

# Commercial Heating

Renewable heating solutions for commercial buildings





# A new generation of Commercial Renewable Heating Technology

There are a number of challenges facing building owners and managers today.

They must tackle ongoing requirements to reduce energy used in their buildings, but there are also a number of areas of legislation that are placing additional pressure on those responsible for business energy use.

This legislation relates to the reduction of carbon emissions from UK businesses and requires robust solutions to address this, alongside tackling the key market issues. The UK is on the path to a green revolution.

In June 2019, the UK government set a target of achieving net zero national greenhouse gas (GHG) emissions by 2050 - the first country in the world to do so. This means we are aiming for a 100% net reduction in GHG emissions against 1990 levels.

This target, now a legal requirement, means that the UK must cut emissions (particularly carbon) across the whole economy, including transport, energy supply, industry and the built environment. The Climate Change Committee (CCC), which advises government, has said that the goal is 'feasible but challenging'.







Over time, the UK's net zero goals have become more ambitious and more focused. The net zero target has generated a range of new and proposed legislation on energy use and adoption of low carbon technologies across industries.


There is also an opportunity for new approaches to building design and operation to flourish, and to encourage building owners to adopt low carbon building services technologies.

Mitsubishi Electric has developed a range of heat pumps specifically designed for heating commercial buildings. The Ecodan and Climaveneta ranges provide renewable heating, challenging traditional heating solutions, whilst meeting the energy and carbon reduction demands of today and beyond.

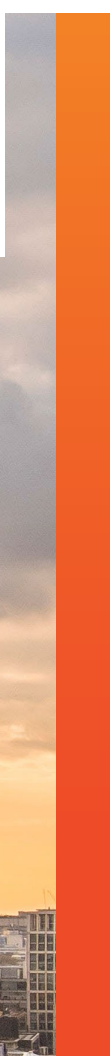
## Mitsubishi Electric is the first name for **comfort and efficiency**

Founded in 1921, Mitsubishi Electric is now a global, market leading environmental technologies manufacturer. In the UK, the Living Environment Systems Division provides pioneering solutions that heat, cool, ventilate and control our buildings in some of the most energy efficient ways possible.

Through our technical expertise, long experience and innovative product range, we enable building operators everywhere to significantly improve energy efficiency, reduce running costs and adhere to increasingly tough legislation. We believe that global climate challenges need local solutions. Our aim is to help individuals and businesses reduce the energy consumption of their buildings and their running costs.



At Mitsubishi Electric, we offer advanced technology that really can **make a world of difference.**



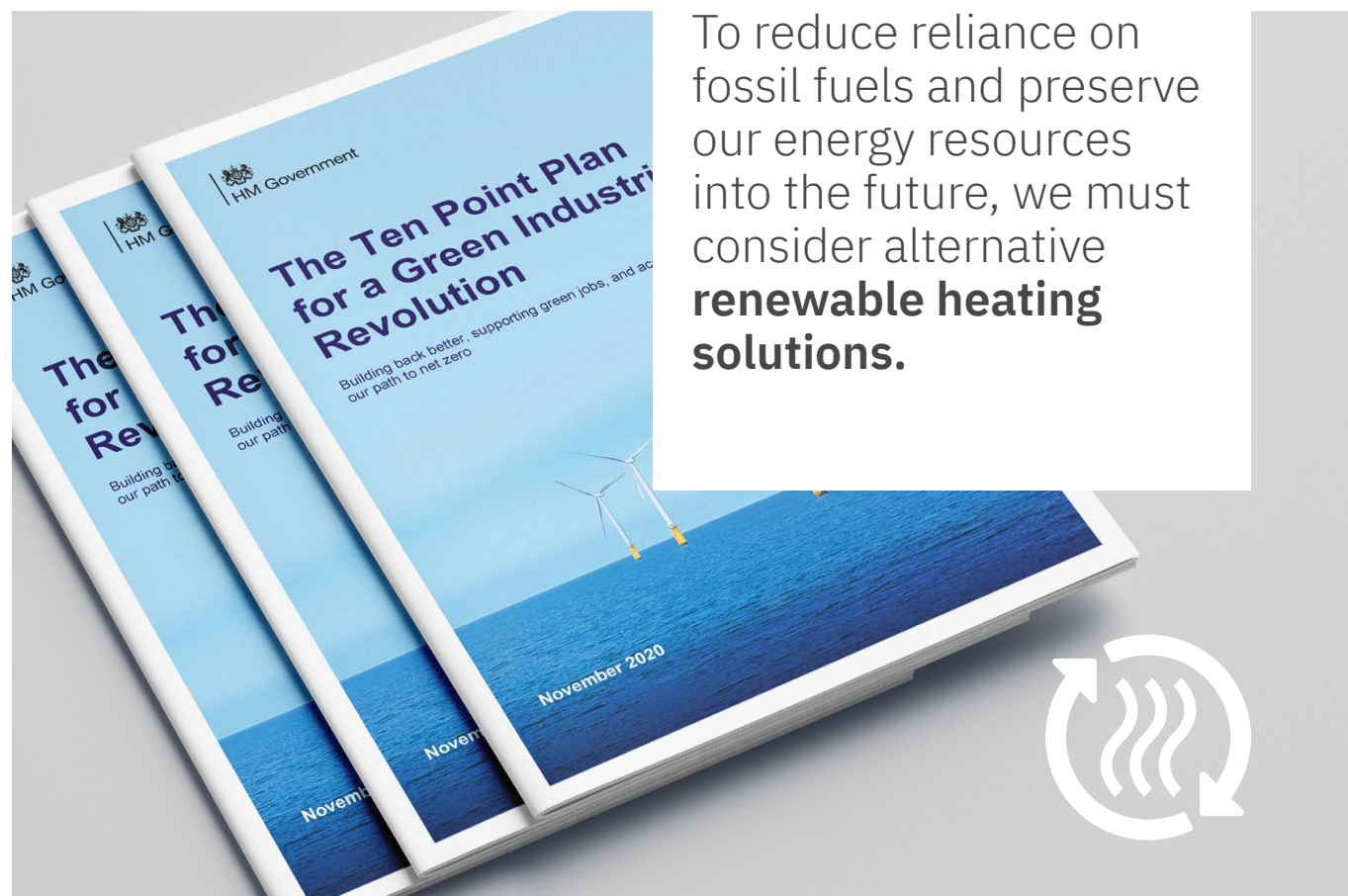
# Mapping the way to Net Zero

In 2020, we saw a new government emphasis on developing the ‘green economy’- developing new technologies and creating jobs. This activity has been driven in part by the 2021 COP26 United Nations climate change Summit which the UK hosted in Glasgow.

The Climate Change Act was introduced in 2008, setting the original target of an 80% emissions reduction against 1990 figures by 2050. The Act provides a framework for government reporting on its progress towards the goal. And it also established the Climate Change Committee as advisor to government on methodologies such as carbon budgeting.

The 2017 Clean Growth Strategy was developed as one of the government obligations arising from the Climate Change Act. It focused on moving towards cleaner economic growth, with an emphasis on the low carbon economy as a source of opportunity and jobs. It stated: “The low carbon economy could grow 11% per year between 2015 and 2030.” The Strategy highlighted the built environment as a significant source of emissions, with heating in buildings and industry creating around 32% of total UK emissions.

**In November 2020, government published its Ten Point Plan for a Green Industrial Revolution. It builds on the earlier Clean Growth Strategy.**







The Plan is to increase energy efficiency across the economy and grow offshore wind and nuclear energy generation. Use of natural carbon sinks in the form of reforestation and exploring options for man-made carbon capture technologies are also on the agenda.

The Ten Point Plan points to growth in areas such as low carbon transport, zero emission vehicles and green finance. Its proposals for buildings include higher efficiency standards for homes and driving heat pump installations for heating and hot water to 600,000 per year by 2028.

Shortly after the Plan was launched, the Climate Change Committee published its Sixth Carbon Budget in December 2020, as required under the Climate Change Act. This pushes even harder on the carbon target, recommending an interim target of a 78% cut in UK emissions against 1990 levels by 2035 - and a 63% reduction from 2019 levels.

Part of the CCC's sweeping vision is that high carbon options for heating in buildings are phased out, replaced by electric alternatives. It also calls for UK electricity production to be zero carbon by 2035, with offshore wind growing from the projected 40GW by 2030 to 100GW or more by 2050.

There is no doubt that this is an ambitious proposal that would bring significant changes to how buildings (domestic and commercial) are designed and operated. The CCC identifies four pathways which it says aim to: "reduce emissions in buildings to zero by 2050 at the latest."

#### CCC's four pathways are:

- Upgrade all buildings (domestic and commercial) to EPC level C over the next 10 to 15 years.
- Scale up the market for heat pumps as a critical technology for decarbonising space heating, while maintaining quality (this is accompanied by a phase-out of gas boilers in all buildings).
- Expand the use of heat networks in areas such as cities using 'anchor' loads such as schools and hospitals. Fossil fuel combined heat and power (CHP) is to be phased out and replaced with low-carbon or waste heat CHP systems from the mid-2020s.
- Prepare for a "potential role" for hydrogen heat.





# Mapping the way to Net Zero: Future Developments

Successive UK governments have led with legislation to drive the need for renewable heating and support the journey to net zero carbon. Some of the key items with regards to the provision of heat to buildings include:

## Part L of the Building Regulations

Many of the non-domestic buildings that will exist in 2050 having already been built. The Building Regulations provide an important opportunity to raise standards in existing and new buildings. The government's vision is to transition non-domestic buildings to use low-carbon heat sources for heating and hot water. This in turn means that new buildings constructed to the standard will be fit for the future, with the ability to become carbon neutral over time as the electricity grid and heat networks decarbonise.

Updates to the Building Regulations include fuel weightings that reflect the UK's move to renewables for generating electricity. This means that electric heating and hot water systems will be given greater priority when calculating potential carbon emissions from buildings. A new SAP10.2 (Standard Assessment Procedure) is available for use now the updated Part L for dwellings has come into force, and this includes these new weightings.

## Minimum Energy Efficiency Standards (MEES)

As a result of analysis and consultation with the market, the Government has implemented MEES as a way of moving the commercial property market away from buildings with poor energy performance - and at the same time raising awareness of the benefits of being more energy efficient.

MEES applies to the rented private sectors for dwellings and non-dwellings in England and Wales. In simple terms, the MEES regulation means that it is illegal to let any property which has an Energy Performance Certificate (EPC) rating of less than a band 'E'. The non-dwellings which will fall under the scope of the MEES rules are defined as any property let on a tenancy which is not a dwelling.

MEES is being introduced in phases. For non-domestic properties, the rules applied to new leases from 1st April 2018; and to all leases, regardless of the start date of the tenancy, from April 2023. Commercial landlords whose properties with an existing lease fall under MEES therefore have until 1st April 2023 to ensure that the EPC rating of the properties they let achieve an E rating - or that they have registered an exemption.

Government will also be advancing the Minimum Energy Efficiency Standards. Currently, government is exploring options for setting higher EPC requirements. Level B is the 'preferred trajectory'. This would require all non-domestic privately rented buildings to achieve an EPC of B by 1st April 2030 (if the measures required are 'cost effective'). The alternative route is to set the target at C by 1st April 2030. Low carbon heating, such as heat pumps, is regarded as an important element of achieving these higher energy performance standards in non-dwellings.



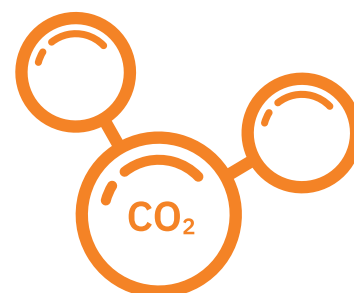
For more information, read our:

**Mitsubishi Electric CPD Guide to  
Minimum Energy Efficiency Standards (MEES)**

**Click on the icon or Scan the QR code**







## Embodied Carbon

There is also an increasing interest in improving the embodied carbon of buildings. The CCC raised this issue in the recent Sixth Carbon Budget, proposing the introduction of “mandatory disclosure of whole life carbon in buildings and infrastructure to facilitate benchmarking as soon as possible.”

In January 2021, CIBSE (the Chartered Institute of Building Services Engineers) introduced Technical Memorandum TM65: Embodied carbon of building services equipment - calculation methodology and guidance. Environmental Product Declarations (EPDs) can be used to show the embodied carbon of a product. If an EPD is not available, manufacturers can supply information for a mid-level product embodied carbon calculation as set out in TM65. The Technical Memorandum includes a form for manufacturers to complete.

TM65 advice on achieving low embodied carbon in building services includes specifying equipment with long lifetimes and products that can be demounted and re-used. Low GWP refrigerant use and low leakage rates are also important. This would affect choice of technology such as heat pumps which include refrigerant.

## Future Buildings Standard

During 2021 government consulted on the Future Buildings Standard. This informed the development of the next iteration of Part L of the Building Regulations relating to non-dwellings (new and existing), and it is clear from the consultation that government is focused on raising energy efficiency requirements for new non-domestic buildings. The aim will be to deliver a 27% improvement on new non-dwellings compared to current Part L standards.

Low carbon heating systems will be central to achieving this goal, and the consultation document states: “We anticipate that the installation of heat pumps will play an increasing role in delivering low carbon heat for buildings built to the Future Buildings Standard. Heat pumps come with the same low-carbon benefits as direct electric heating, but deliver heat much more efficiently, as they capture renewable heat from the atmosphere.”<sup>1</sup>

The Future Buildings Standard proposal also suggests that wet space heating systems should be designed to operate with a flow rate of 55°C or lower in the final heating circuit (in order to be prepared for use of heat pumps). This is in addition to the use of suitable emitters. The aim is that tenants of non-dwellings will not face disruption when low carbon heat is installed in the future.

**For building services professionals, the message from government is clear: specifying and installing the heating and hot water systems of yesterday will not suit the buildings and policies of tomorrow.**



For more information, read our:

**Mitsubishi Electric CPD Guide to the Updated Building Regulations 2021**

**Click on the icon or Scan the QR code**



<sup>1</sup>1. The Future Buildings Standard – Consultation on changes to Part L










# The Green Grid



As government and CCC reports highlight, a crucial development for the UK's net carbon policy is the decarbonisation of its electricity grid. Natural gas remains a significant fuel for UK electricity generation. However, the UK's reliance on coal for electricity production has fallen dramatically over the past decade while our use of renewables is growing.

Renewable energy sources accounted for 40.2% of total electricity generation in 2020, at 29.4 TWh (terawatt hours). The main source was offshore wind, an increase boosted by added new capacity. The Ten Point Plan includes growth of offshore wind from 24GW in 2020 to 40GW by 2030, including 1GW of floating offshore wind.

The closure of coal power stations has accompanied this growing renewable electricity generation, shifting the UK's energy mix. The government's Energy Trends report from December 2020 shows that electricity generation in the whole of the UK from coal was down 30% on the same period in 2019. Government will phase out the UK's remaining four coal plants by October 2024.

Electricity generated by fuel type (TWh - terawatt hours)							
	1990	% in 1990	2000	2010	2018	2019	% in 2019
 <b>Coal</b>	229.8	71.8%	120.0	107.6	16.8	6.9	2.12%
 <b>Oil</b>	20.7	6.5%	13.6	10.5	9.5	9.2	2.83%
 <b>Gas</b>	0.4	0.1%	148.1	175.7	131.5	131.9	40.62%
 <b>Nuclear</b>	63.2	19.8%	85.1	62.1	65.1	56.2	17.3%
 <b>Hydro</b>	5.6	1.8%	5.1	3.6	5.5	5.9	1.82%
 <b>Wind &amp; Solar</b>	-	0%	0.9	10.3	69.8	77.3	23.3%
 <b>Other renewables</b>	-	0%	4.3	12.3	34.8	37.3	11.48%
<b>Total electricity generated</b>	<b>319.7</b>	<b>100%</b>	<b>377.1</b>	<b>382.1</b>	<b>332.9</b>	<b>324.8</b>	<b>100%</b>

Source: Energy in Brief, December 2020, BEIS

In December 2020, government published its Energy White Paper titled: Powering our Net Zero Future. It reiterates the commitment to reduce our reliance on fossil fuels: **“Our success will rest on a decisive shift away from fossil fuels to using clean energy for heat and industrial processes, as much as for electricity generation.”**



## Energy Related Products Directive (ErP)

Seasonal efficiency is set out by the EU's Energy Related Products Directive (Eco-Design Directive) which specifies the minimum Eco-Design requirements that manufacturers must integrate into their energy-using products.

For space heating systems, the efficiency ( $\eta_s$ ) value is used to compare the space heating efficiency of systems like gas boilers and hydronic heat pumps. In the case of heat pump, the efficiency equals the Seasonal Coefficient of Performance (SCOP) divided by the conversion coefficient in primary energy set as 2.5 by the RES directive.

ErP Lot 1 is the directive that establishes ecodesign requirements for the placing on the market and/or putting into service of space heaters and combination heaters with a rated heat output  $\leq 400\text{kW}$ . From September 2017 the seasonal space heating energy efficiency of heat pump space heaters and heat pump combination heaters should not fall below the values set here.

Heat Pump Type	Minimum Seasonal Space Heating Efficiency ( $\eta_s$ ) %
Heat pump space heaters and heat pump combination heaters, with the exception of low-temperature heat pumps	<b>110%</b>
Low-temperature heat pumps	<b>125%</b>

Requirements are also set for the minimum water heating efficiency (depending on load profile) and rated sound power levels. A 'low-temperature heat pump' means a heat pump space heater that is specifically designed for low-temperature application, and that cannot deliver heating water with an outlet temperature of  $52^\circ\text{C}$  at an inlet dry (wet) bulb temperature of  $-7^\circ\text{C}$  ( $-8^\circ\text{C}$ ) in the reference design conditions for average climate.

## Whole Life Carbon

When talking about emissions generated from the built environment, it is important to consider the whole life effect. Whole life carbon is made up of 2 parts, embodied carbon and operational carbon.

Embodied Carbon is the total greenhouse gas emissions generated to produce a built asset. This means that to calculate the embodied carbon for a building we need to understand the environmental cost to the planet for the extraction, processing, manufacture, delivery and assembly of every single product or material used in its construction. Throughout a building's lifetime some maintenance or replacement of these products or materials will be necessary - and this also needs to be measured as a part of calculating embodied carbon. At the end of the building's useful life more emissions will be produced because the asset needs to be deconstructed, and the products within disposed of, and this also needs to form part of an embodied carbon calculation.

Operational Carbon refers to the total greenhouse gas emissions produced by a building during its useful (operational) life. These emissions arise from energy consuming activities like the heating, cooling, ventilation, and lighting needs of the building - also known as 'regulated' emissions as they fall under Part L of the Building Regulations 'Conservation of fuel and power' - as well as other 'unregulated' emissions such as those from appliance use and small power plug loads from the day-to-day activities of the people using it.



# Heating and hot water - the end of natural gas



CCC figures show that heating and hot water production in buildings are the largest contributors to emissions from the built environment.

The CCC's Sixth Carbon Budget points out that in 2019 direct building emissions (caused by heating and hot water production) were 87 MTCO<sub>2</sub>e (metric tonnes of carbon dioxide equivalent).

The UK has achieved higher levels of building energy efficiency over the past decade, however, the CCC points out that: **“Progress in delivering emissions reductions (in the built environment) has broadly flattened since 2015.” Heating and hot water production are therefore crucial targets for future emissions reductions. We must decarbonise our heat.**

The CCC's Sixth Carbon Budget sets out a net zero pathway for buildings that relies on new approaches to heating. While energy efficiency measures can contribute around 34% of emissions reductions, says the CCC, “low carbon heating dominates the picture from 2028”.

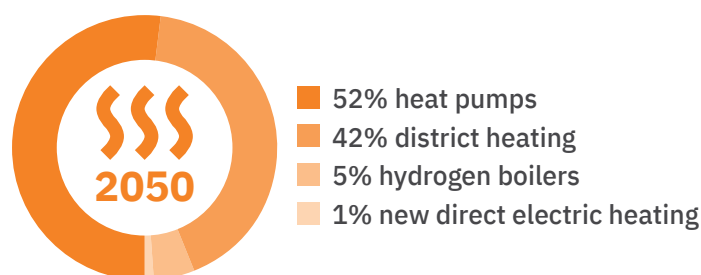
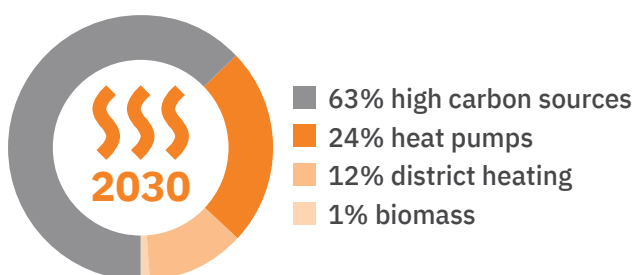
Government has already stated that installation of gas heating in new homes from 2025 is no longer permitted, and this is included in the Future Homes Standard. The Sixth Carbon Budget also recommends a gas heating phase out in commercial buildings by 2033. It also states that public buildings should move faster, with a deadline of 2030: “The faster pace in public buildings allows the Government to meet its targeted 50% reduction in emissions by 2032.”

The CCC's vision for building heat and hot water is that: “Buildings shift on to low-carbon heat networks, high efficiency and flexible electrification along with some hydrogen near industrial clusters.” Government is exploring hydrogen as an option. However, as the BEIS research from 2019 mentions: “Replacing natural gas with hydrogen in an everyday setting - piping hydrogen to homes and businesses through the existing gas network - is a new and untested position.” It has not been attempted in other countries, so there are no examples to follow.

The government has a target of 5GW of low carbon hydrogen production capacity by 2030, and it plans to trial hydrogen for heating in neighbourhoods and towns by the same date. The Ten Point Plan emphasises that the success of the hydrogen approach is only possible when accompanied by the growth of carbon capture and storage infrastructure. Hydrogen's application at scale for heating and hot water is therefore unlikely to happen quickly.

No single technology can be the solution for replacing our current reliance on natural gas. However, time is pressing and finding solutions that can make a difference in the next decade is crucial. The CCC's goal is that by 2030, 37% of public and commercial heat demand is met by low carbon sources. Of this 65% of heat demand is met by heat pumps; 32% by district heating and 3% by biomass.

**And by 2050 the CCC believes that all UK heat demand is met by low carbon sources:**



# Heat pumps - the decarbonised future



Heat pumps are central to the decarbonised future. As noted previously, government has set a target of 600,000 heat pump installations per year by 2030. The CCC estimated that 19 million heat pumps will need to be installed by 2050 to achieve the net zero goal - a massive increase from current installation numbers (in 2018 heat pump sales were around 27,000 units according to the UK's Heat Pump Association (HPA)).

One of the reasons for the government's strong support of heat pump technology is its energy efficiency. Generally speaking, for every 1kW of electrical energy used, a heat pump can produce 3kW of heat energy. While the UK's electricity is becoming 'cleaner' every year, government regards efficient use of this supply as crucial for long-term success. Without efficient technologies, it will be difficult to meet electrical demand from renewables and low-carbon sources alone.

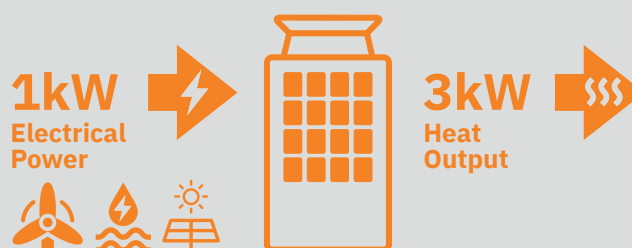
Application of heat pumps in buildings combined with the greening of the UK's electricity grid will make a significant reduction in the country's carbon emissions. As the HPA identifies in its report (Delivering Net Zero: A Roadmap for the Role of Heat Pumps, published in 2019): **“Running on electricity in an extremely efficient process, heat pumps make the most of the widespread growth in renewable electricity generation over the past decade to provide a cleaner power source for heating.”**

In fact, the carbon reductions from use of heat pumps in buildings will increase over time as the grid moves further away from fossil-fuel generated electricity. The benefits of this shift are therefore both immediate (i.e. the short-term switch from gas) and long-term (as the CO<sub>2</sub> emissions from electricity generation fall even further). While there is never a single solution for a challenge on the scale of national carbon emissions reduction, heat pumps are well-known, tested and scalable. There can be little doubt that, as a ready-to-go technology, they offer a genuine alternative to current space heating and hot water approaches.



As the CCC indicates, meeting the 2050 net zero target through the built environment means:

**“Minimising costs and disruption (which) means working as much as possible with existing technology lifetimes - particularly the heating technology stock.”**





# Renewable heat from heat pumps is the answer



Decisions taken on which heating technology to use will affect the performance of a building for many years to come. The need to address the urgent issues of climate change as well as fuel security and rising prices are key, and with heating accounting for more than half of the total energy consumed by an average commercial property, this is the obvious area to target to make the required difference.

Using advanced heat pumps specifically designed to deliver heat in the UK climate, Mitsubishi Electric meet these tough energy challenges head on. Designed for use in commercial properties our renewable products use proven heat pump technology to deliver effective, low carbon heating; providing a simple solution that can replace traditional systems. Classified by the UK Government and European Union as a renewable technology<sup>1</sup>, our commercial heating products come in a range of sizes and options to meet the required demands.

## Renewable heat pumps:

- Help to achieve renewable energy targets
- Provide high levels of efficiency, cutting running costs as well as CO<sub>2</sub> emissions
- Are easy to design, reducing installation time and minimising disruption
- Offer cost effective renewable heating, suitable for retro-fit or new build
- Are fully scalable and able to work independently or in conjunction with other systems
- Provide sanitary hot water



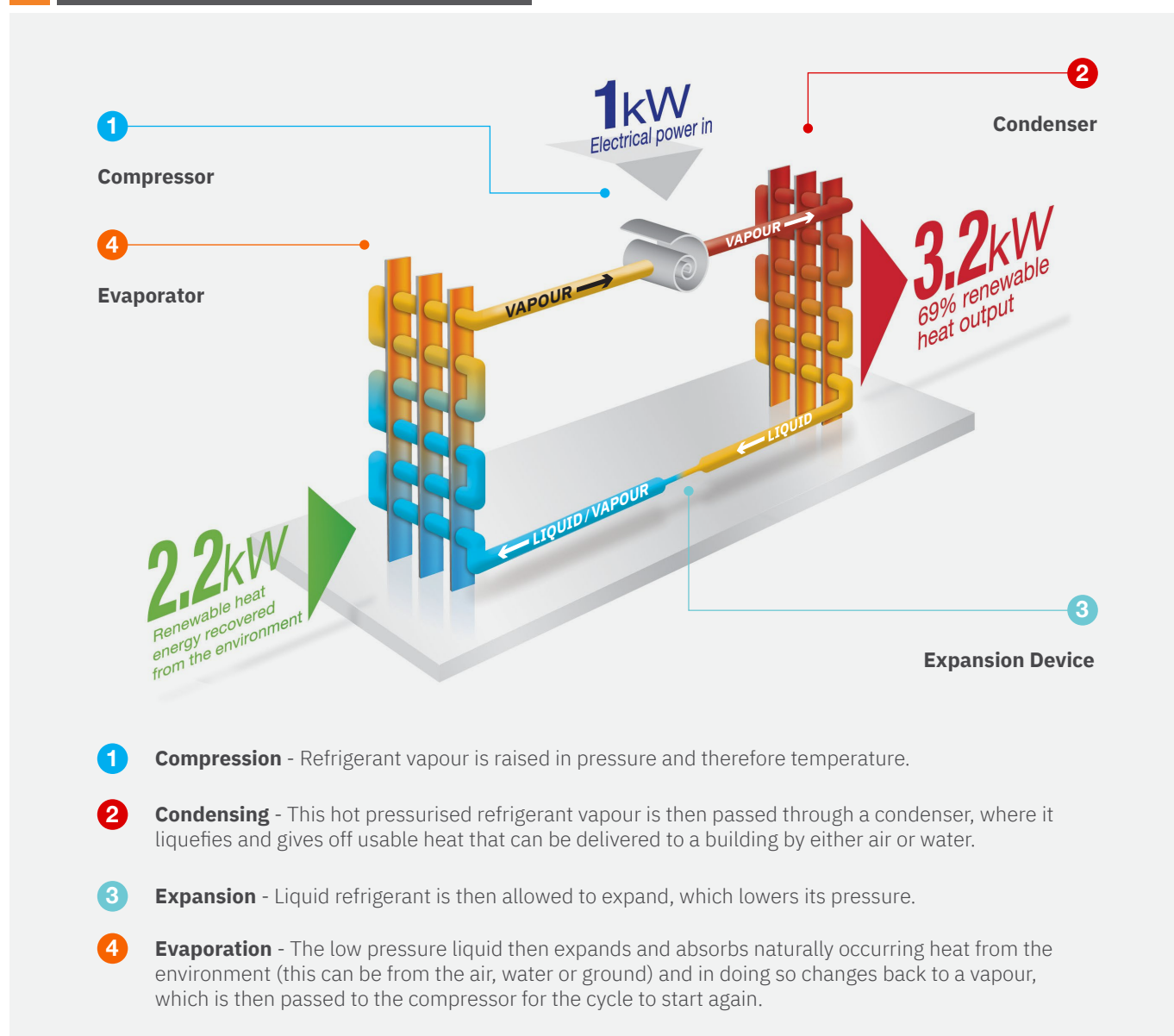
<sup>1</sup> European Parliament & Council, Renewable Energy Directive 2009/28/EC

# How a heat pump works



Our Ecodan heat pumps require only a small amount of electricity to harvest, upgrade and move heat from one location to another. To achieve this a **vapour compression cycle** is used, which has the ability to take low temperature renewable heat from the environment and raise it to usable temperatures capable of providing the space and water heating loads required in buildings.

## The vapour compression cycle





# The right heat pump for the job



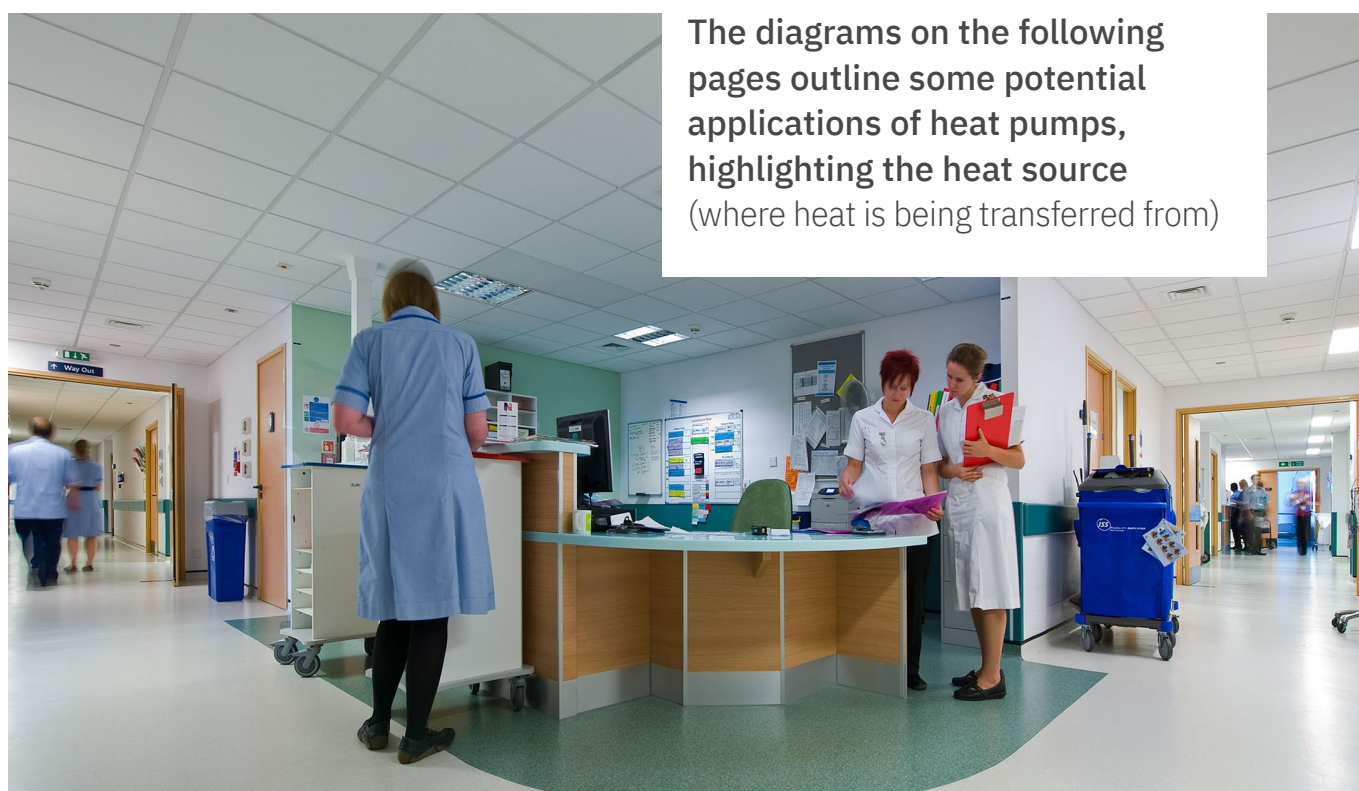
The range of heat pumps on the market is now much wider than it ever has been. This means it is possible to select exactly the right equipment for the client's requirements.

In the past, heat pumps were regarded as highly effective for supplying low temperature space heating. But recently, high temperature heat pumps have entered the market, offering hot water supply up to 90°C. This means that heat pumps can now be applied in projects with requirements for high demand of sanitary hot water with high peak demands (such as hotels, hospitals and leisure centres). As a result, there is no need to use a gas boiler for either use.

There are a number of areas to consider when applying heat pumps for commercial hot water. Volume and temperature requirements are key to correct sizing of the system. It's also crucial to understand if the hot water usage profile will be steady across the day, or will experience peaks.

For example, Mitsubishi Electric recommends that, with its high temperature Ecodan QAHV heat pump, the sanitary hot water load should be achieved at the lowest required design ambient temperature where the heat pump is located. This is so that the system can be sized to achieve the target hot water temperature efficiently - and in a suitable timeframe.

Other heat pumps offer options for a modular approach, so that a number of heat pumps can operate as a multiple system. One benefit of this approach is that the multiple unit system can cascade available units on and off to meet the head load from a building. For example, the Mitsubishi Electric Ecodan CAHV can work as a 16 unit system, allowing for 0.5kW increments of capacity, from 18kW to 688kW, providing a significant level of modulation. It provides water flow temperatures from 25°C to 70°C.



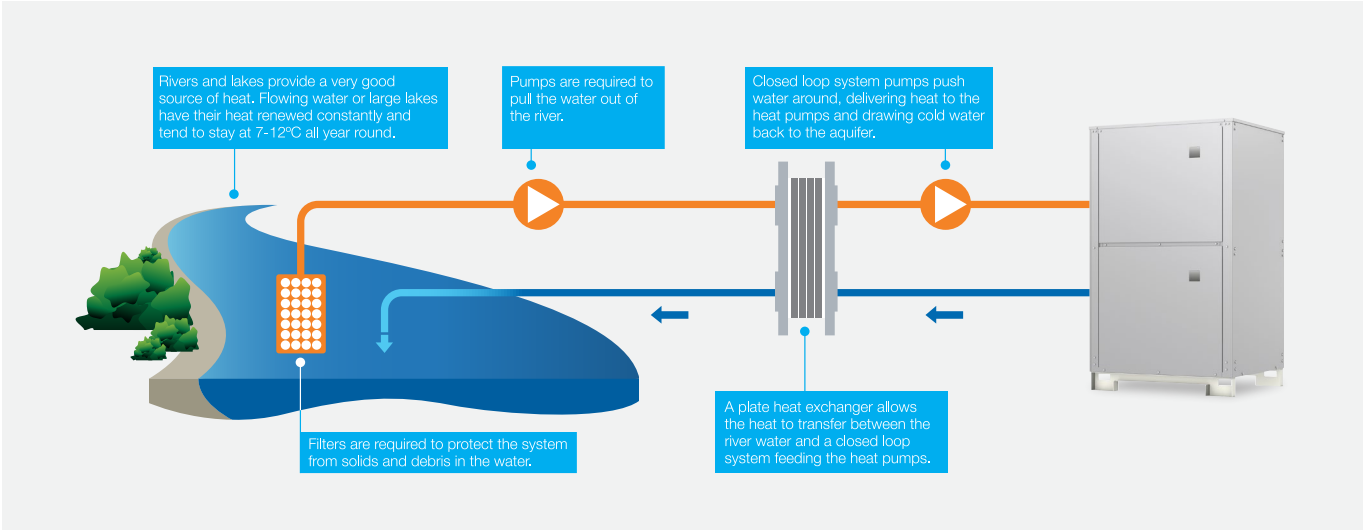
**The diagrams on the following pages outline some potential applications of heat pumps, highlighting the heat source (where heat is being transferred from)**

# Heat Sources

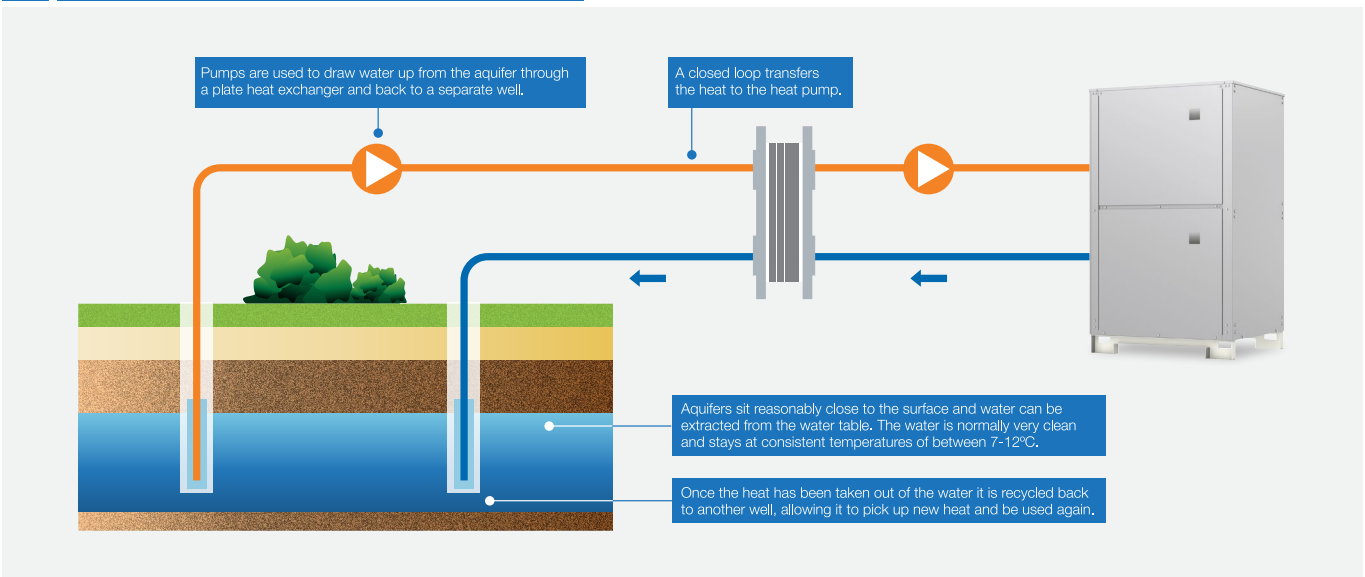
## Air source - Air



## Water source - Rivers and lakes

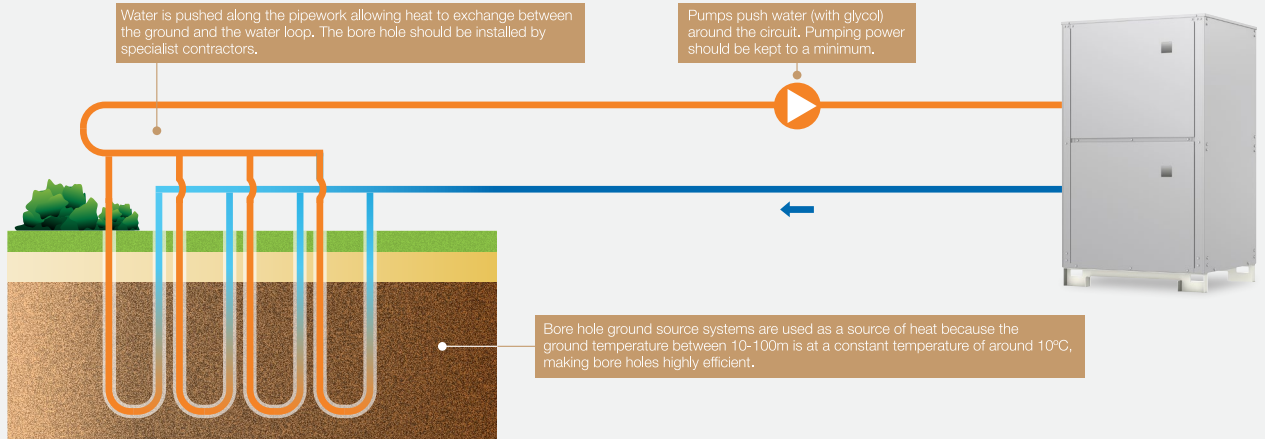


## Water source - Aquifers

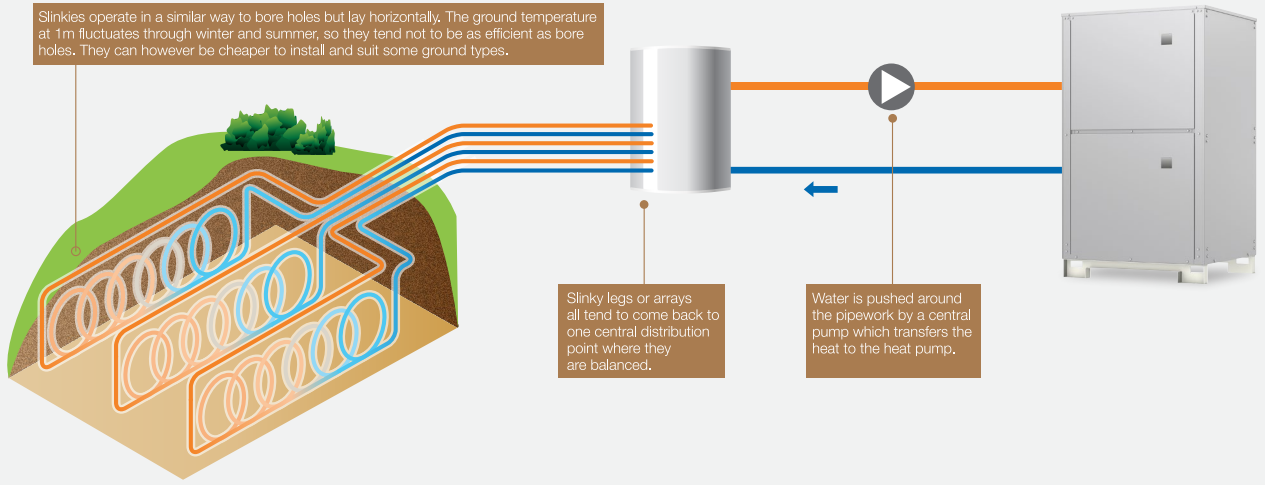


# Heat Sources

## Ground source - Bore holes



## Ground source - Slinky systems





# Specifying, sizing and applying heat pumps for commercial heating & hot water



Specifiers looking for an alternative will find that heat pump technology has evolved over the past five years. This allows them to be applied more widely for commercial heating and hot water systems, but it is important to select the right heat pump for the project.

There are a few general points to bear in mind when applying heat pump technology. When considering the application of heat pumps in a project, it is important to understand the peak heat loss at the design condition within the local area, put another way you will need your maximum heating capacity output when the external ambient is coldest, therefore it's important to select the correct heat pump at this ambient condition.

It's also really important to be aware of energy efficiency metrics. The Seasonal Coefficient of Performance (SCOP) is the overall performance of a heat pump using electricity across the heating season. Designers should also examine the specific application they are working on in order to calculate a specific SCOP for that project. This will help to properly assess the carbon reduction and operational cost savings moving forward. Heat pumps also have a lower  $\Delta T$  than traditional gas-fired heating and hot water systems. What this typically means is that they will require higher flow rates to deliver the required capacity, and higher flow rates generally means bigger pipework. However, this is not an issue for the system performance, as it can be mitigated by application of low-loss headers and three-way valves. This will maintain the correct flow of water through the heat pump and ensures that delivery of heat to emitters remains steady.

## Why choose Ecodan heat pumps over other technologies

Efficient, versatile and renewable, Ecodan heat pumps are specifically designed for commercial properties of any size, new build or refurbishment. Wherever there's a need for space or water heating, we rival gas, oil and biomass - easily meeting heat load and renewable energy targets.

Mitsubishi Electric heat pumps perform well against all relevant criteria. Crucially they are highly scalable and can be applied to projects of all sizes, from doctor's surgeries through to entire district heating projects for instance. While it has existed for a long time and is tried and tested, heat pump technology continues to evolve and improve.

**Commercial scale Ecodan heat pumps are available as air or ground/water source options and can be applied in a variety of different methods.**





**ecodan**<sup>®</sup>  
Renewable Heating Technology



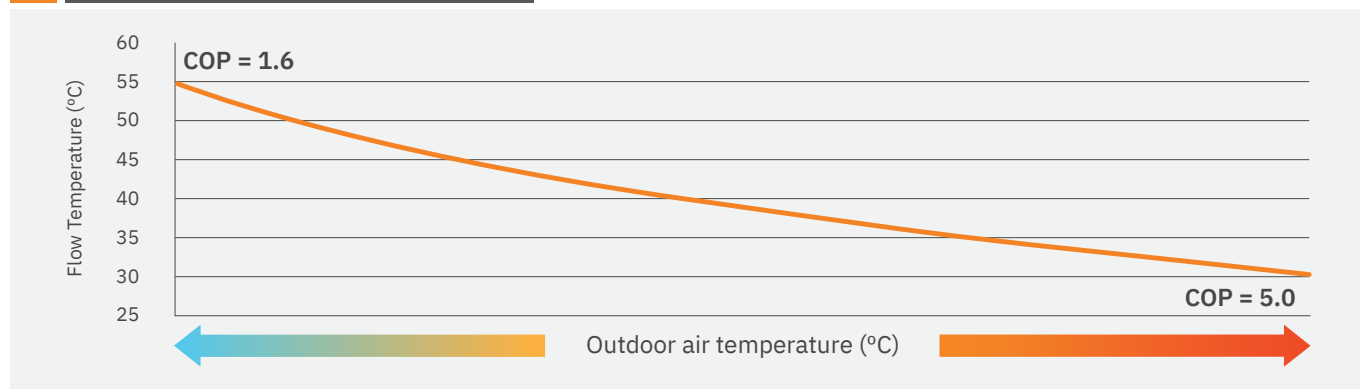
# Operating an Ecodan heat pump



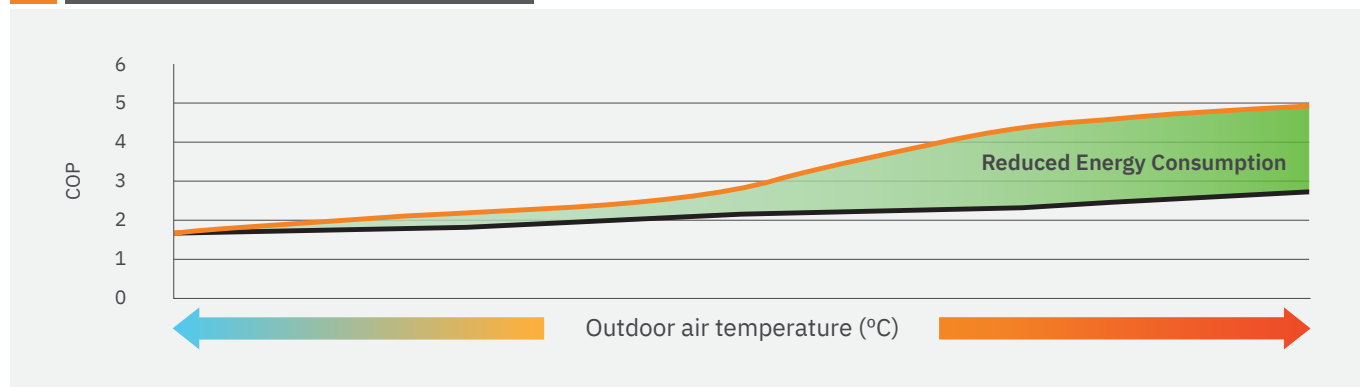
Operating an Ecodan heat pump correctly is essential. Many features are built into our Ecodan systems to ensure that the optimum control, performance and efficiency are achieved. Some examples of these are:

-  **Night Setback** - ensuring fabric protection and faster heat up times
-  **24 hour running** - optimising the Coefficient of Performance (COP) by trickling heat into a building at partial loads
-  **Defrost on air source** - allowing the unit to function at outdoor temperatures of -20°C
-  **Weather compensation** - by varying the flow temperature, Ecodan optimises the system at different ambient conditions and loads. The two graphs below illustrate the effect that flow temperature control can have on COP, when compared to a fixed flow temperature system:

## 1 Effect of Flow Temperature on COP

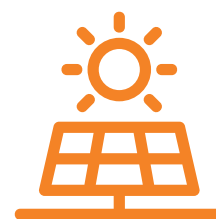


## 2 Variable Flow Temperature Control



— Variable Flow Temperature      — Fixed Flow Temperature 55°C

# Heat pumps with other technologies



Modern heat pumps can be applied in buildings alongside other technologies to boost the renewable element of a project - and to reduce the requirement for heat energy.

For example, used with on-site photovoltaics (PVs), less electrical energy from the grid is required to serve the building and the electrified heating system. This dual renewable approach can also lower the size of PV array needed to meet building regulations, reducing capital costs.

Another example of heat pumps being successfully combined with other technology that is attracting more attention is the fifth generation low temperature ambient loop. Heat is generated in a via a central source using low carbon technology such as heat pumps, or environmental sources such as rivers or ground source - but at lower temperatures than a traditional boiler (around 10°C to 30°C flow, rather than 60°C to 90°C flow).

Water source heat pumps, such as the Mitsubishi Electric Ecodan Hydrodan, are then placed around the building to boost the temperature to useable levels at point of demand. The benefit is that the lower temperature water generation requires less energy to produce, reduces overheating in corridors and greatly improves transmission losses.





# Heat recovery and heat pumps



It's likely that the move to efficient electric heating will impact other building services systems. As the commercial gas boiler market shrinks, specifiers will need to consider other options for their projects.

As space heating is likely to be dominated by heat pump technology, it is not unreasonable to expect that the cooling-only chiller market, and the VRF markets (where the same parent heat pump technology is being deployed) will transition towards heating and cooling. This means that we might expect to see a transition to reversible heat pump chillers, with heat recovery capabilities in the system.

By re-using heat that has been generated in the building (for example, when rejected by the cooling system) it is possible to save significant amounts of energy, reducing long-term operational costs.

Heat recovery offers a number of benefits for today's built environment. For example, inner city projects may require HVAC equipment with a small footprint, which may close off the option of a large capacity heat pump. However, heat recovery systems can be included within the HVAC plant, with little to no impact on space requirements.

Heat recovery systems that make use of heat pump technology can be particularly useful for mixed-use developments or large offices, where heat profiles are diverse. Heat can be captured from the cooling process and used to reduce heating requirements in other areas of the building (or to pre-heat domestic hot water).



For more information, read our:

**Mitsubishi Electric CPD Guide to Heat Recovery Chillers**

Click on the icon or Scan the QR code



# A Net-Zero carbon future



As the UK moves down the path to a Net-Zero carbon future, building services professionals can lead the way by encouraging clients to take a new approach to heating and hot water in commercial buildings.

The heating equipment we install today will be in a building for at least a decade. Against the backdrop of the government's green revolution, this is a significant point for specifiers to bear in mind.

Installing a heating system based on fossil fuels might leave the building as a 'stranded asset' in the future. Not only will the operational cost of a fossil-fuel based system increase, but the building owner may find they are forced to switch heating systems again as carbon targets tighten.

It is very likely that specifiers will find themselves looking for new options for heating and hot water provision. This may not always be a direct heat-pump-for-gas-boiler-swap (though this is now possible). Instead, specifiers may apply heat pump chiller solutions that also provide heating, for example. These are already available on the market and from Mitsubishi Electric.

**For engineers and installers, the message is that they need to stay aware of the latest heating and hot water technology systems in order to offer the best solutions that stand the test of time for clients.**





# How our Ecodan heat pumps work for you commercially

Perfect for use in a variety of applications, our commercial heating products are easy to design, quick to install, simple to maintain and efficient to run.

To demonstrate how our systems work and to show how easily they can be applied to suit many commercial applications, we've used a large school as an example.

**This illustration depicts 4 different commercial Ecodan options:**

- 1 Ecodan QAHV High Temperature Air Source Heat Pump Monobloc System
- 2 Ecodan CRHV Water Source Heat Pump Monobloc System
- 3 Ecodan CAHV-R Air Source Heat Pump Monobloc System
- 4 Ecodan CRHV Ground Source Heat Pump Monobloc System



1

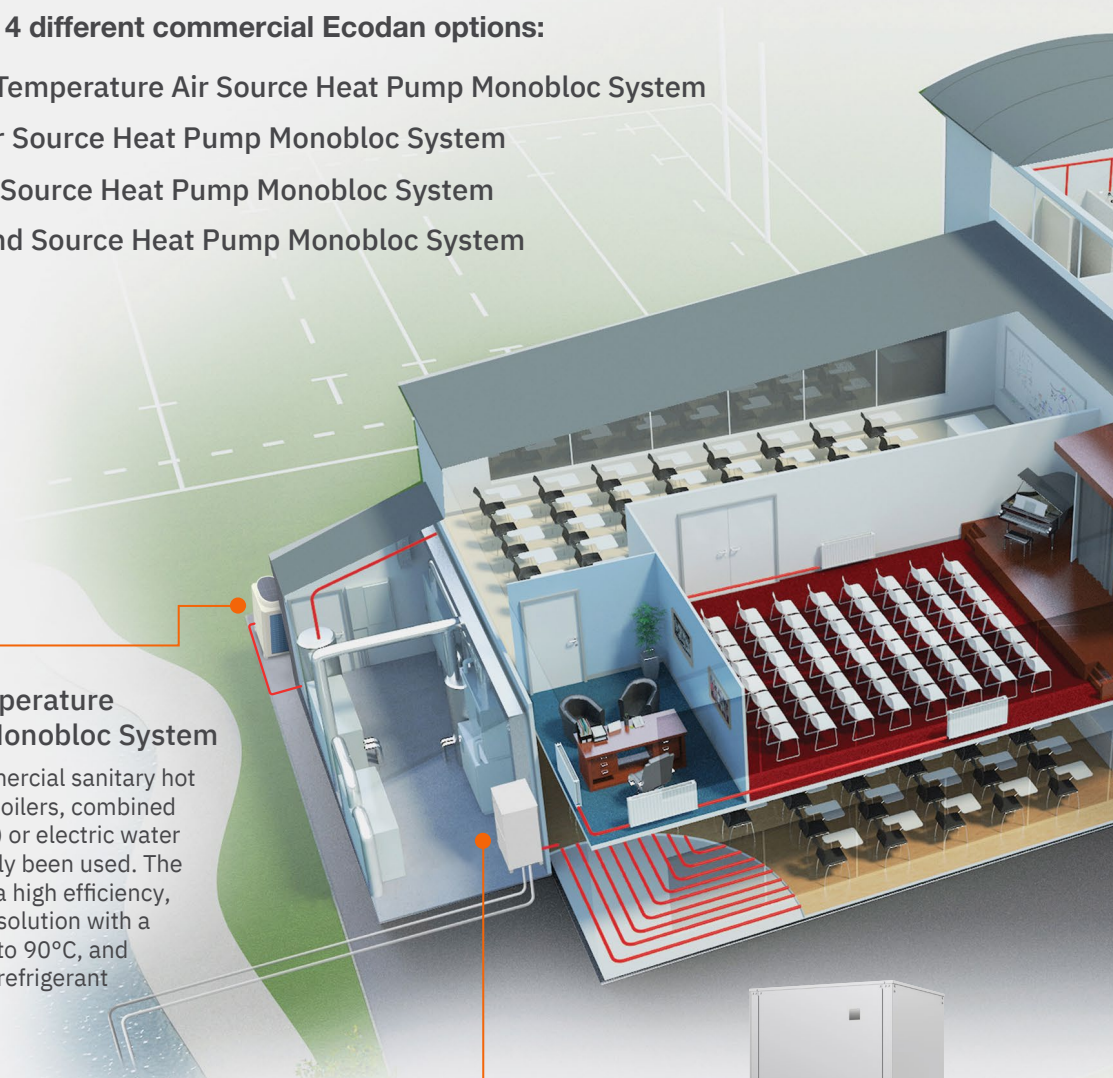
## Ecodan QAHV High Temperature Air Source Heat Pump Monobloc System

Specifically designed for commercial sanitary hot water application, where gas boilers, combined heat and power systems (CHP) or electric water heating would have traditionally been used. The 40kW Ecodan QAHV provides a high efficiency, low carbon hot water delivery solution with a leaving water temperature up to 90°C, and utilises the natural and stable refrigerant CO<sub>2</sub> (R744).

2

## Ecodan CRHV Water Source Heat Pump Monobloc System

These systems are able to extract heat from an aquifer or open loop system such as a lake or river in order to maximise efficiency. Educational facilities are an example of where there may be available water resources that can be used to optimum effect.





### 3 Ecodan CAHV-R Air Source Heat Pump Monobloc System

This system provides a simple, packaged solution that's perfect for use on retro-fit and new build alike. Using 'Optimised Cascade' for high level efficiency and 'Back-up & Rotate' built into the controller, the monobloc system's ability to replicate fossil fuel burning systems is second-to-none.



### 4

### Ecodan CRHV Ground Source Heat Pump Monobloc System












These systems are able to extract heat from the ground in order to maximise efficiency. Educational facilities are an example of where there may be available ground resources that can be used to optimum effect.



# Our Commercial Heating range at a glance

The range of heat pumps on the market is now wider than it has ever been. This means it's possible to select exactly the right equipment for the specific application. **Our commercial heat pumps fall into three broad ranges:**



		Max Flow Temperature at -5°C			
		(Flow Range)	0	100	200
	<b>Climaveneta NX2-N</b>	<b>51°C</b> (24°C to 55°C)			
	<b>e-Series EAHV</b>	<b>55°C</b> (25°C to 55°C)			<b>150-1,080kW</b>
	<b>Climaveneta FOCS-N</b>	<b>55°C</b> (26°C to 60°C)			
	<b>Climaveneta i-FX-N</b>	<b>55°C</b> (26°C to 60°C)			
	<b>Ecodan PUZ-WM/HWM</b>	<b>58°C</b> (25°C to 60°C)	<b>5-86kW</b>		
	<b>MEHP-iS-G07</b>	<b>61°C</b> (24°C to 65°C)		<b>50-880kW</b>	
	<b>Climaveneta AW-HT</b>	<b>65°C</b> (35°C to 65°C)		<b>38-205kW</b>	
	<b>Ecodan CRHV</b>	<b>65°C</b> (30°C to 65°C)*		<b>60-960kW</b>	
	<b>Ecodan CAHV</b>	<b>70°C</b> (24°C to 70°C)		<b>40-640kW</b>	
	<b>Climaveneta EW-HT*</b>	<b>78°C</b> (55°C to 78°C)		<b>70-279kW</b>	
	<b>Ecodan QAHV</b>	<b>90°C</b> (55°C to 90°C)		<b>40-640kW</b>	

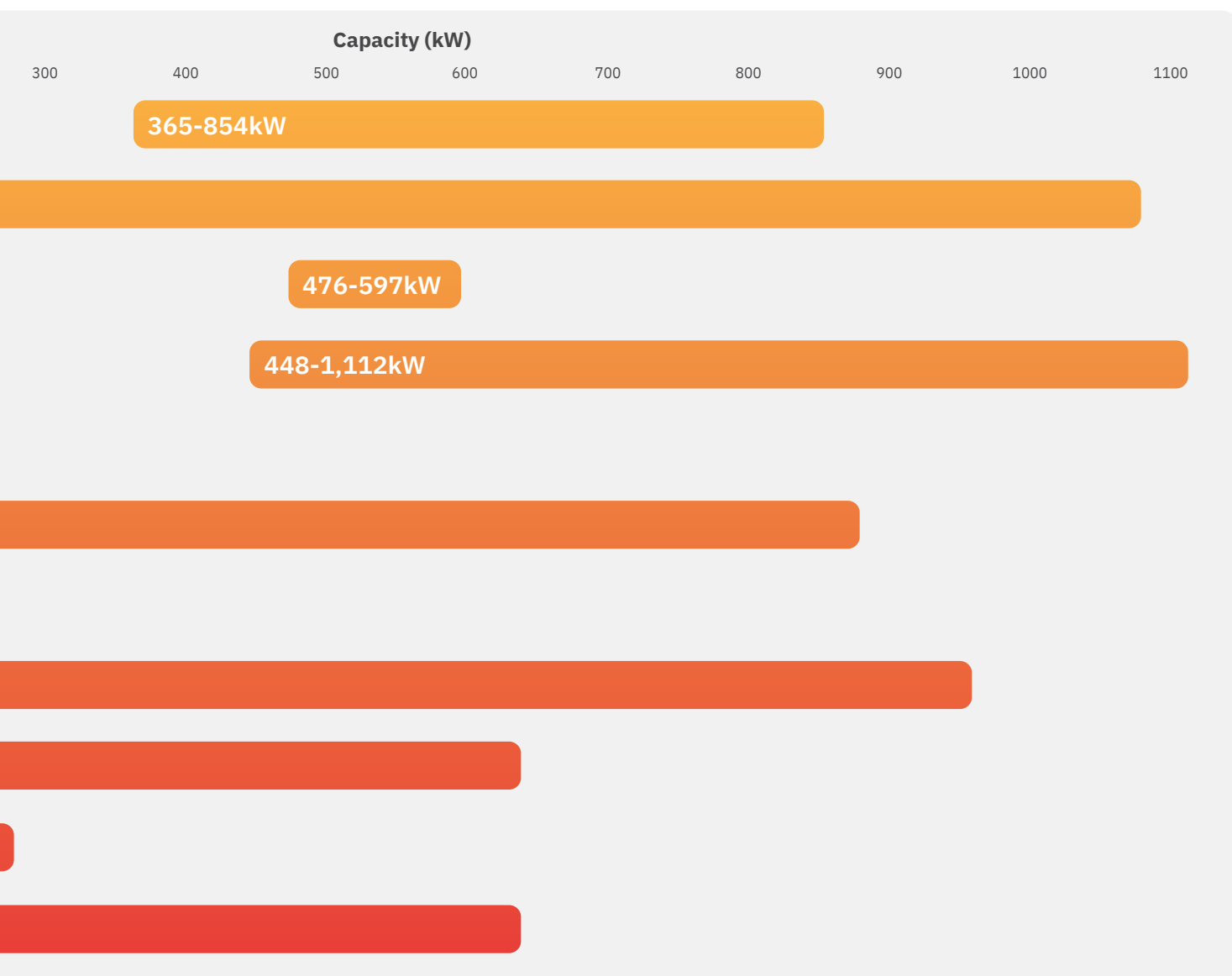
Notes: \* Water source



**Climaveneta** - Commercial heat pumps that use a wide range of low and lower GWP refrigerants, alongside the latest fixed speed/inverter scroll and screw compressors.

**e-Series** - Designed for medium to large capacity LTHW commercial applications, the e-Series modular heat pump range allows for up to 6 individual units to be connected together.

**Ecodan** - A range of renewable heat pumps that efficiently and reliably generate sustainable space heating and hot water all year round.





# Ecodan Hydrodan EHWT17D-MHEDW

## Water to Water Heat Pump

The **Ecodan Hydrodan** is a water to water heat pump, designed to produce heating and hot water in residential apartments, and connect to a fifth generation ambient temperature heat network deployed throughout the building.

The use of these networks helps to reduce overheating in apartments and also produces negligible distribution losses. The local heat network can be maintained at ambient temperature by a Mitsubishi Electric commercial heat pump, environmental source or connected to a district heat network.



### Capacity Range

Single Phase	7kW (1.5 - 9.3kW) - L25/W35
--------------	-----------------------------

### Components

Compressor Type	 Inverter
-----------------	--

Refrigerant	 32
-------------	--

Variable PICV Loop Control	
----------------------------	---

### Operation Range

Loop Temperature Range	10°C to +30°C
------------------------	---------------

Flow Temperature Range	20°C to 60°C
------------------------	--------------

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment.

Embodied carbon data can now be found for the Ecodan Hydrodan product according to the CIBSE TM65 calculation methodology.



### **EHWT17D-MHEDW**

CIBSE TM65 Embodied Carbon Mid-level Calculation



## Key Features & Benefits



### ▶ **Removable Heat Pump Module**

Simple for repairs.



### ▶ **Highly Efficient Heating and Hot Water Production**

Low running costs for owners.



### ▶ **Low Quantity of R32 Refrigerant**

Low environmental impact.



### ▶ **PIC Valve Network Control**

Simple pressure balancing and flow control.



### ▶ **Ultra-Low Noise Output**

No disturbance for owners.



## Product Information

Click on the icons or Scan the QR codes

### **Ecodan Hydrodan**

Water to Water Heat Pump



# NX2-N

## Air Source Heat Pump

Designed for medium to large capacity commercial applications, the Climaveneta NX2-N heat pump range is the ideal solution for LTHW in a wide range of applications.

The unit is supplied fully factory tested, with site installation only requiring power and hydraulic connection



### Capacity Range

Single Modules

365 – 853kW

### Components

Compressor Type



Scroll

Refrigerant

**R**

454B

Fan Type



Axial

Heat Exchanger Type

**T**

Shell & Tube

Heat Exchange Coils



Copper & Aluminium Tube and Fin

### Operation Range

Ambient Temperature Range

-15°C to +35°C in heating mode

Flow Temperature Range

24°C to 55°C

**Note:** Full detail of operation windows can be found in product databook.




## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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 **Embodied Carbon TM65 Calculations**



## Key Features & Benefits



### ▶ Wide Capacity Range

Units are equipped with up to 8 scroll compressors in multi-circuit configuration, for a wide capacity range of up to 853kW of heating capacity.



### ▶ Patented Fan Section Layout

To ensure the independent operation of the circuits, reduce the unit's footprint and improve the efficiency at partial load.



### ▶ Extensive Options

An extensive option list, including: high efficiency, silent operation, BEMS connection, refrigerant leak detection and more means the NX2-N can offer a solution for the most demanding of project requirements.



## Product Information

Click on the icons or Scan the QR codes

### **NX2-N**

Air Source Heat Pump



# EAHV

## Air Source Heat Pump

Designed for medium to large capacity LTHW commercial applications, the e-Series heat pump range allows for up to 6 individual units to be connected together using a modular design.

This approach reduces space requirements and simplifies lifting and installation






# R32

### Capacity Range

Single Modules	150 & 180kW
Cascade Solution	300kW - 1,080kW

### Components

Compressor Type	 Inverter Scroll	Refrigerant	<b>R</b> 32
Fan Type	 DC	Heat Exchanger Type	<b>P</b> Plate (water side)
Heat Exchanger Type	 Aluminium Tube (air side)		

### Operation Range

Ambient Temperature Range	-20°C to +43°C in heating mode
Flow Temperature Range	25°C to 55°C

Note: Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment.

Embodied carbon data can now be found for the EAHV-M1500 product according to the CIBSE TM65 calculation methodology.



### EAHV-M1500YCL-N

CIBSE TM65 Embodied Carbon Mid-level Calculation



## Key Features & Benefits



### ▶ Internal Headers

The in-built internal header pipes simplify design, installation and maintenance, and makes the e-Series range truly modular and suitable for almost any situation.



### ▶ Optimum Frequency Control

The optimum number of units is put in operation by using a unique automatic frequency control function, to achieve maximum efficiency based on the system load demand.



### ▶ Rotation Function

When multiple modules are installed, the operating time of each module in the same system can be equalized according to the load of the whole system.



## Product Information

Click on the icons or Scan the QR codes

### EAHV-M1500/1800YCL-N

Air Source Heat Pump





# FOCS-N

## Air Source Heat Pump

Designed for medium to large capacity LTHW commercial applications, the Climaveneta FOCS-N heat pump features screw compressors and is suitable for a wide range of projects.

The new generation of air source heat pump has been perfectly designed for reducing operating costs, whilst keeping an extremely compact design.



### Capacity Range

Single Modules

465 – 596kW

### Components

Compressor Type



Screw

Refrigerant



513A

Heat Exchanger Type



Shell & Tube

### Operation Range

Ambient Temperature Range

-10°C to +20°C in heating mode

Flow Temperature Range

26°C to 60°C

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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Embodied carbon data can now be found for many of our products according to the CIBSE TM65 calculation methodology, and we will be expanding the products on this list as we move forward.



**Embodied Carbon  
TM65 Calculations**



## Key Features & Benefits



### ► Compact Design

Reduced footprint for easy installation, even on sites with space constraints.



### ► Low GWP Refrigerant

A new generation refrigerant R513A, with a reduced global warming potential value of 572, zero impact on the ozone layer and non-flammable A1 class.



### ► Extensive Options

An extensive option list, including: high efficiency, silent operation, BEMS connection, refrigerant leak detection and more means the FOCS-N can offer a solution for the most demanding of project requirements.



## Product Information

Click on the icons or Scan the QR codes

### FOCS-N

Air Source Heat Pump



# i-FX-N

## Air Source Heat Pump

Designed for medium to large capacity LTHW commercial applications, the Climaveneta i-FX-N heat pump features inverter driven screw compressors and is suitable for a wide range of projects.

The new generation of air source heat pump has been perfectly designed for reducing operating costs, whilst keeping an extremely compact design.



### Capacity Range

Single Modules

448 - 1,111kW

### Components

Compressor Type



Inverter Screw

Refrigerant

**R**

513A

Fan Type



Axial

Heat Exchanger Type

**T**

Shell & Tube

### Operation Range

Ambient Temperature Range

-12°C to +35°C in heating mode

Flow Temperature Range

26°C to 60°C

**Note:** Full detail of operation windows can be found in product databook.




## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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Embodied carbon data can now be found for many of our products according to the CIBSE TM65 calculation methodology, and we will be expanding the products on this list as we move forward.

 **Embodied Carbon  
TM65 Calculations**



## Key Features & Benefits



### ▶ Total Inverter Technology

Inverter control on all compressors, fans and optional hydraulic modules means perfectly matched cooling loads of the plant in every condition, and stepless capacity control with high accuracy.



### ▶ Low GWP Refrigerant

A new generation refrigerant R513A, with a reduced global warming potential value of 572, zero impact on the ozone layer and non-flammable A1 class.



### ▶ Extensive Options

An extensive option list, including: high efficiency, silent operation, BEMS connection, refrigerant leak detection and more means the i-FX-N can offer a solution for the most demanding of project requirements.

## Product Information

Click on the icons or Scan the QR codes

**i-FX-N**  
Air Source Heat Pump



# PUZ-WM

## Air Source Heat Pump

Designed for low to medium capacity applications, the Ecodan PUZ-WM range of monobloc air source heat pumps can operate singularly or form part of a multiple unit system.

The advanced FTC6 controller can manage the cascade, rotation and capacity output of up to 6 units of the same capacity for LTHW and DHW.



# R32

 **MELCloud**



Manufactured in the UK



037-0032-20-01

### Capacity Range

Single Module

5, 6, 8.5 & 11.2kW

Cascade Solution

10 – 67.2kW

### Components

Compressor Type



Inverter Scroll

Refrigerant

**R** 32

### Operation Range

Ambient Temperature Range

-20°C to +24°C (-25°C for 11.2kW model) in heating mode

Flow Temperature Range

25°C to 60°C

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment. Embodied carbon data can now be found for the Ecodan PUZ-WM product according to the CIBSE TM65 calculation methodology.

**PUZ-WM50VHA(-BS)**  
CIBSE TM65 Embodied  
Carbon Mid-level Calculation



**PUZ-WM60VAA(-BS)**  
CIBSE TM65 Embodied  
Carbon Mid-level Calculation



**PUZ-WM85VAA(-BS)**  
CIBSE TM65 Embodied  
Carbon Mid-level Calculation



**PUZ-WM112VAA(-BS)**  
CIBSE TM65 Embodied  
Carbon Mid-level Calculation



## Key Features & Benefits



### ▶ A+++ High Efficiency Systems

The incredibly high efficiency of the range results in ultra low running cost for the end user.



### ▶ Compact Design

The single fan chassis minimises required plant space in commercial applications by reducing the installation space required.



### ▶ Maintains Full Heating Capacity at Low Temperature

Suitable for a wider range of applications, with no compromise in performance.



### ▶ Ultra Quiet Noise Levels (6-11.2kW models)

Creates flexibility in product placement.



## Product Information

Click on the icons or Scan the QR codes

**PUZ-WM50VHA(-BS)**  
Ecodan Air Source Heat Pump



**PUZ-WM60VAA(-BS)**  
Ecodan Air Source Heat Pump



**PUZ-WM85VAA(-BS)**  
Ecodan Air Source Heat Pump



**PUZ-WM85YAA(-BS)**  
Ecodan Air Source Heat Pump



**PUZ-WM112VAA(-BS)**  
Ecodan Air Source Heat Pump



**PUZ-WM112YAA(-BS)**  
Ecodan Air Source Heat Pump





# PUZ-HWM

## Air Source Heat Pump

Designed for low to medium capacity applications, the Ecodan PUZ-HWM range of monobloc air source heat pumps can operate singularly or form part of a multiple unit system.

The advanced FTC6 controller can manage the cascade, rotation and capacity output of up to 6 units of the same capacity for LTHW and DHW.



# R32

 **MELCloud**

 037-0032-20-01

### Capacity Range

Single Module **14kW**

Cascade Solution **28kW - 86kW**

### Components

Compressor Type  **Inverter Scroll**

Refrigerant **R 32**

### Operation Range

Ambient Temperature Range **-28°C to +21°C in heating mode**

Flow Temperature Range **25°C to 60°C**

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment.

Embodied carbon data can now be found for the Ecodan PUZ-HWM product according to the CIBSE TM65 calculation methodology.



### PUZ-HWM140VHA(-BS)

CIBSE TM65 Embodied Carbon Mid-level Calculation



## Key Features & Benefits



### ▶ A+++ High Efficiency Systems

The incredibly high efficiency of the range results in ultra low running cost for the end user.



### ▶ Compact Design

The single fan chassis minimises required plant space in commercial applications by reducing the installation space required.



### ▶ Maintains Full Heating Capacity at Low Temperature

Suitable for a wider range of applications, with no compromise in performance.



## Product Information

Click on the icons or Scan the QR codes

### PUZ-HWM140VHA(-BS)

Ecodan Air Source Heat Pump



### PUZ-HWM140YHA(-BS)

Ecodan Air Source Heat Pump



# MEHP-iS-G07

## Air Source Reversible Heat Pump

The MEHP-iS-G07 heat pump range is manufactured to the highest standard quality and features. Suitable for a range of different applications, from comfort to industrial.

Achieving top-level energy efficiencies, in the most compact footprints in their category. The range comprises of 7 new sizes developed within 3 compact modules to fit any thermal load requirement up to 110kW and able operating in a group to provide 880kW.



# R32

### Capacity Range

Single Modules

50-110kW

Cascade solution

110kW - 880kW

### Components

Compressor Type



Inverter Scroll

Refrigerant

**R**

32

Fan Type



Axial

Heat Exchanger Type

**P**

Plates

### Operation Range

Ambient Temperature Range

- 20°C to 40°C in heating mode

Flow Temperature Range

25°C to 60°C

**Note:** Full detail of operation windows can be found in product databook.



**Embodied Carbon TM65 Calculation Results** Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment. Embodied carbon data can now be found for the Ecodan PUZ-WM product according to the CIBSE TM65 calculation methodology.

**MEHP-iS-G07 /0051**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0061**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0071**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0082**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0092**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0102**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**MEHP-iS-G07 /0112**  
CIBSE TM65 Embodied Carbon Mid-level Calculation



**Key Features & Benefits**



**Total Inverter Technology**

Inverter control on all compressors, fans and optional hydraulic modules means perfectly matched cooling loads of the plant in every condition, and stepless capacity control with high accuracy.



**Reduced Sound Levels**

Best-in-class sound levels without additional accessories. The MEHP-iS-G07 is fitted with acoustic enclosures for compressors and (optional) hydronic kits as standard.



**Smart Coordinated Defrost**

Smart control logic for coordinating the non-simultaneous start of defrosting cycles of a group of heat pumps.

**Product Information** Click on the icons or Scan the QR codes

**MEHP-iS-G07**  
Air Source Reversible Heat Pump



# AW-HT

## Air Source Heat Pump

Designed for medium capacity commercial applications, the Climaveneta AW-HT heat pump system is the ideal solution for a wide range of applications requiring both LTHW and DHW.



### Capacity Range

Single Modules **38 - 205kW**

Cascade Solution **38 - 1,025kW**

### Components

Compressor Type  **Scroll**

Refrigerant **R 407C**

Fan Type  **Axial**

Heat Exchanger Type **P Plate**

Heat Exchange Coils  **Copper & Aluminium Tube and Fin**

### Operation Range

Ambient Temperature Range **-20°C to + 60°C**

Flow Temperature Range **35°C to 65°C**

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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Embodied carbon data can now be found for many of our products according to the CIBSE TM65 calculation methodology, and we will be expanding the products on this list as we move forward.



**Embodied Carbon  
TM65 Calculations**



## Key Features & Benefits



### ▶ Extensive Operation Range

Production of 65°C water is available even at ambient temperatures down to -12°C, whilst maintaining high efficiency.



### ▶ Maximum Operating Reliability

Split independent refrigerant circuits and an advanced defrost control provides maximum operating reliability when it's needed most.



### ▶ Cascade Control

Up to 5 units can be controlled in a single cascade. This cascade control allows capacity from 38kW all the way up to 1,025kW.



## Product Information

Click on the icons or Scan the QR codes

### AW-HT

Air Source Heat Pump





# EW-HT

## Water to Water Heat Pump

The Climaveneta EW-HT is perfect for applications where very high temperature water is needed. With the ability to provide hot water up to 78°C, the operating parameters of the EW-HT make it the ideal solution for a wide range of commercial applications, such as 4-pipe systems for residential and commercial buildings, industrial process heat recovery (including IT Cooling) and district heating systems.



### Capacity Range

Single Modules

70 - 279kW

Cascade Solution

140 - 2,232kW

### Components

Compressor Type



Scroll

Refrigerant

**R**

134a

Heat Exchange Coils



Plate

### Operation Range

Inlet Water Range

10°C to 48°C

Flow Temperature Range

55°C to 78°C

**Note:** Full detail of operation windows can be found in product databook.

Heat Exchanger Type

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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### EW-HT 0152

CIBSE TM65 Embodied  
Carbon Mid-level Calculation



### EW-HT 0302

CIBSE TM65 Embodied  
Carbon Mid-level Calculation



## Key Features & Benefits



### ► Extensive Operation Range

Production of up to 78°C water making it ideal for replacing fossil fuel heating.



### ► Dual Circuit Heat Exchangers

A design that ensures each refrigerant circuit is operating with the entire water flow - maximising part load efficiencies.



### ► Compact size and reduced noise

Acoustically orientated design ensures that the EW-HT will fit into your building with minimal noise emissions.

# CRHV

## Ground / Water Source Heat Pump

The Ecodan CRHV is a ground/water source heat pump that can operate singularly, or form part of a multiple unit system for LTHW and DHW. With cascade and rotation built in as standard, the Ecodan CRHV system is perfectly suited to a wide range of commercial applications.



Certificate Number: MCS HP0002  
Product Type: Heat Pumps  
Product Reference: CRHV-P600YA-HPB

### Capacity Range

Single Modules

60kW

Cascade Solution

120 - 960kW

### Components

Compressor Type



Inverter Scroll

Refrigerant

**R**

410A

Hermetically Sealed Design



Heat Exchanger Type

**P**

Plate

### Operation Range

Inlet Water/Brine Temperature Range

-5°C to + 45°C

Flow Temperature Range

30°C to 65°C

**Note:** Full detail of operation windows can be found in product databook. +27°C inlet water needs dip switch setting change.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



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### Embodied Carbon TM65 Calculations



## Key Features & Benefits



### ► Connection to Multiple Heat Sources

Bore holes, slinkies, aquifers, lakes, rivers and waste heat can all be used as a heat source.



### ► Cascade Control

Up to 16 units can be controlled in a single cascade.



### ► Rotation Function

When multiple modules are installed, the operating time of each module in the same system can be equalized according to the load of the whole system.



### ► Split Refrigerant Circuits

Compression is delivered from 2 compressors. If a single compressor was ever to malfunction the other could continue to operate and provide 50% capacity.



## Product Information

Click on the icons or Scan the QR codes

### CRHV-P600YA-HPB

Ecodan Ground / Water Source Heat Pump





# CAHV-R

## Air Source Heat Pump

The Ecodan CAHV air source heat pump uses low GWP R454C refrigerant, offering a robust, low carbon system for the provision of sanitary hot water and space heating. This innovative heat pump solution can operate as a single system or form part of a multiple unit system, making it suitable for most commercial applications. The multiple unit system has the ability to cascade.



### Capacity Range

Single Modules

40kW

Cascade Solution

40 - 640kW

### Components

Compressor Type



Inverter Scroll

Refrigerant

**R**

454C

Fan Type



Axial

Heat Exchanger Type

**P**

Plate

Hermetically Sealed Design



### Operation Range

Ambient Temperature Range

-25°C to +43°C

Flow Temperature Range

24°C to 70°C

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment.

Embodied carbon data can now be found for the Ecodan CAHV product according to the CIBSE TM65 calculation methodology.



### CAHV-R450YA-HPB

CIBSE TM65 Embodied Carbon Mid-level Calculation



## Key Features & Benefits



### ▶ Cascade Control

Multiple unit cascade control from 7.8kW to 640kW capacity provides design flexibility for a wide range of commercial applications.



### ▶ Rotation Function

When multiple modules are installed, the operating time of each module in the same system can be equalized according to the load of the whole system.



### ▶ Low Frequency Compressor Control

This feature minimises thermo on/off frequency during low-load operation, resulting in improved energy efficiency. Compression is delivered from a compressor with low frequency control. It results in continuous heating provision for low ambient temperature.



## Product Information

Click on the icons or Scan the QR codes

**CAHV-R450YA-HPB**  
Ecodan Air Source Heat Pump



# QAHV

## Air Source Heat Pump





Specifically designed for medium capacity commercial sanitary hot water application, where gas boilers, combined heat and power systems (CHP) or electric water heating have been traditionally utilised, the Ecodan QAHV provides a low carbon, high temperature solution for a wide range of projects. To help achieve this, the Ecodan QAHV utilises the natural refrigerant CO<sub>2</sub>.



### Capacity Range

Single Modules	40kW
Cascade Solution	80 - 640kW

### Components

Compressor Type	 Inverter Scroll	Refrigerant	<b>R</b> 744 (CO <sub>2</sub> )
Fan Type	 Axial	Heat Exchanger Type	<b>P</b> Plate
Twisted & Spiral Gas Cooler		Flash Injection Technology	

### Operation Range

Ambient Temperature Range	-25°C to +43°C in heating mode
Flow Temperature Range	55°C to 90°C

**Note:** Full detail of operation windows can be found in product databook.

## Embodied Carbon TM65 Calculation Results

Click on the icons or Scan the QR codes



Driven by our mission to make changes for the better, Mitsubishi Electric are taking steps to provide information to help calculate the carbon impact of the built environment.

Embodied carbon data can now be found for the Ecodan QAHV product according to the CIBSE TM65 calculation methodology.



### QAHV-N560YA-HPB

CIBSE TM65 Embodied Carbon Mid-level Calculation



## Key Features & Benefits



### ► High Efficiency at High Flow Temperatures

The combination of CO<sub>2</sub> refrigerant and the twisted & spiral gas cooler technology allows the Ecodan QAHV to provide high  $\Delta T$ 's with flow temperatures up to 90°C at incredible efficiency.



### ► Full Heating Output to -3°C

An injection circuit provides optimum amount of refrigerant to the compressor through a specially designed injection port, to ensure a particularly stable operation at low ambient conditions.



### ► Super Low Noise Levels

Creates flexibility in product placement and minimises the requirement for acoustic mitigations.



## Product Information

Click on the icons or Scan the QR codes

### QAHV-N560YA-HPB

Ecodan Air Source Heat Pump





# Assured Quality and Professional Service

Mitsubishi Electric commercial heating systems are manufactured to the highest, quality assured standards and are supported with the level of pre-sales and after sales service that you'd expect from a leading manufacturer.

With our reputation and continued success reliant on customer satisfaction, we invest 5% of our turnover in research and development to ensure we deliver reliable, high performance solutions that meet tough energy demands.



## Responsible Manufacturing Excellence

Our manufacturing facility in Livingston, Scotland produces many of our air source heat pumps for the UK and European markets. Our manufacturing plants are also ISO14001 and ISO9001 registered, an international benchmark ensuring we meet and continually improve upon quality and environmental standards.

Mitsubishi Electric is committed to lowering our own production emissions levels and those generated by our equipment during their lifetime. Our **Green Gateway philosophy** strives to improve energy efficiency and take a more responsible approach to energy use, helping the nation to achieve its climate goals.



## Specific Training for Professional Installation

To maximise performance and efficiency, our heating systems require professional design and installation, carried out to exacting standards. Accordingly, the installation of our commercial Ecodan systems must be carried out by an Accredited Mitsubishi Electric Heating Partner. Mitsubishi Electric provide specific, in-depth training at our state-of-the-art training centres across the UK, or via our award-winning online training, covering all aspects of installation, from design through to maintenance.



## Technical Support to Maximise Performance

Mitsubishi Electric has a dedicated Technical Support department to ensure the optimal performance of our heating systems throughout their lifetime. From fault-finding to quick delivery of spare parts, our team of qualified engineers are on hand to offer technical advice at all levels.



## Warranty for Added Peace of Mind

For added assurance, all professionally installed and maintained systems come with a warranty period. Our e-Series, QAHV, CAHV and CRHV products come with a 3 year standard warranty, extendable up to 5 years if commissioned by a Mitsubishi Electric Engineer. Our Climaveneta heat pump range comes with a 1-year warranty that can be extended to 3-year\*1.

\*1 Subject to warranty terms and conditions being met.

# Mitsubishi Electric is a market leader in providing solutions to cool, heat, ventilate and control our buildings

As a major manufacturer of these pivotal technologies, we hold the UK's energy challenges close to our heart.

We want to help the nation achieve its climate goals; we want to help individuals and businesses reduce the energy consumption of their buildings, whilst also helping to reduce their annual running costs.

For more information visit:

[les.mitsubishielectric.co.uk](https://les.mitsubishielectric.co.uk)





**Telephone: 01707 282880**

MELSmart Technical Services: 0161 866 6089

Technical Help - option 1

Warranty - option 3

Training - option 6 followed by option 1

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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), 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).

Effective as of February 2023



[www.greengateway.mitsubishielectric.co.uk](http://www.greengateway.mitsubishielectric.co.uk)

Mitsubishi Electric UK's commitment  
to the environment