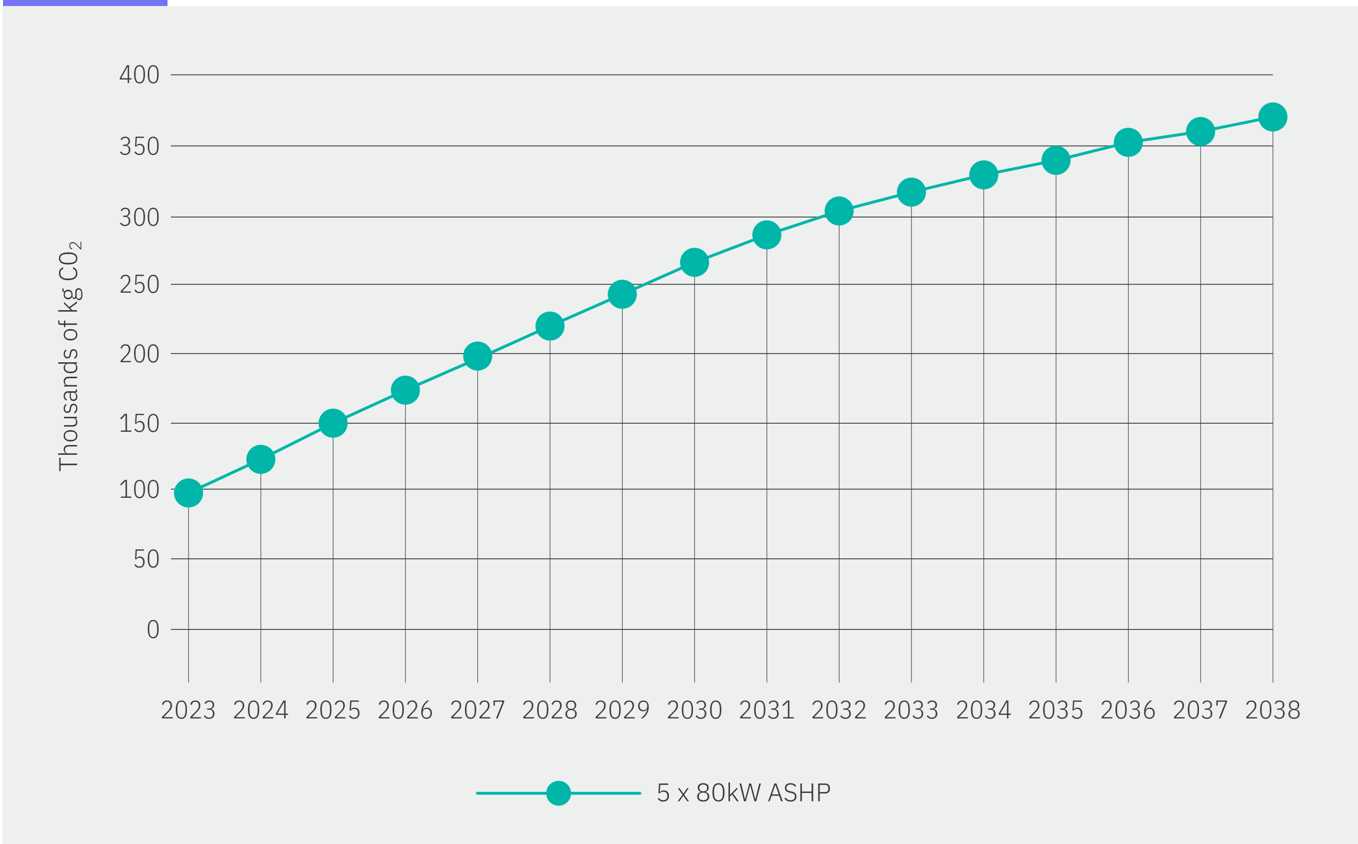
A modular gas boiler delivering 400kW of capacity with an efficiency of 90%.

Gas boiler weight is approximately 500kg.

Assumed embodied carbon taken from CIBSE TM65 average data sets as reported in CIBSE Journal, October 2021: 7kg CO_2e / kg for a gas boiler.

Amounts to: 500kg x 7 = 3,500kg CO_2e embodied carbon for the gas boiler.

Graph 2: **5 x MEHP-iS-G07 112 Air Source Heat Pumps** (with a decarbonising electricity grid)



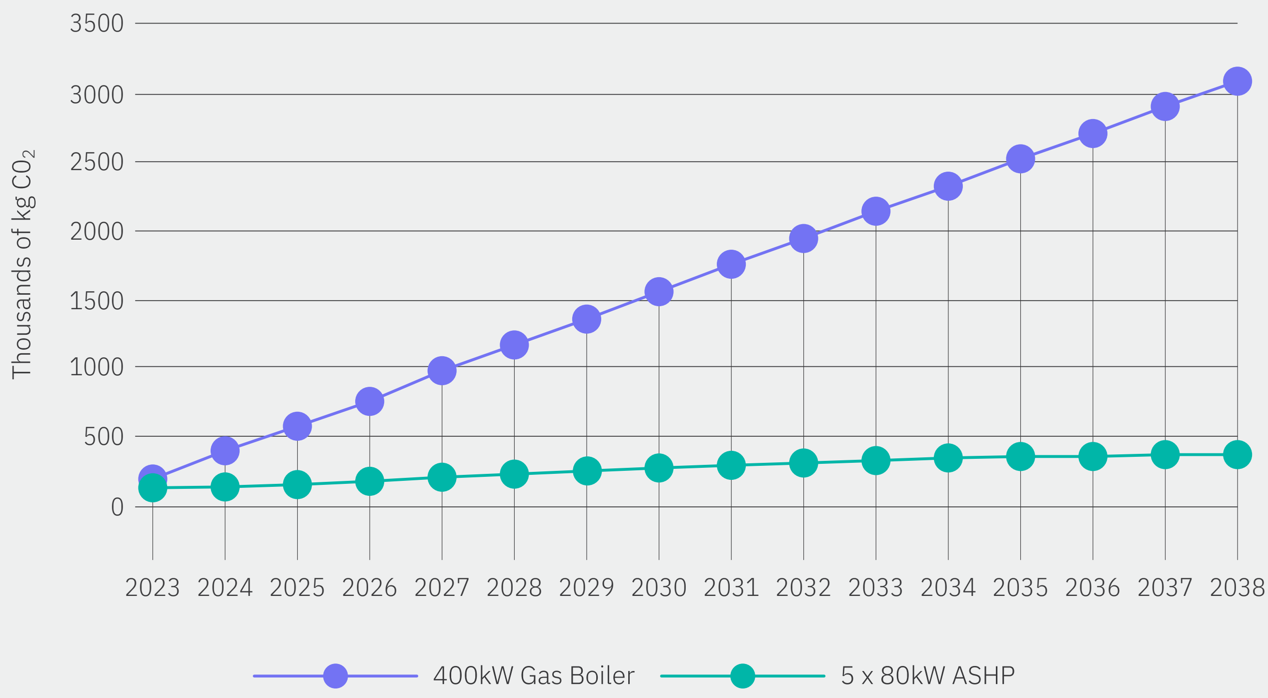
Assumptions: Modular air source heat pump embodied carbon

ASHP delivering 395kW of heat capacity (in this example, x 5 MEHP-iS-Go7 112) at SCOP of 3.43.
Delivering 55ºC flow temperature calculated in accordance with EN14825.
Using TM65 mid-level calculation of ASHP units estimated at 13,915kg CO_2e.
Resulting in a total of 69,575kg CO_2e for x 5 units.

So we see that the embodied carbon of the x 5 air source heat pump units is higher than that of a single 400kW gas boiler.

However, we must also look at the operational carbon of our proposed systems to get a full picture.

Graph 3: Whole life carbon - comparison of gas boiler and ASHP



We can see here that there is a whole life carbon saving when comparing a 400kW capacity air source heat pump against a gas boiler. This represents around **2,700 tonnes of CO_2 over 15 years**. The embodied carbon difference on day one of installation of 66,075kg CO_2e is therefore paid back through operational carbon savings within the first year of operation.

The complexities of carbon calculations for HVAC systems are easy to see, particularly when we take into consideration other factors such as GWP of refrigerants, for example.

Mitsubishi Electric recognises the challenge and to help our clients achieve the carbon outcomes they're looking for, we have put together an in-house Sustainable Construction Team of experts which is unique in the industry.

They can share and discuss your target project outcomes and advise on optimising your HVAC systems.

Click here **To find out more about the Sustainable Construction Team**

Sustainability & Construction Team

Whole Life Carbon
in the Built Environment

Case Studies:

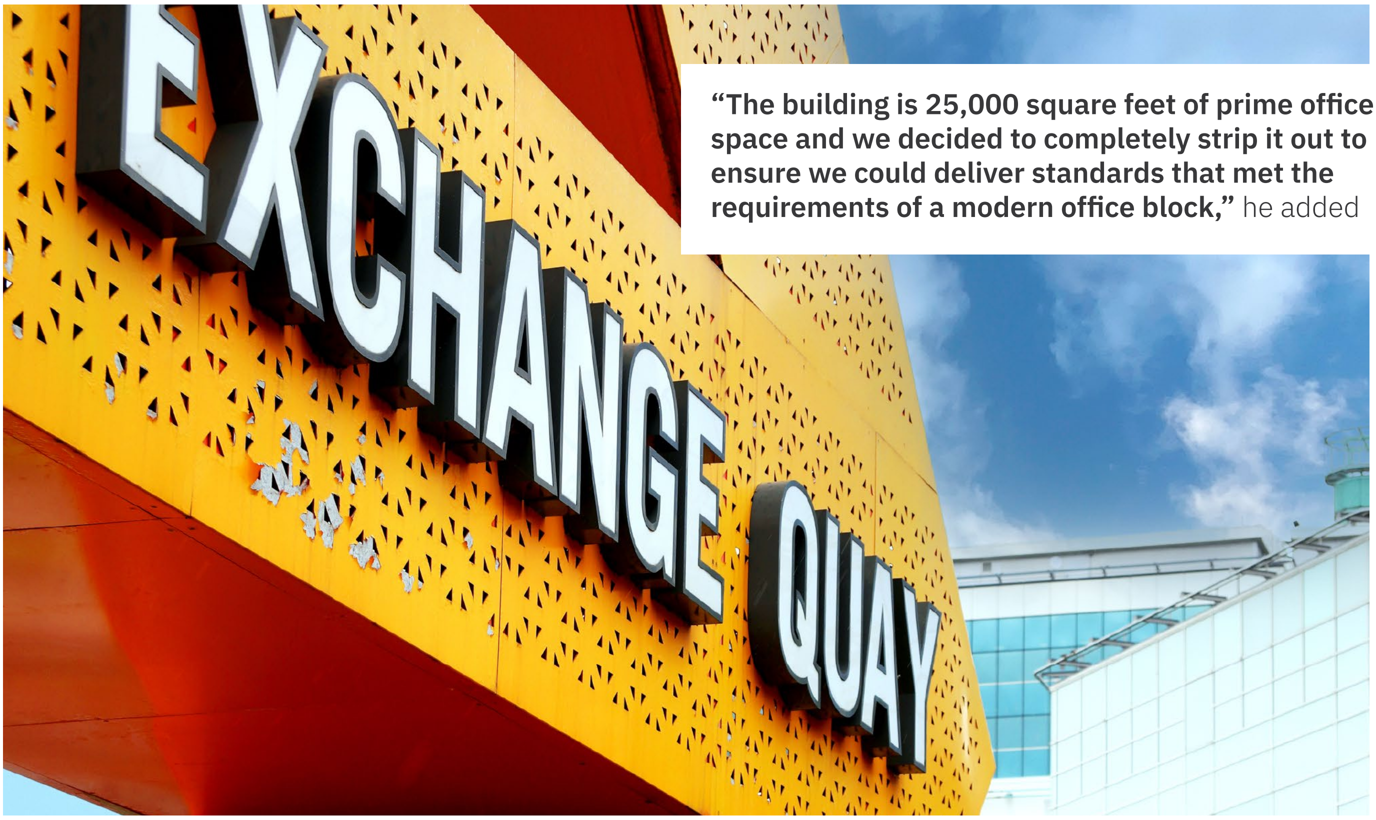
Refurbishing to EPC A rating is easier with an empty building

When the owners of Exchange Quay in Manchester wanted to refurbish a vacant office block, they knew that they would need to ensure that it was ready for future legislation affecting energy use and carbon emissions, especially as the nation looks towards legally binding net zero targets in 2050.

Exchange Quay sells itself as an exciting and inviting place to work with seven Grade A buildings offering 472,000 sq ft of office space. The site is in a prime location with excellent transport links to the rest of Manchester and the surrounding area, alongside extensive on-site facilities, including a nursery, a gym, restaurants, cafés and shops.

Originally developed in the 1980s, Exchange Quay has been a busy hub of commerce for the city ever since. One of the buildings became vacant giving the Investment Managers, Till Asset Management (Tillam), the opportunity to refurbish and upgrade the building services.

"The 5-storey, Building Number 7 on the site was empty so it was easier to plan a comprehensive refurbishment that allowed us to look at every aspect of the energy performance," explained Les Lang, Investment Manager and Director of Tillam.



"The building is 25,000 square feet of prime office space and we decided to completely strip it out to ensure we could deliver standards that met the requirements of a modern office block," he added

Tillam called in Cannock-based FSW, who are a Value-Added Reseller of Mitsubishi Electric air conditioning and heating products. Oliver Broomfield of FSW worked with consultant Mark Broady of Austin Broady, to develop a system that would help increase the EPC rating of the office block.

“We estimate that the old system was probably just about an EPC rating of C, so we knew it could be improved and this is where the VRF system has seriously helped,” said Oliver Broomfield.

4-pipe fan coil chiller system and its replacement with City Multi VRF air conditioning, which can be installed module by module to match the requirements of the refurbishment.

City Multi is the market leader in VRF technology and can deliver simultaneous heating and cooling, so that energy use can be more balanced across a building, with waste heat from areas that need cooling reused in other areas that need heating. The system offers complete flexibility in design, installation and operation with the ability to connect up to 50 indoor units with one outdoor condenser.

Five City Multi PURY-EP models were installed in the roof space, with each condenser serving one of the building’s floors. These connect to a mixture of ceiling cassette, wall-mounted and ducted indoor units to deliver heating and cooling around the building. The overall system is controlled by an AE-200 centralised controller with 41 x PAR-41 wall mounted controllers giving local control to each office space.

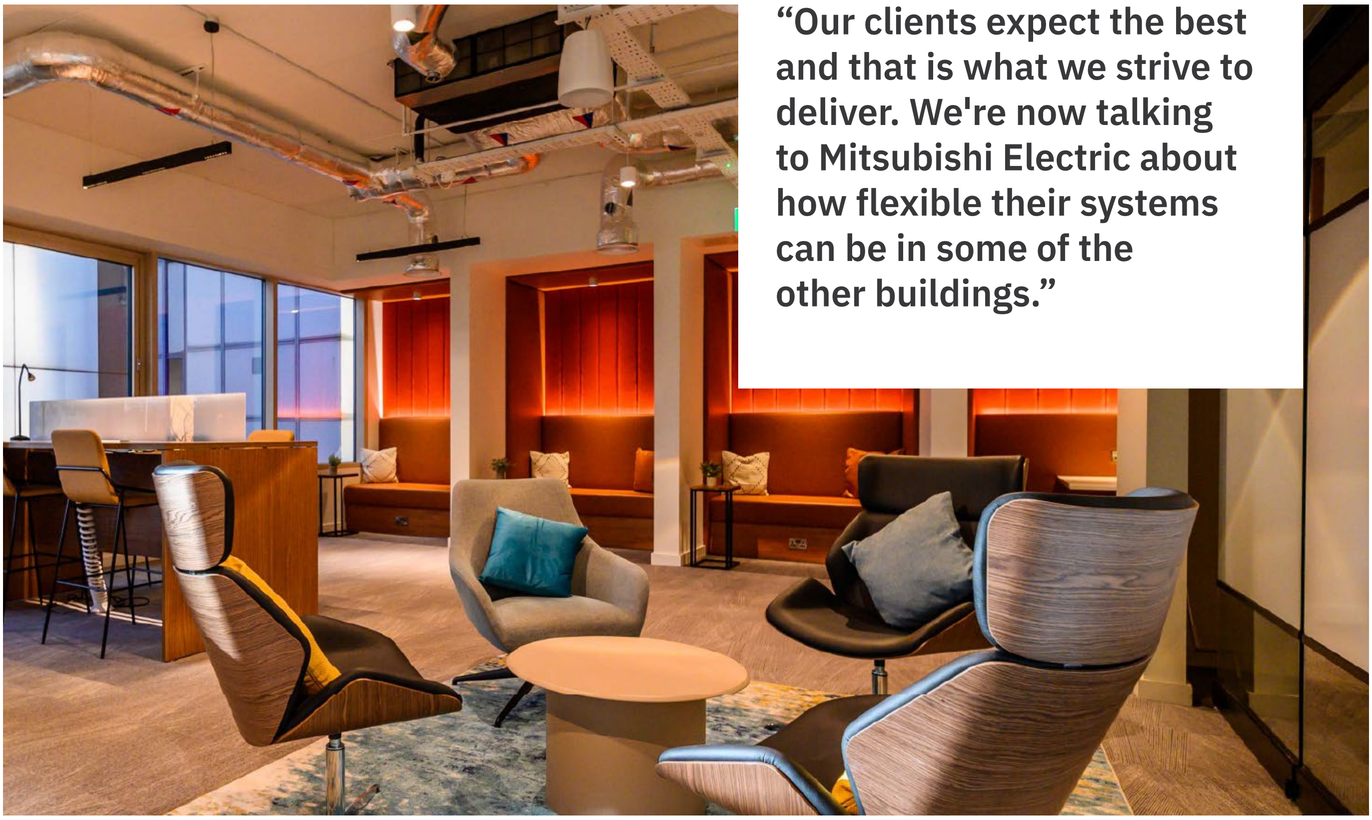
The work was completed early in 2023 and the building is now run by Serendipity Labs who provide flexible workspaces, alongside meeting rooms and conference facilities.

"Our spaces are designed to be a welcoming, inspiring and productive workplace that offer flexible options for our clients and the style, look and feel of the refurbished office matches our ethos completely," explained Dean Haslam, General Manager of the Serendipity Labs site.

"Many of our clients ask about the sustainability of our spaces, so it is reassuring to know that Tillam have thought about this and built energy efficiency into the building."

For Les Lang, the refurbishment of Building Number 7 has shown how straightforward it can be to upgraded and improve the energy efficiency of your premises, especially when the building is empty.

He's now looking at the slightly different challenge of upgrading another block in Exchange Quay, but doing so floor-by-floor. For now though, he is delighted with how well the VRF system is performing in Building Number 7.



"Our clients expect the best and that is what we strive to deliver. We're now talking to Mitsubishi Electric about how flexible their systems can be in some of the other buildings."

References, Further reading and Useful external sources of information

Whole Life Carbon
in the Built Environment

References

1. **LETI - What does Net Zero mean?** Document: LETI-CIBSE Net Zero FAQs
2. **Carbon Emissions (Buildings) Bill - Private Members' Bill**
3. **CIBSE TM54: Evaluating operational energy use at the design stage**
4. **UK Green Building Council Net Zero Whole Life Carbon Roadmap**

Further reading

Mitsubishi Electric CPD Guides that provide useful information around this topic.

Embodied Carbon CPD Guide

Whole Life Carbon in the Built Environment CPD Guide

Operational Carbon

Sustainable Buildings Landscape CPD Guide

Other related information from Mitsubishi Electric

Stranded Assets White Paper

Energy efficiency and Carbon Reduction Guide for the Retail Industry

Energy efficiency and Carbon Reduction in Retail Warehousing

Energy efficiency and Net Zero Guide for University Estates

Useful external sources of information

Low Energy Transformation Initiative - a network of over 1,000 built environment professions that is working closely with organisations such as CIBSE, RICS and RIBA on developing standards and targets for Net Zero. Website includes some useful slides on definitions and proposals for future Net Zero targets for buildings. It is already informing government proposals around this issue.

RICS Whole Life Carbon Assessment - This Assessment from the Royal Institute of Chartered Surveyors is important guidance for designers and engineers. It is regarded as an exemplar for calculating WLC. The website includes the original 2017 assessment, as well as updated toolkits. We can add any updates here after the webinar on 5 October with their assessment update.

Part Z - This is an industry-proposed amendment to the Building Regulations which would bring the regulation of embodied carbon in the built environment into legislation. Many organisations support this proposal (and are named on the website). It is an interesting overview of where proposals are heading and gives a good indication of why major property investors and managers support the idea.

UK Green Building Council (UKGBC)

Changes for the Better

Telephone: 01707 282880

email: sustainable.construction@meuk.mee.com
website: les.mitsubishielectric.co.uk

@meuk_les
@green_gateway

Mitsubishi Electric Living Environmental Systems UK

Mitsubishi Electric Cooling and Heating UK

mitsubishielectricuk_les

Mitsubishi Electric Living Environmental Systems UK

BLOG thehub.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environmental Systems Division
Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881

IRELAND Mitsubishi Electric Europe
Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R290 (GWP:3), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Green Gateway
www.greengateway.mitsubishielectric.co.uk
Mitsubishi Electric UK's commitment to the environment

Effective as of January 2024