The Renewable Solutions Provider

Making a World of Difference

Heating

For Commercial Applications

MITSUBISHI ELECTRIC

Air Conditioning | Heating
Ventilation | Controls

ecodan®
Renewable Heating Technology

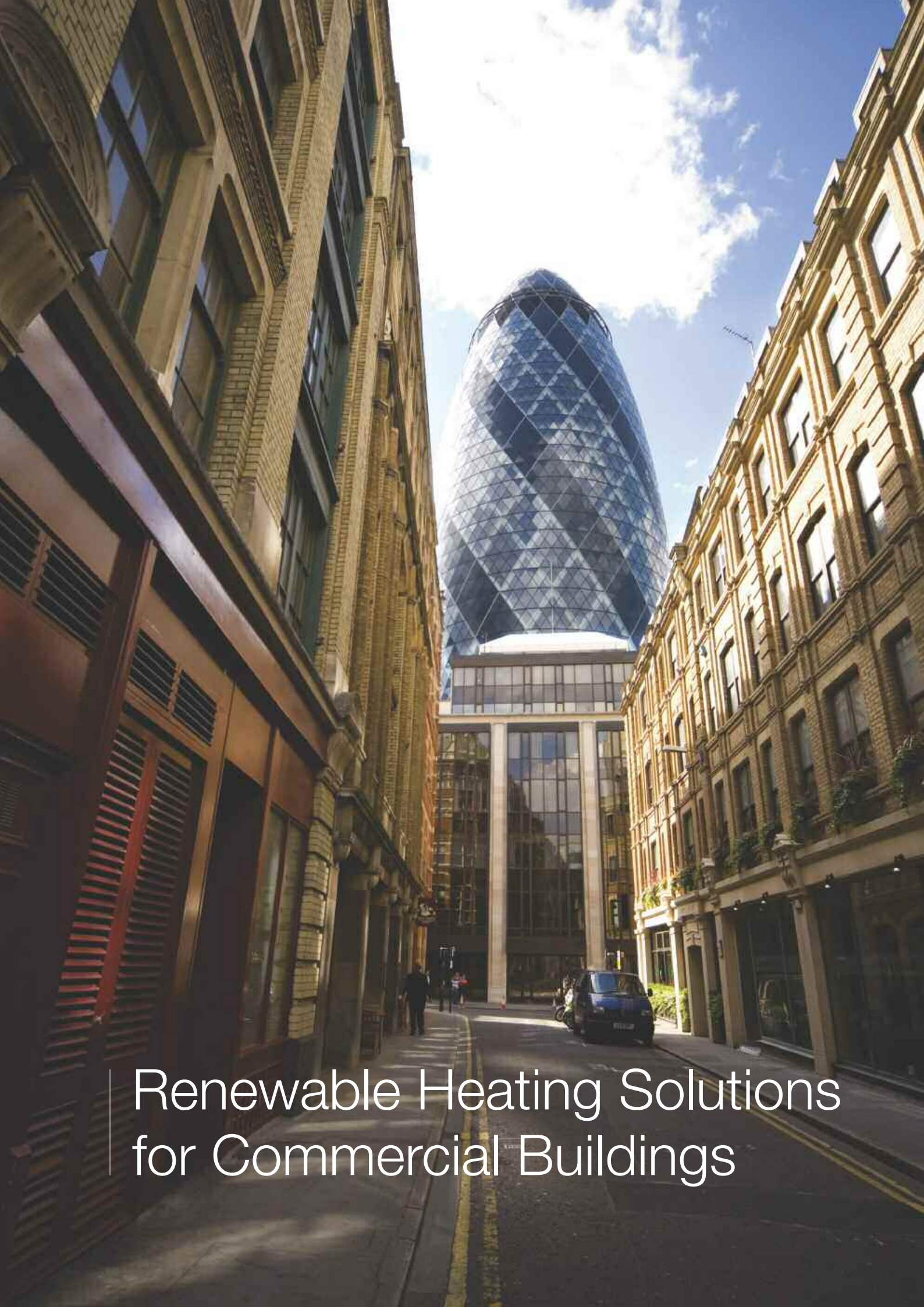
The name Mitsubishi is synonymous with excellence

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

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

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 have evolved and today we offer advanced environmental systems that really can make a world of difference.



Renewable Heating Solutions for Commercial Buildings

Issues driving the need for renewable heating

How heat is provided to commercial buildings has to change dramatically. Fuel security, rising fossil fuel prices, increasingly tough legislation and the need to combat climate change, are all driving the demand for greater efficiency and the inclusion of renewable energy.

The key drivers encouraging the use of renewable heating are:

- The need to reduce CO_2 emissions by 80% by 2050[1]
- Reducing the UK's reliance on fossil fuels
- Meeting increasingly tough legislation
- Incorporating renewable energy

Commercial buildings are responsible for 18% of total UK emissions[2] and typically 51% of the emissions generated by each building are due to the need for space and water heating.[3]

It is clear that if the UK is to achieve the goals that have been set then these areas need urgent attention. This is why many new build and major refurbishment projects throughout the UK must now demonstrate significant use of renewable energy or simply face planning refusal.

To reduce reliance on fossil fuels and preserve our energy resources into the future, we must consider alternative heating solutions that harness renewable energy and subsequently reduce energy consumption, lower emissions and increase efficiency.

Pressure to improve energy efficiency and reduce CO_2 emissions, has resulted in the UK Government introducing tough new laws and challenging targets. As part of the EU objective to increase the use of renewable energy, the UK has committed to sourcing 15% of its energy from renewable sources by 2020.[4]

A further 900,000 commercial buildings are expected to be in place by 2050, this sector has a big part to play in reducing CO_2.[5]

1 www.decc.gov.uk/en/content/cms/emissions/carbon_budgets/carbon_budgets.aspx
2 Digest of UK Energy Statistics, BRE
3 Carbon Trust Analysis, BRE
4 www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx
5 Pathways 2050

To reduce reliance on fossil fuels and preserve our energy resources into the future, we must consider alternative renewable heating solutions

Key legislation driving the need for renewable heating

Successive UK Government's have led with legislation to drive the need for renewable heating. Some of the key items with regard to the provision of heat to buildings include:

Part L of the Building Regulations

Through Part L (2013) the Government aims to reduce emissions from new non-domestic buildings by an average of 9% when compared against the 2010 standards. As the need for heat is the major energy demand in a building, it is vital that this area is addressed. This means that energy consumption has to be reduced as much as possible through reducing the heat lost by a building, making it more air tight and improving levels of insulation.

One of the most significant rules of Part L 2013 is that before construction starts the technical, environmental and economic feasibility of high efficiency alternative systems needs to be considered. Low and zero carbon alternatives, such as heat pumps, can then be chosen to deliver renewable heat, whilst removing the need for direct fossil fuel use on site that typically results in higher direct emission levels.

As with previous versions, Part L 2013 has a prescribed method for showing compliance with the regulations. The compliance calculation methods reflect a greater emphasis on value for money of low carbon technologies. There is also a greater requirement to demonstrate energy efficiency as well as carbon reduction.

By setting targets for both carbon and energy use, the new Part L 2013 prevents any dwelling meeting Part L requirements by offsetting poor fabric performance with renewables or low carbon technologies.

Planning Policy

Planning is key to how buildings are delivered and has an important role in achieving the wider goals of reducing UK emissions and influencing the choice of technology that should be installed. Stringent building regulations, enforced by local authorities, now mean that no new build project will get planning permission without first demonstrating an improvement in efficiency, as well as the use of renewable energy. An example of planning policy is The London Plan.

The London Plan

In October 2013, the Mayor of London published an updated version of the London Plan, which is an overall strategic plan for the UK's capital city. The Plan covers a broad range of important issues including transport, economics and the environment.

One of the most important parts of the London Plan covers 'London's response to climate change'. This section of the document deals with how the city will be affected by increasing temperatures and rising sea levels. The UK Climate Projects 2009 (UKCP09)[6] suggest that by 2020 London could experience an increase in the mean summer temperature of 1.5ºC. This would be accompanied by a rise in mean winter rainfalls of 6%.

The plan is very clear that one of the biggest challenges is in the built environment. Under the Greater London Authority Act 2007, the London Mayor has a statutory duty to 'contribute towards the mitigation of, and adaptation to, climate change in the UK'.

According to the London Plan, London contributes 8.4% of the UK's carbon emissions[7], amounting to around 44.71 million tonnes. Due to the high density of development in London, and the high use of public transport, the city does have the lowest carbon emissions per-person-per-year of all the UK regions[7]. However, this does not diminish the scale of the challenge.

The building stock is a key area of concern for London, and the plan estimates that around 80% of the existing building stock will still be in use in 2050. The plan concentrates mainly on influencing new-build projects, with the aim of limiting future changes in carbon emissions beyond what is already calculated.

For new-build projects, the emphasis in the latest version of the London Plan is very much on reducing carbon emissions. The aim is to achieve an overall reduction in London's carbon dioxide emissions of 60% below 1990 levels and to deliver 25% of the city's energy requirement from decentralised sources by 2025. All London boroughs are expected to play their parts in achieving this goal.

The plan sets carbon emissions targets for new buildings which are expressed as improvements on the 2010 Building Regulations. There is also a requirement for each major development proposal to submit an in-depth energy assessment including how CO_2 reduction targets are going to be met. These target reductions will be set higher each year up to 2031 when new buildings will have to be zero carbon.

Carbon reduction targets for non-domestic buildings

Year	Improvement on 2010 Building Regulations
2010 - 2013	25%
2013 - 2016	40%
2016 - 2019	As per Building Regulation requirements
2019 - 2031	Zero carbon

Two strategies that are considered particularly useful to London are decentralised energy generation and the issue of secondary heat sources. These secondary sources include waste heat from industrial and commercial activities, as well as heat that exists naturally in the air, ground or water.

The London Plan expresses clearly that new development proposals should use renewable technologies to provide secondary heat, including heat pumps, wherever possible. A wide range of technologies are recommended, to ensure that each site uses the most suitable renewable solution and can achieve the most cost-effective carbon emissions savings.

As a consequence of rising fuel costs, tough legislation and the need to reduce CO_2 emissions, the energy saving issues faced by those involved in heating commercial properties are now considerable.

6 UKCP09: Department for Environment, Food and Rural Affairs (DEFRA) June 2009
7 Figures from The London Plan July 2011, Chapter 5 London's Response to Climate Change

ECR: Efficiency, Carbon reduction & Renewables

Pivotal to ECR, heat pumps make significantly better use of electricity to improve efficiency and help to preserve future fuel supplies.

At Mitsubishi Electric, we're aware of the need to influence and improve how energy is used. Buildings need heating, it constitutes the greatest part of their energy demand, however, there is also a pressing need to increase energy efficiency, reduce carbon emissions and incorporate renewable energy.

Using advanced heat pump technology, our commercial heating products can effectively address the three key issues we all face:

- Energy efficiency
- Carbon reduction
- Renewable energy

Increased Efficiency

Maximum efficiency is paramount: the cheapest and cleanest kilowatt of energy is the one you do not use. Achieving this means sealing a building's envelope first, but as the energy consumed through the life of a building accounts for 83% of its total footprint[8], it also requires the selection and correct installation, maintenance, monitoring and operation of the most energy-efficient heating technologies.

It is vital that short-term decisions give way to those that take a whole lifetime view. Fossil fuels will continue to increase in cost and become harder to obtain, making them a far less attractive option, especially as the technologies that burn them are already at their peak efficiency. Greater economies can now be realised by switching to other fuels. Indeed, a future with electricity as the only point-of-use energy source is now possible and desirable, as heat pumps can use this to multiply naturally available heat to more useable temperatures.

8 Low Carbon Construction, Innovation & Growth Team, Final Report

Reduce Carbon Emissions

Buildings in all their forms account for the highest proportion of emissions in the UK than any other sector. This has to change and the emissions generated through the need for heat must be the first priority.

Reductions can be achieved now with technology that is readily available, reliable and scalable for use in many building types. Heat pumps are one of the options, and the skills already exist to incorporate them into most building designs. They can remove the use of fossil fuels on-site, thereby reducing direct emissions and with national targets that are large and short term, they are increasingly seen as being a pivotal solution.

Heat pumps are the only technology that will benefit from grid electricity supplies getting cleaner over time.

Integrate Renewables

The UK is looking to achieve 12% of its heat from renewable sources by 2020[9], and this ambitious target requires immediate action if it is to be realised. Heat pumps offer a solution that delivers proven environmental benefits that are scalable for use in many buildings, whilst being competitive in economic terms and acceptable to the vast majority of users due to their reliable and efficient operation.

We are fortunate that most of our buildings are suitable for the inclusion of heat pumps and that our ambient conditions mean they can work at their optimum output.

Our heat pumps upgrade naturally occurring renewable heat found in the outside air, ground or water.

The ECR Approach:

9 www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/policy/renewableheat/1387-renewable-heat-incentive.pdf

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[10], our commercial heating products come in a range of sizes and options to meet the required demands.

For every 1kW of electricity consumed by one of our air source heat pump systems, 3.2kW of heat can be delivered, 69% of which is renewable energy.[11]

Renewable heat pumps:

- Help to achieve renewable energy targets
- Provide high levels of efficiency, cutting running costs as well as CO_2 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

10 European Parliament & Council, Renewable Energy Directive 2009/28/EC

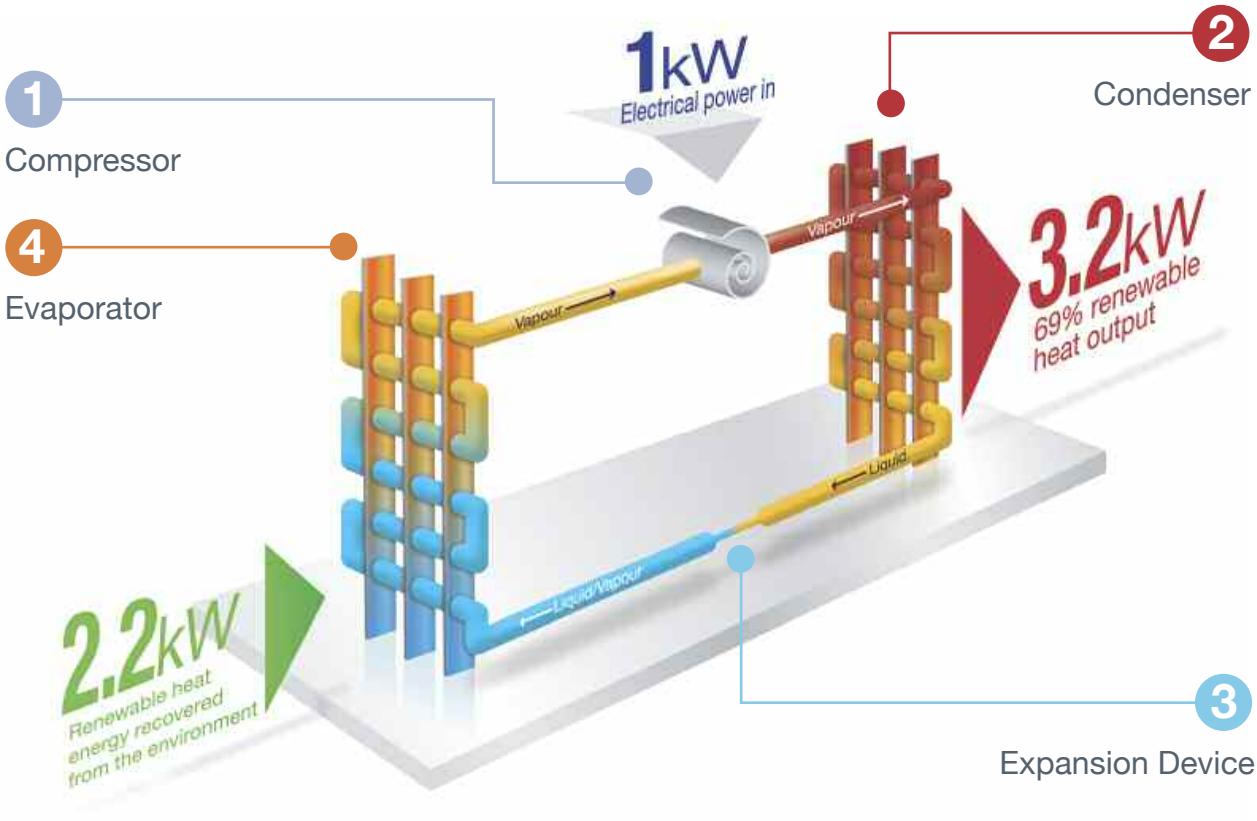
11 As independently tested by BSRIA based upon BSEN14511 Part 3 standard rating conditions. Due to the method of operation, the performance of heat pumps will vary based upon the temperature of the heat source and the requirements of the heat delivered. The BSEN14511 testing relates to the heat pump performance only and not the entire heating system.

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 handling the space and water heating loads required in buildings.

The Vapour Compression Cycle[11]:



1	**Compression** - Refrigerant vapour is raised in pressure and therefore temperature.
2	**Condensing** - This hot pressurised refrigerant vapour is then passed through a condenser, where it liquefies and gives off useable heat that can be delivered to a building by either air or water.
3	**Expansion** - Liquid refrigerant is then allowed to expand, which lowers its pressure.
4	**Evaporation** - The low pressure liquid then expands and absorbs naturally occurring heat from the environment (this can be from the air, water or ground) and in doing so changes back to a vapour, which is then passed to the compressor for the cycle to start again.

The Non-Domestic Renewable Heat Incentive

The Renewable Heat Incentive is the world's first long term financial support for the generation of renewable heat. It was introduced to encourage the uptake of renewable technologies, such as heat pumps, whilst lowering the UK's carbon emissions.

The Government's Department of Energy & Climate Change (DECC) will now pay for the generation of renewable heat. This has been designed to level the playing field between the cost of renewable and traditional fossil fuel systems.

The non-domestic RHI aims to encourage the uptake of renewable heat technologies by compensating for barriers to their adoption, including the current higher capital costs and in some cases higher operational expenditure for these technologies compared to those using traditional fossil fuels.

The heat generated must be used for space, water or process heating to be eligible for RHI support and participants in the scheme will be required to meet a number of ongoing obligations, including maintaining equipment, providing information to Ofgem (which administers the scheme) and allowing installations to be inspected.

So how does it work:

The Non-Domestic Renewable Heat Incentive Application Process

- Set up RHI profile on the Ofgem website
- Submit application to Ofgem online
- Ofgem accredits install if all eligibility criteria is met
- Meter readings are submitted periodically

Save money and get paid thanks to Mitsubishi Electric's Ecodan

- **Time period** - Claimable for 20 years
- **Tariff** - 2.5p/kWh (Air) / 7.2p/kWh* (Ground/Water)
- **Heat claimable** - Total heat output
- **Installations from** - 15th July 2009 (Ground/Water) / 4th December 2013 (Air)
- **Claim from** - 28th November 2011 (Ground/Water) / 28th May 2014 (Air)
- **Flow temperatures** - Low flow temperatures will achieve lower running costs, but RHI allows any flow temperature as long as it achieves an SPF (Seasonal Performance Factor) of 2.5
- **Accreditation** - Our non-domestic heat pumps are Microgeneration Certification Scheme (MCS) and Enhanced Capital Allowance (ECA) approved

*Tier 1 - 8.7p/kWh Tier 2 - 2.6p/kWh

Ecodan Selection Tool

Mitsubishi Electric has developed a calculation tool to help all stakeholders involved in selecting a new heating system get an insight into what a new Ecodan heat pump can deliver for their individual project.

By answering a few very simple questions Mitsubishi Electric can now deliver a bespoke proposal for a project, including an estimate of running costs and Carbon emissions against alternative systems. The application interface is intuitive and goes on to deliver Renewable Heat Incentive payment figures, allowing you to see how making small adjustments to the system will affect the financial reward for having made the decision to move towards this renewable technology.

The new tool is just part of a suite of new functionality we are moving towards in order to make the process of selecting, designing and signing off on choosing Ecodan easier

The tool is available online or as an app for tablets or smartphones:
heating.mitsubishielectric.co.uk/ecodanselectiontool

Available on the App Store | ANDROID APP ON Google play | Windows Store

MELFinance Solutions for Businesses

Mitsubishi Electric developed MELFinance Solutions to respond to current market conditions and the need for customers to manage cash flow, while benefitting from the installation of leading technology to reduce carbon and operational costs.

Through project finance your organisation benefits from a minimum five-year 'trouble free' heating, cooling and ventilation proposition, for every new installation, with a finance package that integrates:

- On-site installation and commissioning fees
- Minimum 3 year warranty on all Mitsubishi Electric equipment
- Minimum six-monthly scheduled maintenance visits
- 24/7 emergency technical helpline for any on-site issues

The Benefits of MELFinance Solutions

Project finance from Mitsubishi Electric is a flexible alternative to a traditional bank loan or overdraft facility that provides significant cash flow and tax benefits:

No need for hefty deposits: Finance deals are secured wholly or largely on the heating, cooling and/or ventilation equipment being financed

Stronger cash flow: Releases tied-up cash and preserves other forms of credit for other business or operational needs

Fixed, regular payments: Helps you plan for the future by eliminating uncertainty and costly surprises

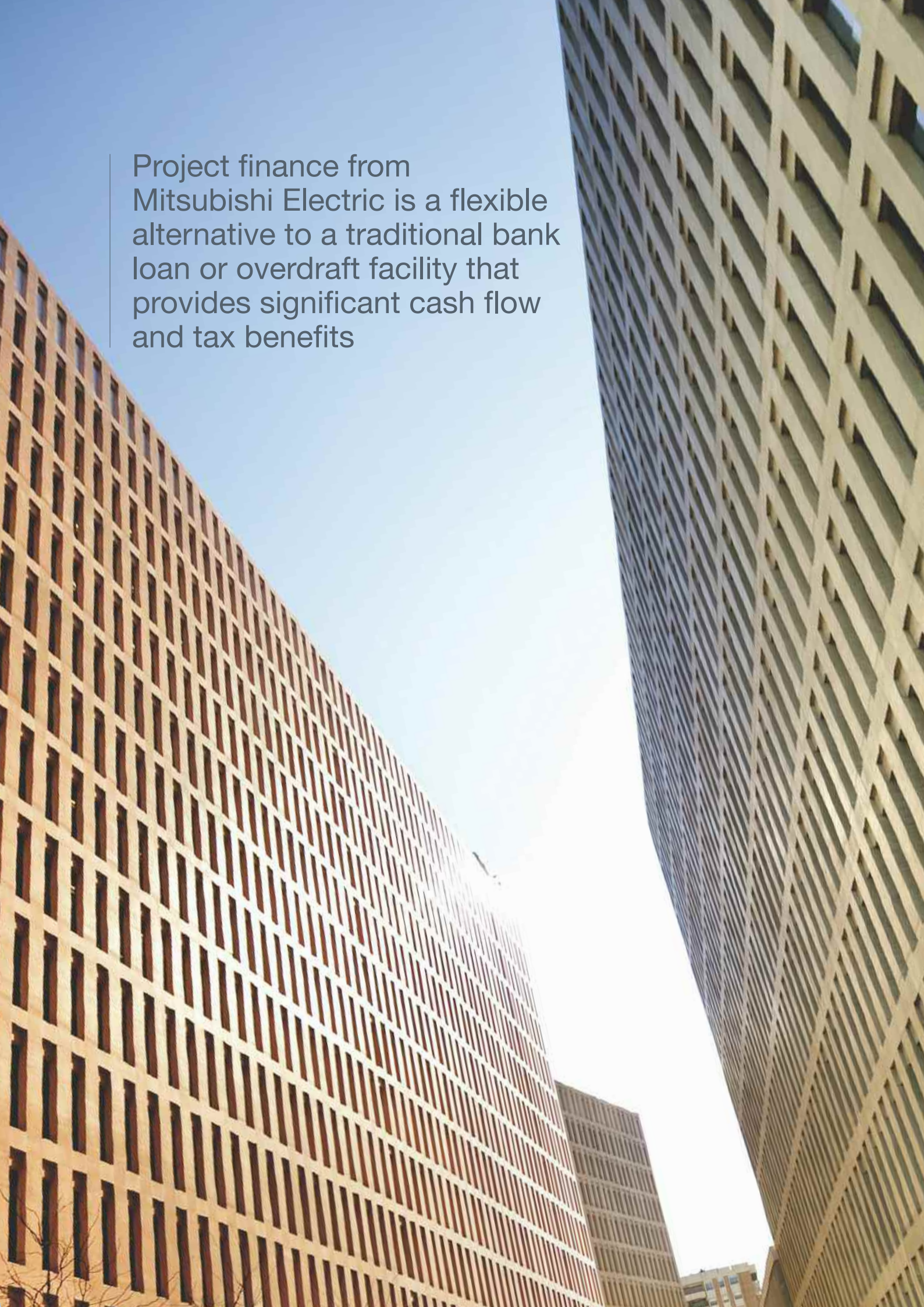
Quick decisions: We always aim to provide a prompt turnaround for funding applications

Immediate payment: Settlement of the full installation and equipment invoice upon installation/delivery

A structured finance programme will give you access to Mitsubishi Electric equipment with the benefit of savings on items such as energy, maintenance and CO_2.

Applying for finance is easy. Once your quote for equipment, installation and commissioning is agreed, a decision on funding is normally reached by our finance providers within 24 hours.

To get your no obligation finance proposal visit:
MELFinanceSolutions.co.uk



Project finance from Mitsubishi Electric is a flexible alternative to a traditional bank loan or overdraft facility that provides significant cash flow and tax benefits

Why choose Ecodan heat pumps over other technologies

ErP A++

ecodan®
Renewable Heating Technology

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.

Ecodan is also compliant with the Energy Related Products Directive or ErP, which is a key part of the European Union's drive to encourage businesses and consumers to use more energy efficient products.

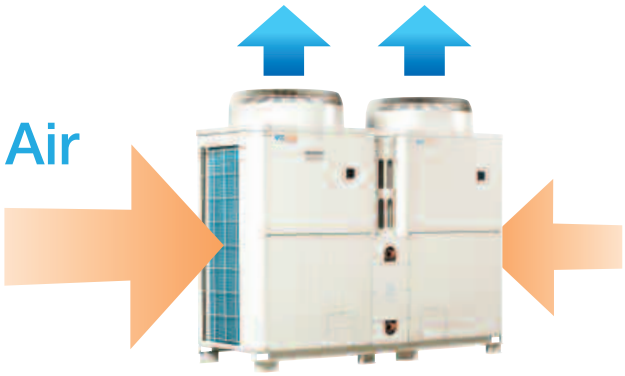
Mitsubishi Electric heat pumps perform well against all relevant criteria. Crucially they are highly scalable and can be applied to projects of all sizes, from doctors surgeries through to entire district heating projects for instance. While it has existed for a long time and is tried and tested, heat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

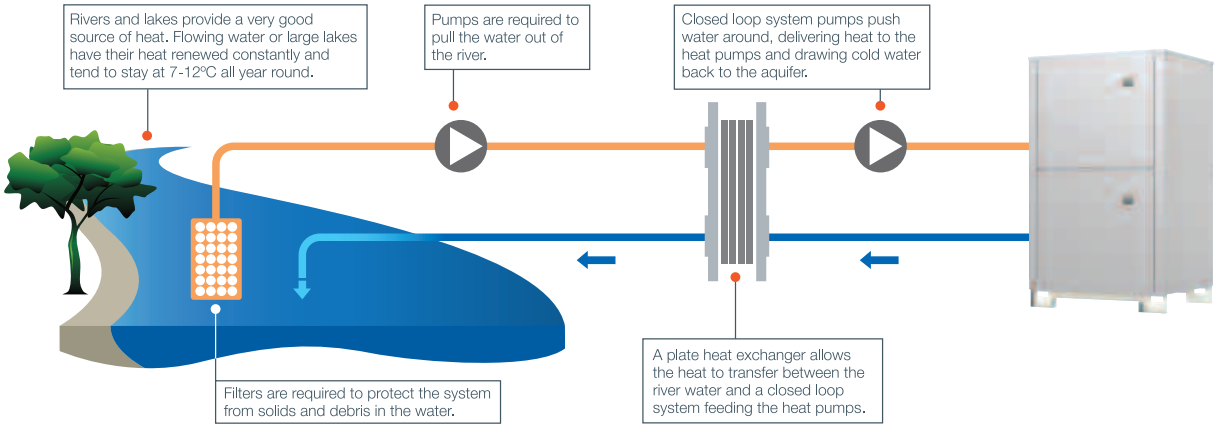
The following pages outline some potential applications of heat pumps, highlighting the heat source (where heat is being transferred from) and the heat delivery method (how heat is being delivered).

Heat Sources

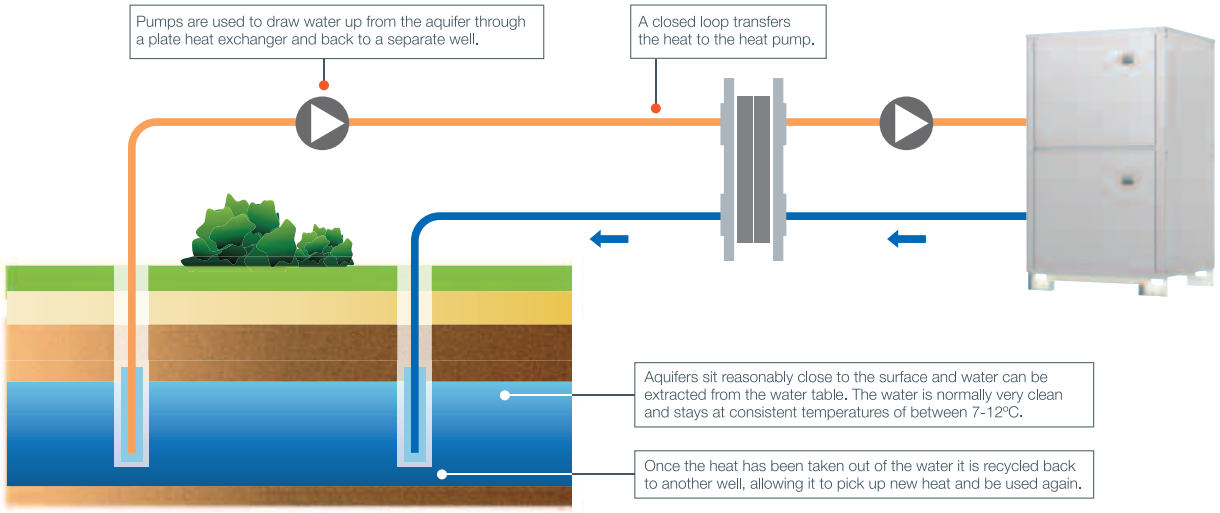
Air source - Air



Water source - Rivers and lakes

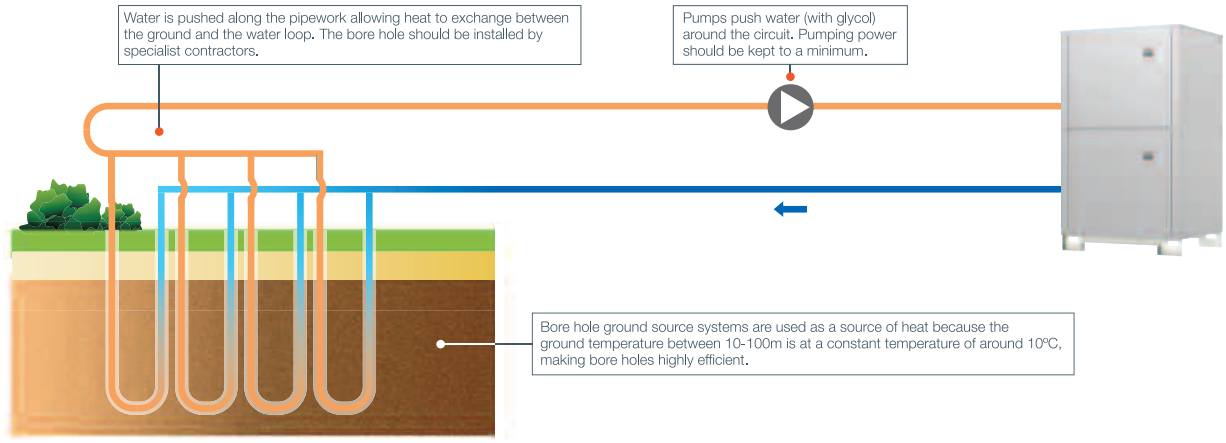


Water source - Aquifers

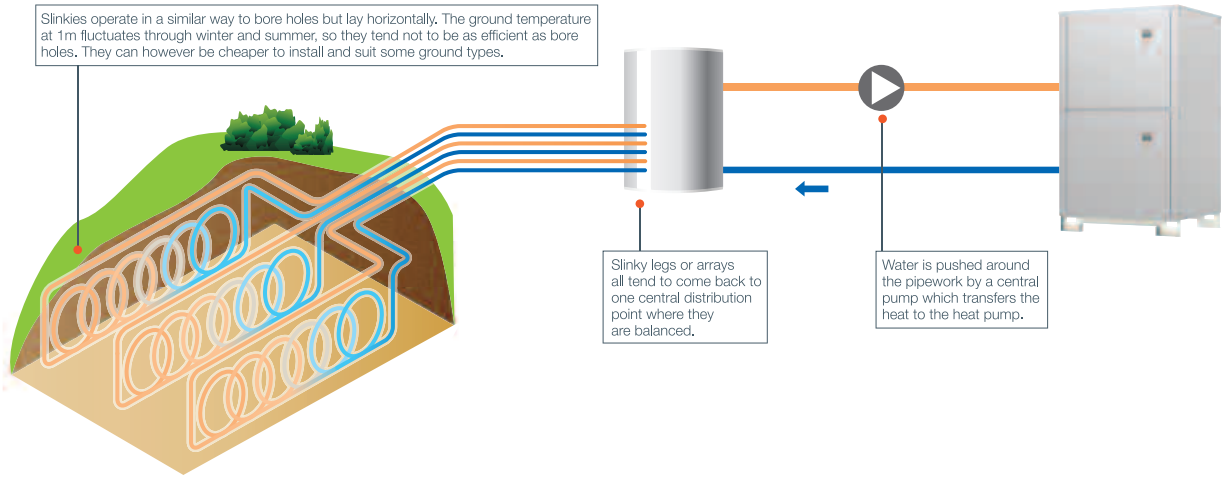


Heat Sources

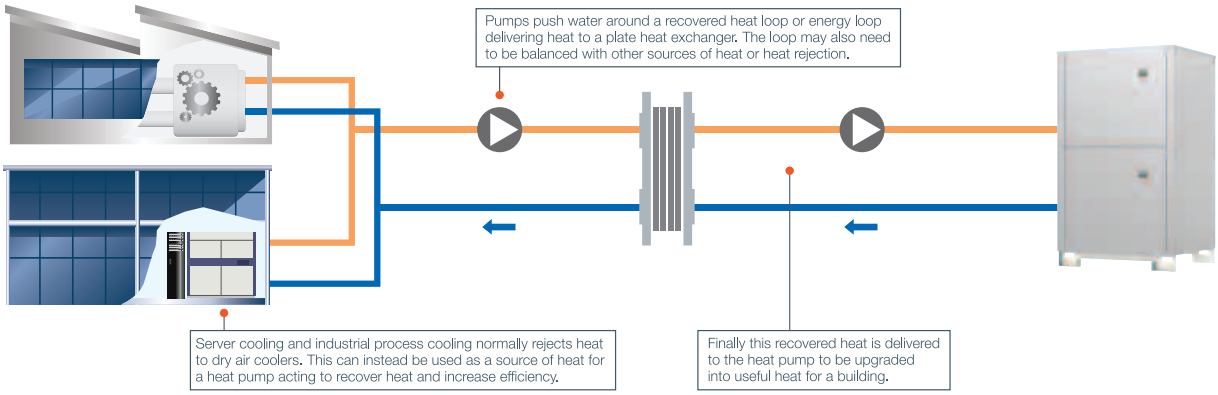
Ground source - Bore holes



Ground source - Slinky systems

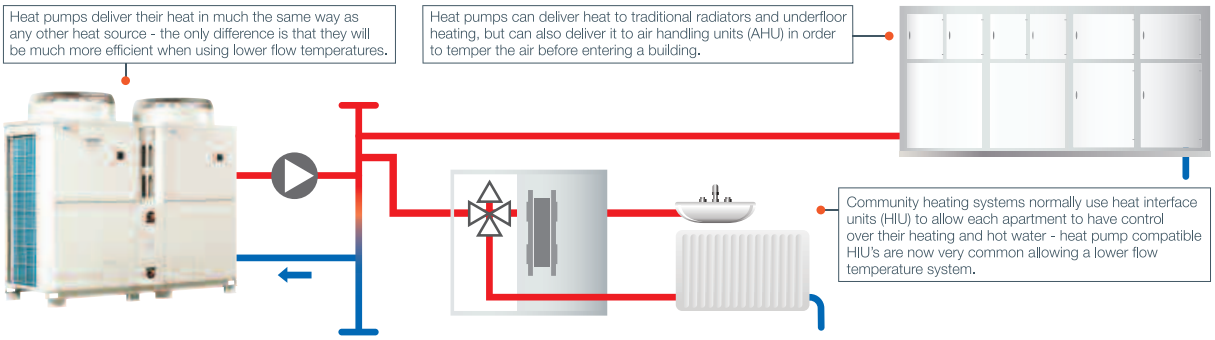


Heat recovery - Industrial processes

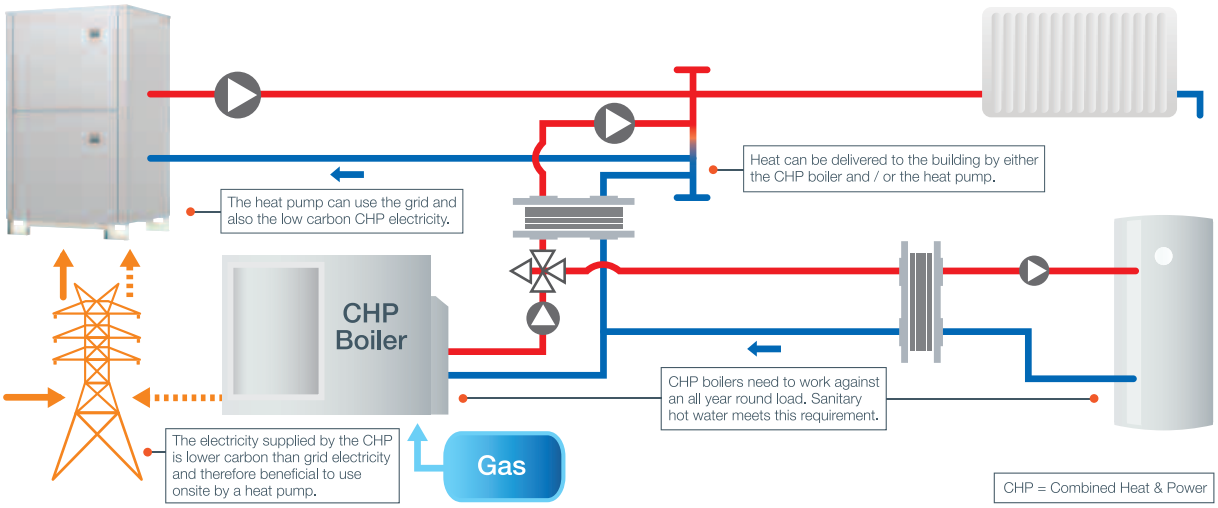


Heat Delivery

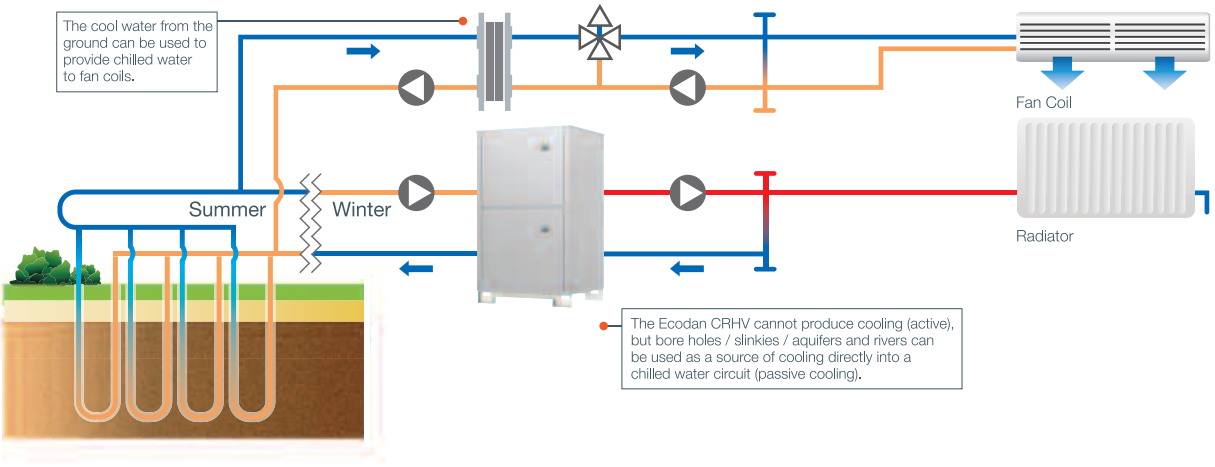
Working with AHU's and HIU's



Technology working together



Passive cooling



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 3 different commercial Ecodan options:

1. Ecodan CAHV Air Source Heat Pump Monobloc System
2. Ecodan CRHV Water Source Heat Pump Monobloc System
3. Ecodan CRHV Ground Source Heat Pump Monobloc System

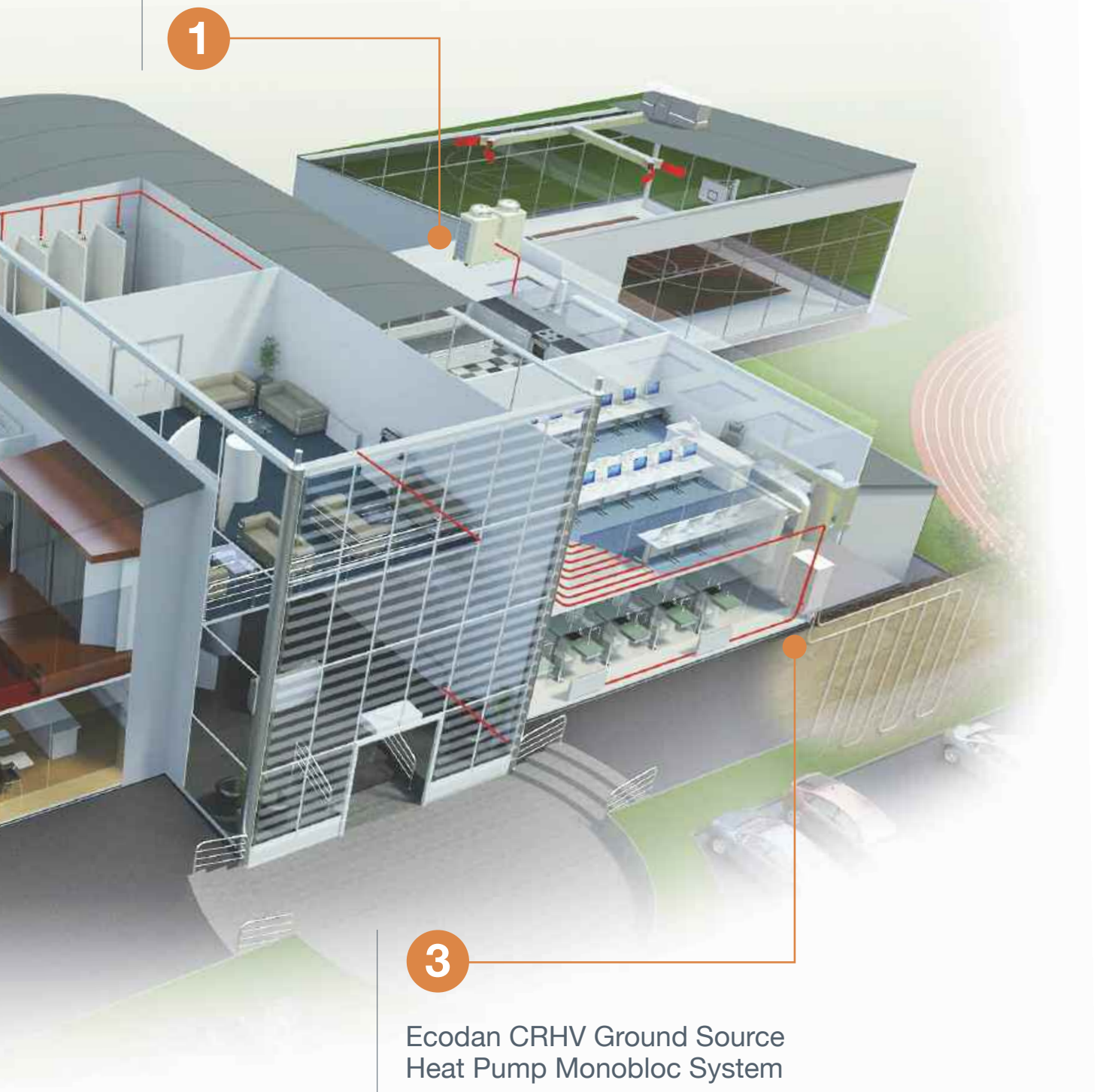
2

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.

Ecodan CAHV Air Source Heat Pump Monobloc System

Our monobloc 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.



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.

Specifying and sizing an Ecodan heat pump

Heat pumps generally deliver their capacity through higher flow rates. This means that the sizing of pumps and pipe work needs to be carefully considered at the design stage to ensure optimum efficiency.

Factors to consider when sizing a heat pump should include:

Flow temperature

The lower the flow temperature, the more efficient the heat pump will be. Our heat pumps can vary the flow temperature according to conditions and load, in order to optimise the system's full potential.

Heat emitter sizing

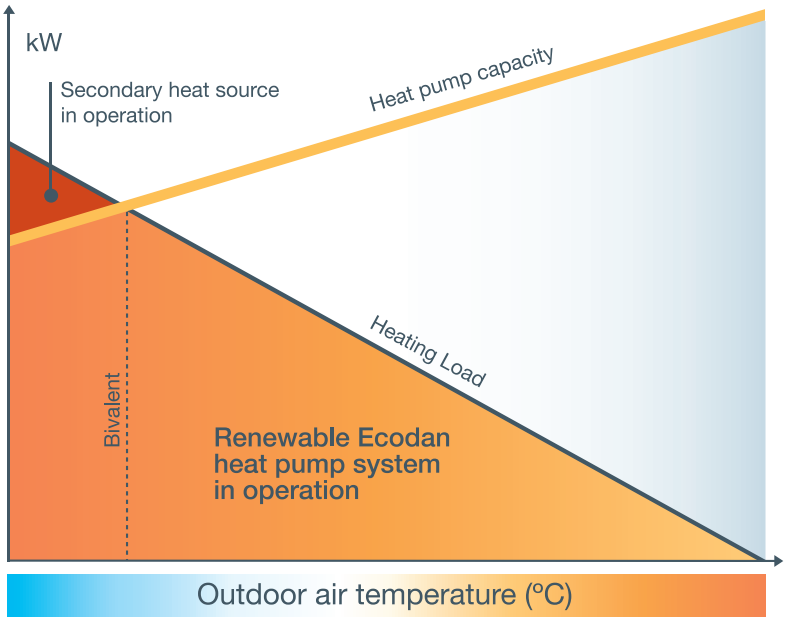
The heat emitter will need to be sized correctly to achieve the required output at a lower flow temperature. This is easily achieved at the design stage, with an adaptable approach to the application of the heating system.

Working with other technology

In most cases we can meet 100% of the load. However, the best solution for a given application may be a combination of technologies working together to meet the load. Our heat pumps work perfectly with other technologies and are capable of fully integrating with the majority of BEMS (Building Energy Management Systems).

The illustration below shows a heat pump working in conjunction with a secondary heat source in a bivalent set-up.

Ecodan Working in Conjunction With Other Technologies:

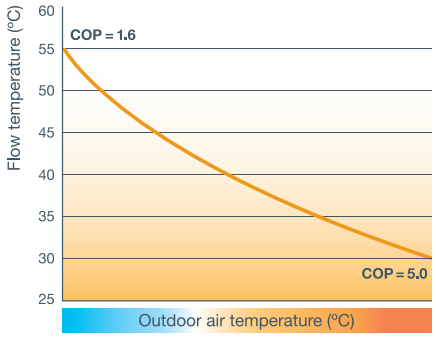


Operating an Ecodan heat pump

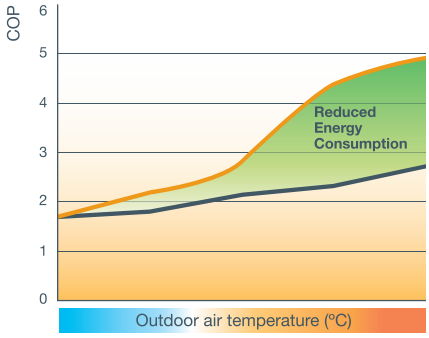
Operating an Ecodan heat pump correctly is essential. Many features are built into our Ecodan systems to ensure that the optimum control, performance and efficiency are achieved. Some examples of these are:

- 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

Effect of Flow Temperature on COP:



Variable Flow Temperature Control:



Variable Flow Temperature ——— Fixed Flow Temperature 55°C ———

CAHV Monobloc System

CAHV-P500YA-HPB

Certificate Number: MCS HP0002
Heat Pumps
Product Reference: CAHV-P500YA-HPB

The Ecodan CAHV air source heat pump monobloc system can operate singularly, or form part of a multiple unit system. The CAHV also comes equipped with a wide range of controller features as standard.

A multiple unit system has the ability to cascade available units on and off to meet the load from a building. As an example of this modulation, a 16 unit system allows 0.5kW increments of capacity, from 18kW all the way up to 688kW. This level of modulation is unprecedented within the heating industry and with cascade and rotation built in as standard, the Ecodan CAHV system is perfectly suited to a wide range of commercial applications.

Key Features

- Multiple unit cascade control of up to 688kW capacity
- Split refrigerant circuits within each CAHV provide 50% back up
- Ability to rotate units based on accumulated run hours
- Provides from 25ºC up to 70°C water flow temperatures without boost heaters
- Low maintenance, hermetically-sealed monobloc design
- Low on-site refrigerant volume
- HIC (Zubadan) technology delivers 43kW at -3ºC with minimal drop off down to -20ºC

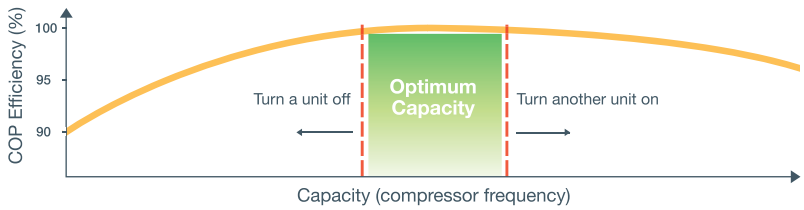
The CAHV Monobloc system qualifies for the Energy Technology List. It is also an MCS certified product, helping to build a rapidly growing Microgeneration industry based on quality and reliability.

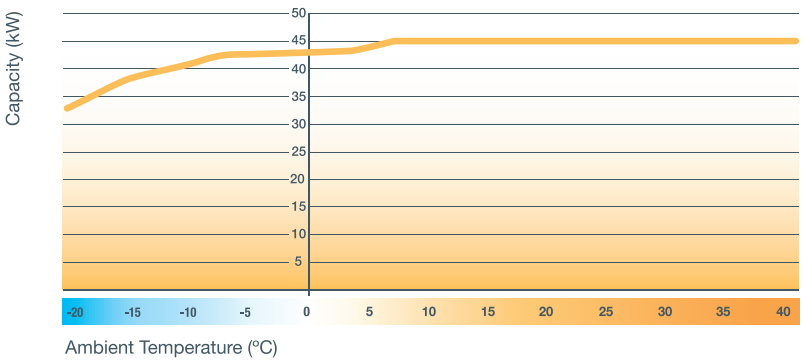
Optimisation of Cascading Units Deliver Maximum Efficiency

Optimisation is built into the CAHV systems logic in order to deliver maximum efficiency.

The standard controller adapts the capacity delivered to ensure that compressors work within their most efficient range, turning individual CAHV units on and off as necessary.

This feature utilises inverter technology to its greatest potential, whilst also ensuring capacity is available at all working ambient temperatures.





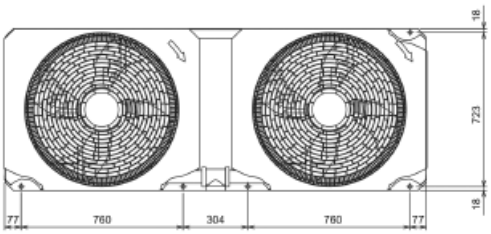
MODEL		CAHV-P500YA-HPB
HEAT PUMP SPACE HEATER - 55℃	ErP Rating	A++
	η_s	125%
	SCOP	3.19
HEAT PUMP SPACE HEATER - 35℃	ErP Rating	A+
	η_s	139%
	SCOP	3.54
HEATING*1 (A-3/W35)	Capacity (kW)	42.6
	Power Input (kW)	15.2
	COP	2.80
OPERATING AMBIENT TEMPERATURE (°C DB)		-20~+40°C
SOUND PRESSURE LEVEL AT 1M (dBA)*2*3		59
LOW NOISE MODE (dBA)*2		Variable
FLOW RATE(l/min)		126
WATER PRESSURE DROP (kPa)		18
DIMENSIONS (mm)	Width	1978
	Depth	759
	Height	1710 (1650 without legs)
WEIGHT (kg)		526
ELECTRICAL SUPPLY		380-415v, 50Hz
PHASE		3
NOMINAL RUNNING CURRENT [MAX] (A)		17.6 [52.9]
FUSE RATING - MCB SIZES (A)*4		63

*1 Under normal heating conditions at outdoor temp: -3°CDB / -4°CWB, outlet water temp 35°C, inlet water temp 30°C
*2 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 35°C, inlet water temp 30°C as tested to BS EN14511
*3 Sound power level of the CAHV-P500YA-HPB is 70.7dBA. Tested to BS EN12102
*4 MCB Sizes BS EN60898-2 & BS EN60947-2

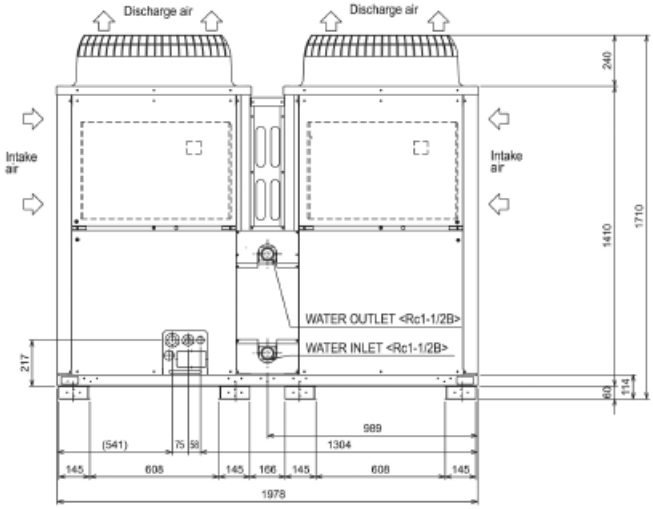
η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

Schematics

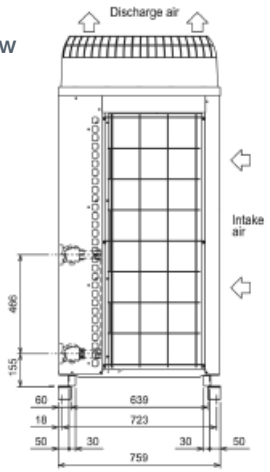
Upper View



Front View



Side View



ecodan®
Renewable Heating Technology

PUHZ Monobloc Systems

PUHZ-W50VHA2(-BS)

Manufactured in the UK

PUHZ-W85VHA2(-BS)

PUHZ-(H)W112-140VHA(2) / YHA2(-BS)

Our range of Ecodan monobloc air source heat pumps includes 5, 8.5, 11.2 and 14kW sizes. Now with the ability to cascade up to six units of the same output, Ecodan monobloc systems offer a capacity range from 5 through to 84kW.

Designed to suit a wide number of applications, these models offer a viable solution for the varying requirements that domestic and small commercial applications demand.

Key Features

- Self-contained unit, only requiring water and electric connections
- No need for gas supply, flues or ventilation
- Single phase power supply with a low starting current (3 phase available for 14kW)
- Low maintenance and quiet operation
- Operates with outside temperatures as low as -25°C
- Multiple unit connection
- Hybrid function, for use with conventional boilers
- 2-zone energy efficient space heating control
- Available as a standalone, packaged or semi packaged system
- Energy monitoring as standard
- Coastal protection models available (-BS)

Application Examples

- The vast majority of UK homes
- Small Retail Outlets
- Dental / Doctors Surgeries
- Public Sector / Commercial Buildings

The PUHZ Monobloc systems qualify for the Energy Technology List. They are also MCS certified products, helping to build a rapidly growing Microgeneration industry based on quality and reliability.

APPROVED PRODUCT
MCS

ErP A++

Certificate Number: MCS HP0002
Product Type: Heat Pumps
Product Reference: PUHZ-W50VHA2-(BS), PUHZ-W85VHA2-(BS) PUHZ-W112VHA-(BS), PUHZ-HW140VHA2/YHA2-(BS)

MODEL		PUHZ-W50VHA2(-BS)	PUHZ-W85VHA2(-BS)	PUHZ-W112VHA(-BS)	PUHZ-HW140VHA2(-BS)	PUHZ-HW140YHA2(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++	A++	A++	A++	A++
	η_s	127%	128%	125%	126%	126%
	SCOP	3.25	3.27	3.20	3.22	3.22
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A++	A++	A++	A++	A++
	η_s	162%	162%	164%	157%	157%
	SCOP	4.12	4.12	4.18	3.99	3.99
HEAT PUMP COMBINATION HEATER - Large Profile*1	ErP Rating	A	A	A	A	A
	η_{wh}	99%	97%	100%	96%	96%
HEATING*2 (A-3/W35)	Capacity (kW)	4.8	8.3	11.0	14.0	14.0
	Power Input (kW)	1.63	2.96	3.65	4.81	4.81
	COP	2.95	2.80	3.01	2.91	2.91
OPERATING AMBIENT TEMPERATURE (°C DB)		-15 ~ +35°C	-20 ~ +35°C	-20 ~ +35°C	-25 ~ +35°C	-25 ~ +35°C
SOUND PRESSURE LEVEL AT 1M (dBA)*3*4		45	48	53	53	53
LOW NOISE MODE (dBA)*3		40	42	46	46	46
WATER DATA	Pipework Size (mm)	22	22	28	28	28
	Flow Rate (l/min)	14.3	25.8	32.1	40.1	40.1
	Water Pressure Drop (kPa)	12	13.5	6.3	9	9
DIMENSIONS (mm)*7	Width	950	950	1020	1020	1020
	Depth	330+30*5	330+30*5	330+30*5	330+30*5	330+30*5
	Height	740	943	1350	1350	1350
WEIGHT (kg)		64	77	133	134	148
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	380-415v, 50Hz
	Phase	Single	Single	Single	Single	3
	Nominal Running Current [MAX] (A)	5.4 [13]	10.3 [23]	11.2 [29.5]	14.9 [35]	5.1 [13]
	Fuse Rating - MCB Sizes (A)*6	16	25	32	40	16

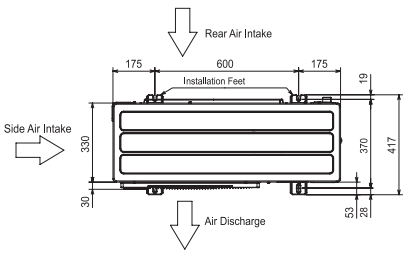
*1 Combination with EHPT20X-MHCW Cylinder
*2 Under normal heating conditions at outdoor temp: -3°CDB / -4°CWB, outlet water temp 35°C, inlet water temp 30°C.
*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 35°C, inlet water temp 30°C as tested to BS EN14511.
*4 Sound power level of the PUHZ-W50VHA2 is 61dBA, PUHZ-W85VHA2 is 62.5dBA, PUHZ-W112VHA is 65dBA, PUHZ-HW140VHA2 is 65.5dBA, PUHZ-HW140YHA2 is 67.5dBA. Tested to BS EN12102.
*5 Grille.
*6 MCB Sizes BS EN60898-2 & BS EN60947-2.
*7 Flow Temperature Controller (FTC) for standalone systems PAC-IF062B-E Dimensions WxDxH (mm) - 520x150x450

η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

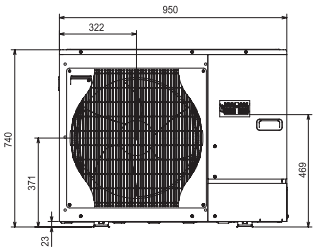
Schematics

PUHZ-W50VHA2(-BS)

Upper View

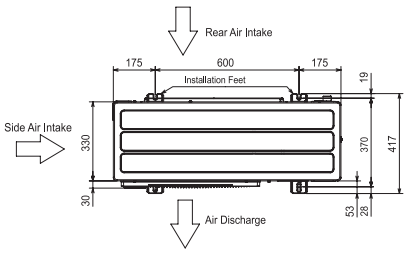


Front View

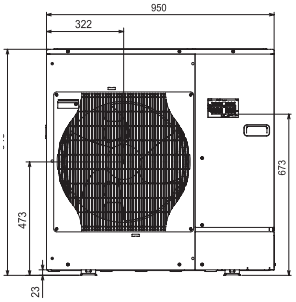


PUHZ-W85VHA2(-BS)

Upper View

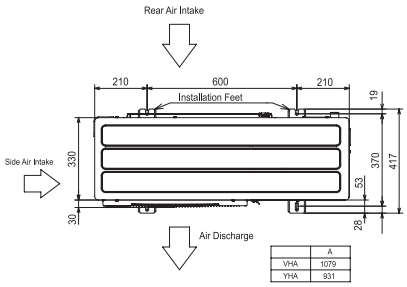


Front View

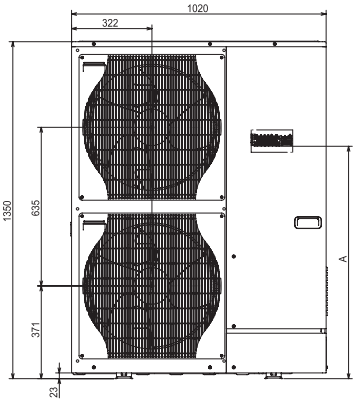


PUHZ-(H)W112-140VHA(2) / YHA2(-BS)

Upper View



Front View



CRHV Monobloc Ground/Water Source System

CRHV-P600YA-HPB

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

Our Ecodan CRHV ground / water source heat pump units provide a renewable heating solution capable of delivering the highest level of COP efficiency throughout the year.

These units use the same inverter technology as our air source systems, allowing them to extract heat from the ground, aquifer or open loop system with maximum efficiency. The scalability of a ground / water source system also helps to make larger projects more cost effective.

Key Features

- Bore holes, slinkies, aquifers, lakes, rivers, waste heat - can all be used as a heat source
- Multiple unit cascade control of up to 960kW capacity
- Split refrigerant circuits within each CRHV provide 50% back up
- Ability to rotate units based on accumulated run hours
- Provides up to 65°C water flow temperatures without booster heaters
- Low maintenance, low refrigerant volume hermetically-sealed monobloc design
- Heat recovery applications can be achieved by moving heat between applications
- Passive cooling possible by exchanging ground/water source with a chilled water system
- Low pressure drop to ensure pumping power is kept to a minimum
- High specification touch screen controls interfacing with BEMS

The ground itself is a very efficient source of energy for heat pump systems. Ground source heat pumps use the Earth's natural solar collection and heat storage capabilities as an infinite heat source/heat sink.

At between 1.7m and 3m below the ground, the temperature changes from 17ºC in the summer to 10ºC in the winter. Deeper down however, the temperature of the ground is a constant 10ºC all year round. It is these relatively constant, dependable temperatures that can be harnessed using ground source heat pumps. The constant ground temperatures allow the heat pump to operate at optimum efficiency, producing higher COP's than its air source rivals as the high summer or low winter temperatures do not influence performance. Heat is extracted from the ground using water which is pumped through a network of plastic pipes.

Selection of the method of extraction and depth is a bespoke decision made based on the geology of the local area. Making the right decisions on technology and ground works will ensure that a system performs as well on year 20 as it does in year 1.

There are two standard ground source methods available, **Open Loop and Closed Loop (Bore Hole or Slinky):**

Open Loop - Large bodies of water can be utilised as a stable source of water at a relatively constant temperature. This can be either surface water or ground water. Surface water would include lakes, reservoirs, rivers and the sea.

Closed Loop Slinky - A trench is dug to a depth of between 1.7 to 3m and plastic spiral pipe is laid into the bottom. The pipe is covered with sand to provide good ground to pipe contact and then the trench is backfilled with the excavated soil.

Closed Loop Bore Hole - A series of holes are drilled down into the ground at a depth of 50 to 130m, depending on geothermal conditions. Two water pipes connected via a 'u bend' are fed directly into these holes and then surrounded by a conductive grout.

MODEL			CRHV-P600YA-HPB
HEAT PUMP SPACE HEATER - 55˚C		ErP Rating	A++
		η_s	127%
		SCOP	3.37
HEAT PUMP SPACE HEATER - 35˚C		ErP Rating	A++
		η_s	153%
		SCOP	4.03
HEATING*1 (B0/W35)		Capacity (kW)	60
		Power Input inc. pump (kW)	14.20
		COP	4.23
SEASONAL EFFICIENCY EN14825 (SPF)		B0/W35 (60kW)	4.33
HEATING*2 (B0/W35)		Capacity (kW)	45
		Power Input inc. pump (kW)	10.20
		COP	4.41
SEASONAL EFFICIENCY EN14825 (SPF)		B0/W35 (45kW)	4.03
HEATING*3 (W10/W35)		Capacity (kW)	60
		Power Input inc. pump (kW)	11.90
		COP	5.08
SEASONAL EFFICIENCY EN14825 (SPF)		W10/W35 (60kW)	5.09
HEATING*4 (W10/W35)		Capacity (kW)	45
		Power Input inc. pump (kW)	8.89
		COP	5.11
SEASONAL EFFICIENCY EN14825 (SPF)		W10/W35 (45kW)	4.55
SOUND DATA		Pressure Level L_{pA} at 1m (dBA)	50
		Power Level L_{WA} (dBA)*5	66
WATER DATA	Flow Rate Range	Heat Source (Brine) (l/s (m³/hr))	1.5 to 4.1 (5.4 to 15)
		Building Side (LTHW) (l/s (m³/hr))	1.5 to 4.4 (5.4 to 16)
	Mechanical Connections	Heat Source Outlet (Brine) (mm ("))	50.8 (R2) screw
		Heat Source Inlet (Brine) (mm ("))	50.8 (R2) screw
		Building Side Outlet (LTHW) (mm ("))	50.8 (R2) screw
		Building Side Inlet (LTHW) (mm ("))	50.8 (R2) screw
	Operating Temperature Range	Heat Source Inlet (Brine) (°C)	-5 to +27
		Heat Source Inlet Option (Brine) (°C)*6	-5 to +45
		Building Side Outlet (LTHW) (°C)	+30 to +65
	Heat Source Fluid Type*7		Min 30% Ethylene Glycol or equivalent
	Pressure Drop (at 1.5l/s inc 30% glycol in heat source fluid)	Heat Source (Brine) (kPa)	12
		Building Side (LTHW) (kPa)	7
	Maximum Working Pressure	Heat Source (Brine) (MPa(Bar))	1 (10)
		Building Side (LTHW) (MPa(Bar))	1 (10)
DIMENSIONS		Width (mm)	934
		Depth (mm)	780
		Height (mm)	1561
WEIGHT (kg)			395
REFRIGERANT		Type	R410A
		Charge (kg)	4.5 x 2
		Max pressure (MPa (Bar))	4.15 (41.5)
		Compressor Type	Inverter Driven
		Circuit type	Hermetically Sealed System
ELECTRICAL DATA		Electrical Supply	415v, 50Hz
		Phase	3 Phase
		Maximum Running Current (A)	44
		Fuse Rating - MCB Size (A)*8	50

PLEASE NOTE: Full design criteria is needed to ascertain the capacity which could change based on heat source temperature and building flow temperature.

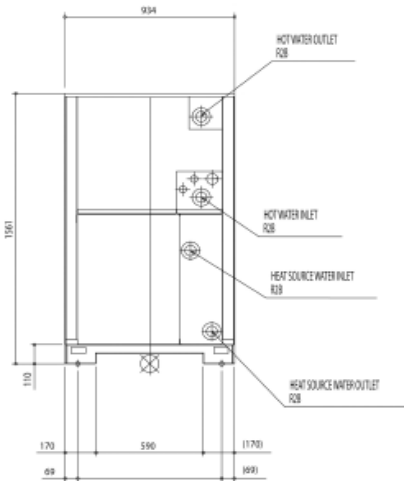
*1 Under normal heating conditions at brine inlet: 0°C, outlet water temp 35°C as tested to BS EN14511 (60kW)
*2 Under normal heating conditions at brine inlet: 0°C, outlet water temp 35°C as tested to BS EN14511 (45kW)
*3 Under normal heating conditions at water inlet: 10°C, outlet water temp 35°C as tested to BS EN14511 (60kW)
*4 Under normal heating conditions at water inlet: 10°C, outlet water temp 35°C as tested to BS EN14511 (45kW)
*5 Sound power level as tested to BS EN12102
*6 Heat source inlet temperature above 27ºC and up to 45°C option must reverse the inlet and outlet heat source connections and refer to manual for dip switch changes
*7 The system should be adequately protected from freezing
*8 MCB Sizes BS EN60898-2 & BS EN60947-2

η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

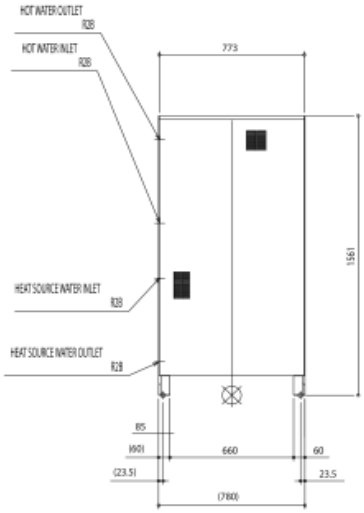
* LTHW - Low Temperature Hot Water
* Please use adequate frost protection to ensure pipework and the unit do not freeze if the system is powered down
* Please do not use ground water or well water directly within the unit
* The water circuit must be a closed circuit

Schematics

Front View



Side View



ecodan® Renewable Heating Technology

PUHZ Split Systems

PUHZ-SW50VKA(-BS)

Manufactured in the UK

PUHZ-SW75VHA(-BS)

Manufactured in the UK

PUHZ-SW120VHA(-BS)

Our range of Ecodan split air source heat pumps includes 5, 7.5 and 12kW sizes.

Now with the ability to cascade up to six units of the same output Ecodan split systems offer a capacity range from 5 to 72kW. Designed to suit a wide number of applications, these models offer a viable solution for the varying requirements that domestic and small commercial applications demand.

Key Features

- Split unit allowing water connections to be made internally
- No need for gas supply, flues or ventilation
- Single phase power supply with a low starting current
- Low maintenance and quiet operation
- Operates with outside temperatures as low as -20°C
- Multiple unit connection
- Hybrid function for use with conventional boilers
- 2-zone energy efficient space heating control
- Energy monitoring as standard
- Coastal protection models available (-BS)

Application Examples

- The vast majority of UK homes
- Small Retail Outlets
- Dental / Doctors Surgeries
- Public Sector / Commercial Buildings

APPROVED PRODUCT MCS

Certificate Number: MCS HP0002
Product Reference: PUHZ-SW50VKA, PUHZ-SW75VHA PUHZ-SW120VHA

ErP A++

MODEL		PUHZ-SW50VKA(-BS)	PUHZ-SW75VHA(-BS)	PUHZ-SW120VHA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++	A++	A++
	η_s	125%	127%	125%
	SCOP	3.20	3.26	3.21
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A++	A++	A++
	η_s	163%	154%	162%
	SCOP	4.16	3.92	4.13
HEAT PUMP COMBINATION HEATER - Large Profile*1	ErP Rating	A	A	A
	η_{wh}	98%	93%	99%
HEATING*2 (A-3/W35)	Capacity (kW)	5.25	7.0	11.2
	Power Input (kW)	1.84	2.24	3.71
	COP	2.85	3.12	3.02
OPERATING AMBIENT TEMPERATURE (°C DB)*7		-15 ~ +35°C	-20 ~ +35°C	-20 ~ +35°C
SOUND PRESSURE LEVEL AT 1M (dBA)*3*4		46	51	54
LOW NOISE MODE (dBA)*3		42	48	51
WATER DATA - Water connections made at indoor hydrobox	Flow Rate (l/min)	11.8	22.9	45.9
DIMENSIONS (mm)	Width	809+62*8	950	950
	Depth	300	330+30*5	330+30*5
	Height	630	943	1350
WEIGHT (kg)		43	75	118
REFRIGERANT	Type	R410A	R410A	R410A
	Charge (kg) - 10m pipe length	1.4	3.2	4.6
	Pipe Size - Gas/Liquid (mm (in))	12.7 (1/2") / 6.35 (1/4")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")
	Connection Type	Flared	Flared	Flared
	Max Pipe Length (m)	40	40	75
	Min Pipe Length (m)	2	5	5
	Max Height Difference (m)	30	10	30
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz
	Phase	Single	Single	Single
	Nominal Running Current [MAX] (A)	3.8 [13]	8.1 [19]	17.5 [29.5]
	Fuse Rating - MCB Sizes (A)*6	16	25	40

*1 Combination with EHST20(D)(C)-MHCW Cylinders
*2 Under normal heating conditions at outdoor temp: -3°CDB / -4°CWB, outlet water temp 35°C, inlet water temp 30°C
*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 35°C, inlet water temp 30°C as tested to BS EN14511
*4 Sound power level of the PUHZ-SW50VKA is 62dBA, PUHZ-SW75VHA2 is 65.6dBA, PUHZ-SW120VHA is 68.8dBA. as tested to BS EN12102
*5 Grille
*6 MCB Sizes BS EN60898-2 & BS EN60947-2
*7 Heating maximum ambient temperature ~21°CDB, DHW Hot water maximum ambient temperature ~35°CDB
*8 Electrical cover

η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

ecodan® Renewable Heating Technology

FTC5 Hydroboxes for Ecodan Split Units

EHS(D)(C)-MEC

Manufactured in the UK

ErP A++

The split hydrobox offers a highly adaptable heating solution for retrofit or new build.

Designed specifically by Mitsubishi Electric to integrate with the Ecodan split air source heat pump range and a third party cylinder. The split hydrobox provides hydraulic components with an advanced simplified graphical user interface and controls. Fast commissioning via an SD card and energy monitoring functions are now included.

Key Features

- Simple graphical control
- 2-zone energy efficient space heating control
- Sleek modern design
- Compatible with Mitsubishi Electric wireless room controllers
- Pre-plumbed and wired for faster installation
- Hybrid function, for use with conventional boilers
- SD card commissioning
- Cascade function for multiple unit control
- Energy monitoring as standard

FTC5 Controller – with Energy Monitoring

Mitsubishi Electric's fifth generation controller (FTC5) includes intelligent room temperature control as standard. This together with advanced weather compensation ensures the system delivers efficient, comfortable heating regardless of the season. FTC5 now also includes energy monitoring showing consumed and produced energy.

MODEL			EHSD-MEC	EHSC-MEC
HEAT PUMP SPACE HEATER - 55°C		ErP Rating	A++	A++ / A++
HEAT PUMP SPACE HEATER - 35°C		ErP Rating	A++	A++ / A++
OPERATING AMBIENT TEMPERATURE (°C DB)			0 ~ +35°C (RH<80%)	0 ~ +35°C (RH<80%)
APPLICABLE OUTDOOR UNITS			PUHZ-SW50VKA(-BS)	PUHZ-SW75VHA(-BS) / PUHZ-SW120VHA(-BS)
SOUND PRESSURE LEVEL AT 1M (dBA)			28	28
WATER DATA		Flow Rate (l/min)	11.8 (SW50)	22.9 (SW75) / 45.9 (SW120)
		Pump	Grundfos UPM2 15 70 - 130	Grundfos UPM2 15 70 - 130
		Connection Size (mm)	28	28
		Primary Expansion Vessel (Litres)	10	10
		Charge Pressure (MPa (Bar))	0.1 (1)	0.1 (1)
WATER SAFETY DEVICES		Control Thermistor (°C)	1 - 80	1 - 80
		Pressure Relief Valve (MPa (Bar))	0.3 (3)	0.3 (3)
		Flow Switch	Supplied	Supplied
DIMENSIONS (mm)		Width	530	530
		Depth	360	360
		Height	800	800
WEIGHT EMPTY / FULL (kg)			38 / 44	42 / 49
REFRIGERANT		Type	R410A	R410A
		Connection Size - Gas/Liquid (mm (in)	12.7 (1/2") / 6.35 (1/4")	15.88 (5/8") / 9.52 (3/8")
		Connection Type	Flared	Flared
ELECTRICAL DATA	Control Board - *optionally powered by outdoor unit*	Electrical Supply	220-240v, 50Hz	220-240v, 50Hz
		Phase	Single	Single
		Fuse Rating - MCB Sizes (A)*1	10	10
OPTIONAL SIMPLIFIED WIRELESS ROOM THERMOSTAT AND WIRELESS RECEIVER			PAR-WT50-E Controller and PAR-WR51-E Receiver	

Hydrobox includes: Flow Temperature Controller (FTC5) with Main Controller and Temperature Sensors, Water Circulation Pump, Flow Sensor and Expansion Vessel.

*1 MCB Sizes BS EN60898-2 & BS EN60947-2

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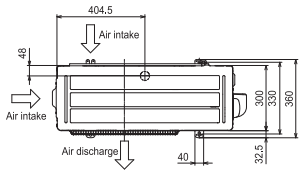
PUHZ Split Systems

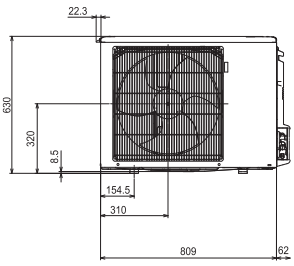
Schematics

PUHZ-SW50VKA(-BS)

Upper View

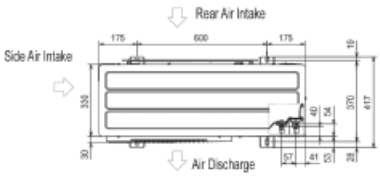


Front View

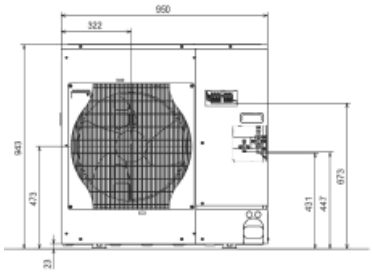


PUHZ-SW75VHA(-BS)

Upper View

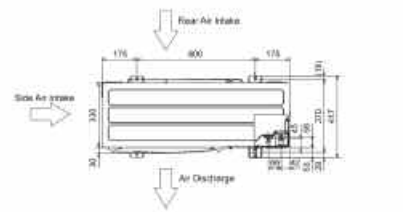


Front View

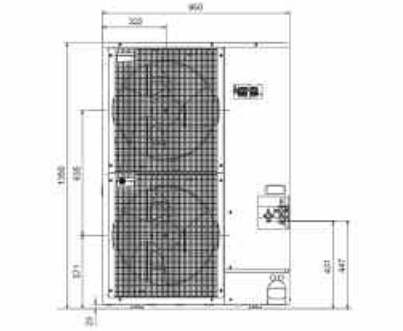


PUHZ-SW120VHA(-BS)

Upper View



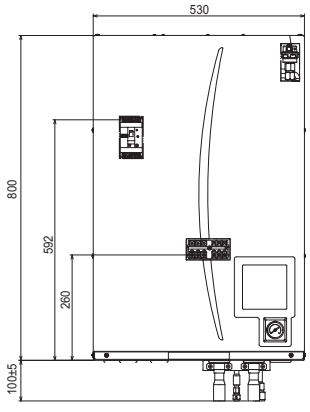
Front View



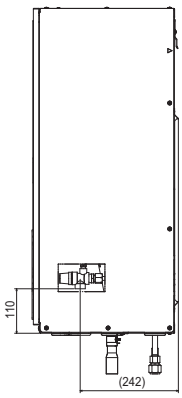
Schematics

EHS(D)(C)-MEC

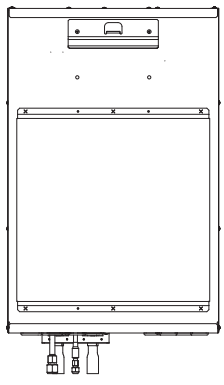
Front View



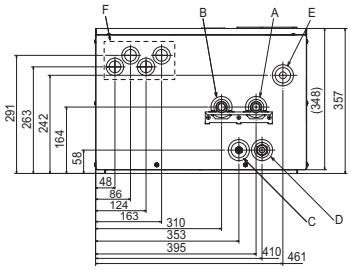
Right View



Rear View



Lower View



Letter	Pipe Description	Connection Size/Type
A	Space heating/ Indirect DHW cylinder (primary) return connection	28mm/Compression
B	Space heating/ Indirect DHW cylinder (primary) flow connection	28mm/Compression
C	Refrigerant (Liquid)	6.35mm/Flare (EHSD-MEC) 9.52mm/Flare (EHSC-MEC)
D	Refrigerant (Gas)	12.7mm/Flare (EHSD-MEC) 15.88mm/Flare (EHSC-MEC)
E	Discharge pipe (by installer) from pressure relief valve	G1/2" female (valve port within hydrobox casing)
F	Electrical cable inlets	-

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FTC2B Flow Temperature Controller

The FTC2B has been developed to allow the Ecodan PUHZ monobloc range to interface with third party or BEMS (Building Energy Management System) controls.

A combination of volt free and voltage inputs allow the Ecodan PUHZ units to be used in applications where only simple on/off and temperature control is required.

Functions that can be controlled by third party controls

- On/Off heating mode
- On/Off heating ECO mode
- On/Off hot water mode
- On/Off holiday mode
- On/Off legionella mode
- Change water flow temperature

Functions that can be monitored by third party controls

- Unit running
- Error
- Defrost

The ability to interface with third party controls opens up a huge number of application opportunities. Many processes simply require a heat source that provides hot water, without polished end user controls. The FTC2B controller allows the Ecodan PUHZ to be used in these applications. FTC2B inputs and outputs can be used in conjunction with local BEMS.

Application Examples

- Leisure centres
- Agriculture
- Industrial process heating
- Under soil heating

FTC2B		PAC-IF032B-E
Dimensions (mm)	Width	336
	Depth	69
	Height	278
Weight (kg)		2.4
Operating Ambient Temperature (°C DB)		0~+35°C (RH<80%)
Electrical Data	Electrical Supply	Powered from outdoor unit (240v)
	Phase	Single

ecodan® Renewable Heating Technology

CAHV / CRHV Accessories

Ecodan has a wide range of accessories available to help improve performance in the harshest of winter environments.

Accessories

CAHV Wind Hood CAHV-WH

- Protects the evaporating coil in high wind environments.
- Allows the unit to be installed in exposed roof top locations.
- Protects the unit in locations where there is a risk of snow build up.
- Four hoods supplied, two side and two rear.

CAHV Raised Stand CAHV-RS

- Gives the unit a solid platform to mount and anchor to.
- Raises the unit up and allows the natural flow of cold air beneath it.
- Fully adjustable in height, allowing the installer to choose ideal height for the location.
- Should be installed with anti-vibration pads between the unit and the raised stand.

CAHV Drain Pan and Heater CAHV-DP

- Neatly directs condensate (naturally occurring water moisture) to a drain away.
- Supplied with optional use resistance heater - the heater can be used where there is risk of freezing due to prolonged cold weather.
- Wired directly into the unit and only activated when the ambient temperature drops below a given point.
- Requires a 240v, 10amp power supply - see installation manual for details.
- Should be installed with anti-vibration pads between the unit and the raised stand.
- Must be purchased with the raised stand.

CAHV / CRHV Main Pipework Thermistor TW-TH16

- Pipework mountable probe thermistor - either dry or wet pocket.
- For use in multiple installations where cascade ability is required.
- Should be installed on the flow/outlet pipework, no more than 20m from the main unit.

CAHV / CRHV Differential Pressure Switch K-CON KS10-EP100S

- Protects heat pump from low flow conditions.
- Heat pump is stopped if system flow rate is too low.
- 2 no. required for CRHV.

CRHV External Temperature Sensor TMP-O

- Used for weather compensation in heating mode.
- Increased system efficiency.
- Comes with solar guard.

ecodan® Renewable Heating Technology

Acoustic Kits
Up to an 8dBA Noise Reduction

Example of a CAHV Acoustic Kit

Mitsubishi Electric offer a range of Acoustic Kits designed for noise reduction. An industry first, these kits offer up to an 8dBA noise level reduction and are available to use with our Ecodan CAHV model.

The sound levels of our kit are already class leading, but with local planning regulations tightening with regards to equipment sound levels, especially in urban environments or in residential areas close to commercial estates, Acoustic Kits can provide the answer.

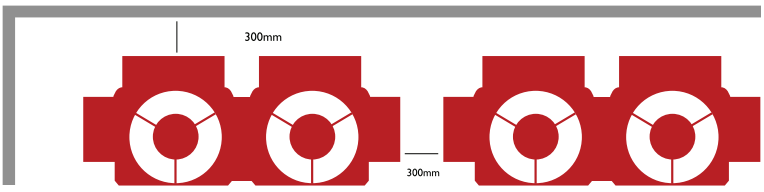
Noise level requirements at neighbouring facades also need to be met in order for planning permission to be granted and to further assist with this, as well as the option of Acoustic Kits, the CAHV systems also have a built in noise reduction input to help in the most extreme cases.

Both 'full kits' and 'top only' kits are available. The 'full kit' comprises of left, right and rear louvres with top attenuator(s). The 'top only' kit has top attenuator(s) only. If space is an issue then the 'top only' kit is still able to reduce the noise level by up to 4dBA.

The sound pressure level is calculated from an average of the noise at a height of 1m above the unit and at a distance of 1m from the front, sides and rear of the unit. All noise measurements are performed in an anechoic chamber.

Installation

Due to the wrap around coil of our units, the louvres are attached to three sides of the unit. Therefore, when installing multiple module systems, a 300mm gap between each louvre is required. See CAHV example below:



1 full kit per outdoor unit is required, unless specifying top attenuator only. In this case, space units as normal.

Supply and / or Installation

Please contact Ambient Acoustics directly for supply and installation costs. Installation costs will vary depending on location and quantity of units.

Ambient Acoustics Ltd
PO Box 1585, Wedmore, Somerset, BS28 4WZ
Tel: 01934 712802 Fax: 01934 710420
Email: sales@ambientacoustics.co.uk

Ambient Acoustics is an independent supplier of acoustic attenuation products, all warranties and liabilities rest with Ambient Acoustic Ltd. The acoustic kits have been tested and approved by Mitsubishi Electric UK.

Example Application Schematics

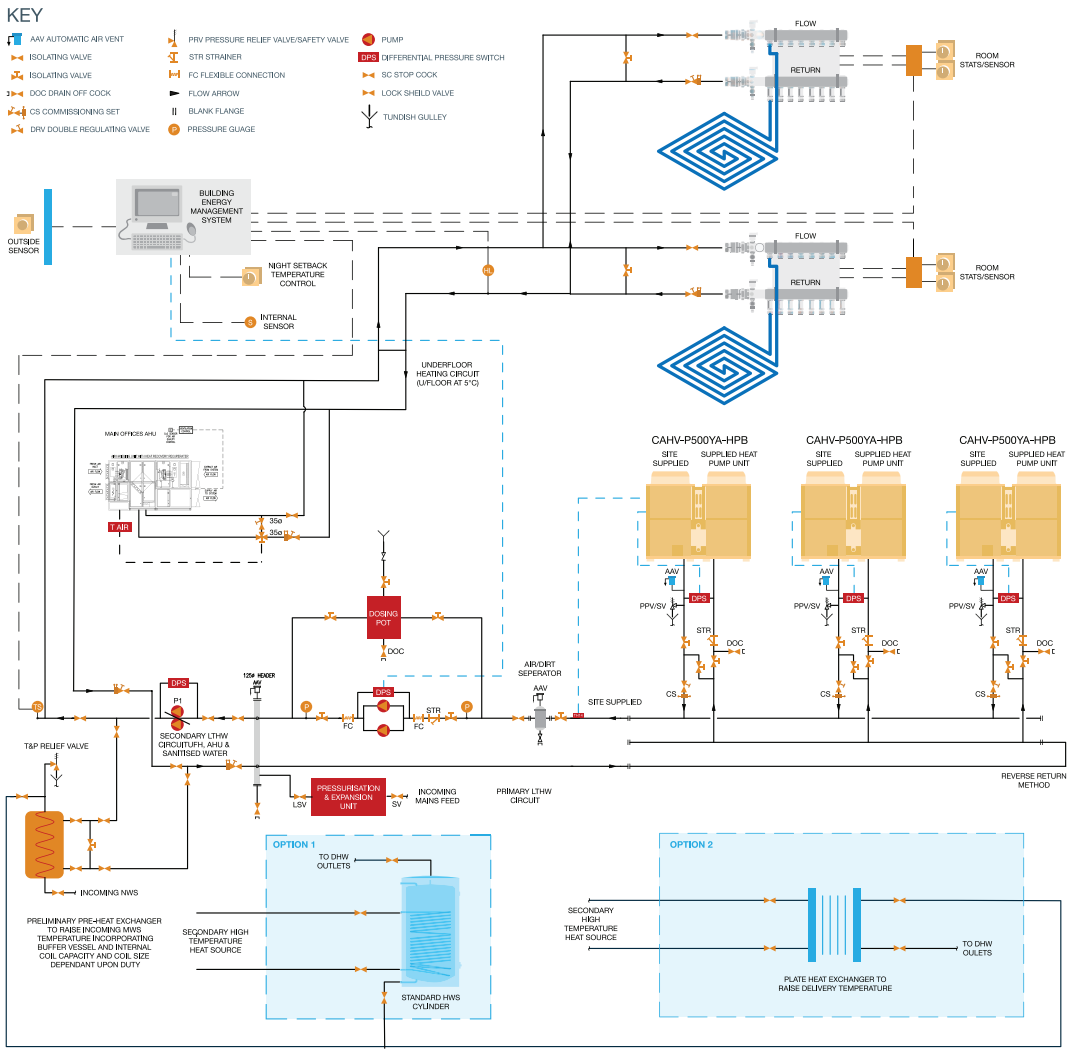
The application of a heating system using heat pump technology takes a little more consideration than conventional systems that use fossil fuels. The benefits however are significantly greater.

To ensure optimum performance and efficiency, a professional installer will need to ensure the following elements are accounted for:

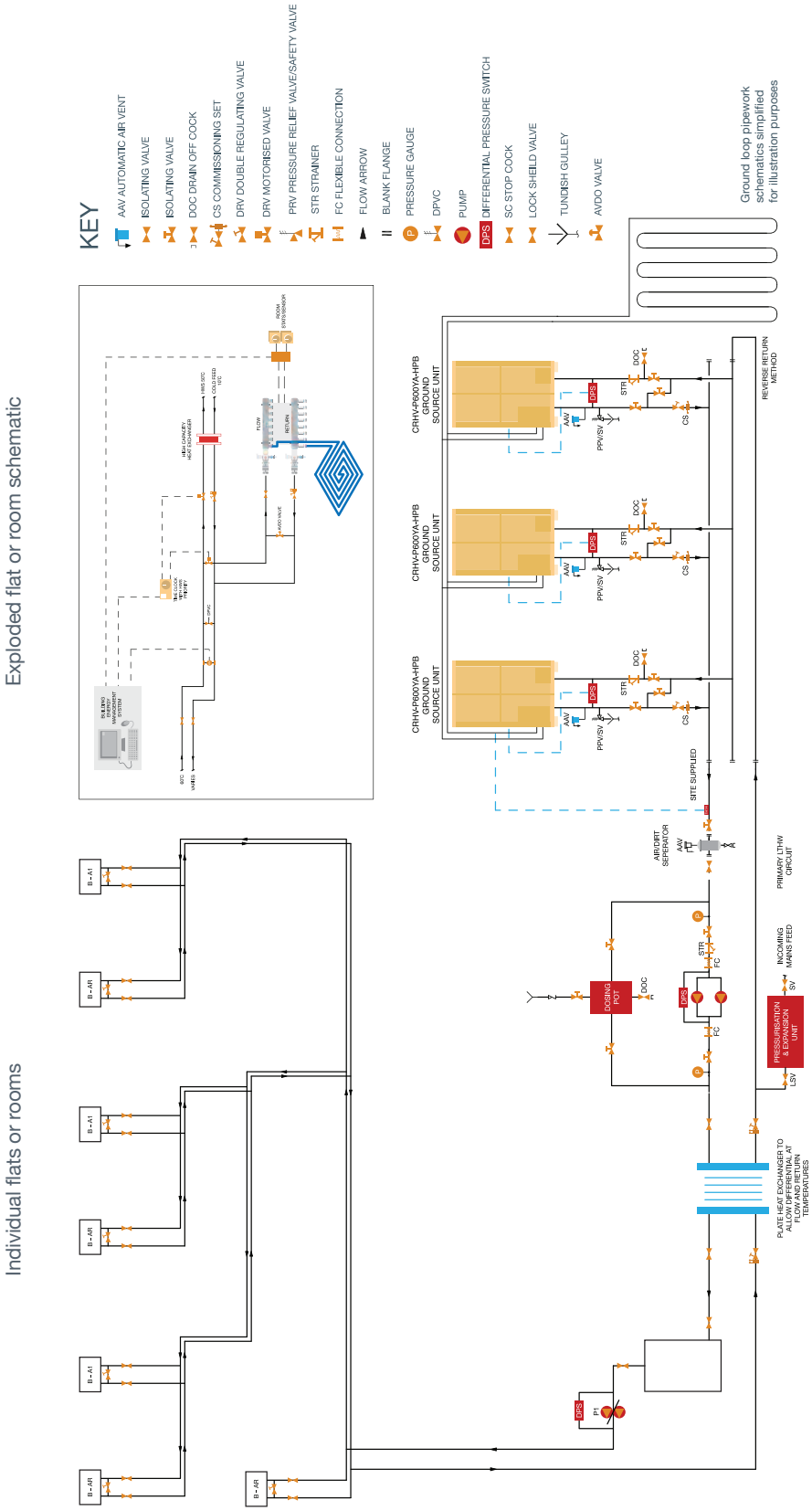
- Correct heat emitter selection and sizing
- Recovery times at low ambient temperatures
- Night setback to between 17-19ºC
- Where the application requires them, buffer vessels (e.g. Air Handling Units) are specified

Including these elements at specification stage will significantly reduce running costs and carbon emissions, helping to meet targets and get the best results from this renewable technology.

Example 1 Underfloor Heating and Hot Water using a CAHV Monobloc System



Example 2 Office Application using a CRHV Ground Source Monobloc System



School Heating Project, Woolley Wood

In a bid to improve conditions for pupils, Woolley Wood Primary School relocated to a new purpose-built school in Chaucer Road, Sheffield. Rising maintenance costs for the ageing building, erected in 1934, along with access difficulties and increased pupil numbers combined to make the old school building redundant.

To solve this problem Sheffield's local education authority called upon Kier Sheffield LLP to create a new school building, fit for purpose.

Strict city council planning regulations required that at least 10% of the building's energy should be met by renewable or low carbon energy and that a 20% reduction was achieved in predicted carbon emissions. To fulfil this brief Kier contacted West Yorkshire-based M&E Contractor, Thornley & Lumb, to design and specify the building services required within it.

Working in conjunction, Thornley & Lumb, renewable energy specialists Turn Key AC Ltd, and Value Added Reseller, PACAIR designed and installed an efficient, economical heating and hot water system, which met every criteria.

Woolley Wood's new system uses six Mitsubishi Electric Ecodan CAHV monobloc air source heat pumps to serve the new underfloor heating. This has eliminated the need for wall mounted radiators and conserved valuable space. The units also provide heating and hot water to the school's hydrotherapy pool.

The CAHV units at the school are roof mounted and Turn Key AC Ltd came up with a unique skid solution to locate the six units on, pressure test off site and incorporate all of the electrical supplies. Thus when the time came to crane the skid and its contents on to the roof, valuable installation time was saved and costs reduced.

The Ecodan CAHV is a unique solution to the challenge of renewable heating within schools and can provide all a school's heating and hot water requirements, either by itself, or in conjunction with alternative systems.

PACAIR

Social Housing Community Heating Project, St Mungo's

St Mungo's, a charity which provides help and services to the homeless in London and the South of England, required a heating and hot water system that would serve the needs of tenants housed in their 24 newly built dwellings in Spring Gardens, Lewisham.

The brief received from the charity contained a challenging set of criteria; the new system had to be able to:

- Use sustainable, renewable energy in order to comply with stringent local authority planning requirements
- Cope with the different loads required by a community heating scheme
- Deal effectively with regular changes in tenancy and occupied hours
- Offer tenants the ability to alter the temperature of their individual flats, whilst giving the charity full central control of the system

Waterstone Design, the building services consultancy tasked with designing the new system for the charity, specified three Ecodan CAHV monobloc air source heat pumps capable of delivering 129kW down to -7°C ambient, including defrost.

These systems will provide underfloor heating for all 24 dwellings, along with their hot water requirements through a direct hot water plate heat exchanger, ensuring the heat delivery system operating temperatures can be kept as low as possible.

The St Mungo's community systems load requirements are extremely dynamic, and our CAHV monobloc systems have been designed to cope with this by allowing the capacity to increase in 0.5kW increments, from 18kW upwards. The units cascade on and off, utilising optimisation to deliver peak efficiency, ensuring even wear and tear throughout their operating life.

Each MCS certified CAHV monobloc unit is hermetically sealed and requires very little maintenance. Two separate refrigerant circuits operate within each unit guaranteeing a 50% back up, whilst offering the benefit of low on-site refrigerant volume.

"As a homelessness charity with a limited budget, we wanted a sustainable solution offering control and flexibility with no compromise on performance, whilst at the same time achieving our goal of reducing the energy costs to our clients and lowering the buildings carbon emissions.

The needs of our clients are always paramount and reducing the institutional feel of their dwellings where possible is a common goal. We aim to offer groundbreaking, innovative support services to our residents, and this design will ideally match the quality and effectiveness we aspire to across our organisation."

Steve Fabian
Purchasing Manager at St Mungo's

Heat Pumps Provide Community Heating via the River Thames

A new eco-friendly housing development in London is getting the energy for its heating and hot water directly from the Thames in a pioneering community heating scheme that could be replicated in many of our major towns and cities.

The £70 million mixed-use development has been created by NHP Leisure Developments on the site of a former power station right in the heart of Kingston upon Thames, and 200 metres from the banks of the river.

The 137 apartments, built by specialist contractor and developer, United House, all benefit from the cutting-edge heat pump system that harvests naturally stored energy from the River Thames.

The community heating scheme takes renewable heat from the sun, stored in the river water and boosts it to the temperature required for the underfloor heating and hot water needed by residents.

"At two metres below the surface the water never falls below 7°C, even in winter, so we can be certain that it can provide enough energy to heat the apartments," explains Mike Spenser-Morris, managing director of NHP Leisure Developments and the visionary behind the scheme.

"If we had fitted gas boilers, then the site would be dumping around 500 additional tonnes of carbon into the atmosphere each year. In addition, because of this system's exceptional energy efficiency, the equivalent heating cost for a couple living in a one bedroom apartment would be 18% more."

Inside a specially-built plant room adjacent to the river, water from the Thames passes through high-efficiency heat exchangers and, once the low grade heat has been harvested, the water is immediately fed back into the river, untreated in any way. The heat exchangers transfer the low grade heat to an internal 'closed' loop water system which is then carried 200 metres to a plant room in the apartment building, where Ecodan heat pumps boost the low grade heat to the temperature required for the apartments' heating and hot water.

Towards the end of 2014, the construction of a new 142 bedroom hotel, with meeting, banqueting and conference facilities, will also be completed at the site, which will increase the efficiency of the heating scheme further still. The hotel will derive all its heating and hot water, as well as its cooling, from the open water heat pump installation. Heat recovered from cooling the individual hotel rooms will be reclaimed and returned to the community system to support the heating and hot water demand for the whole site.

Mike Spenser-Morris believes the scheme paves the way for other developments taking place near an open body of water to benefit from this highly energy efficient system, doing away with the need for traditional combustion boilers, with their attendant carbon emissions.

"This open water heat pump system will be capable of producing over two megawatts of thermal energy for this development and will provide it 24/7, 365 days a year regardless of the weather or air temperature, even in the depths of winter," he explains.

"Almost every major city in this country is close to a river, lake, reservoir, canal or the sea."

Edward Davey, Secretary of State for Energy and Climate Change and MP for Kingston and Surbiton, who officially switched on the development's innovative heating system said: "Kingston Heights is a great example of how sustainable solutions can help power entire communities. I want to see a community energy revolution where projects like this are the norm, not the exception.

"The Thames is a great natural asset to Kingston and London as a whole. By capturing the heat permanently stored in the river to provide heat and hot water to the whole development the project shows the enormous potential of renewable energy."

The Glencorse Centre

A new, state-of-the-art Community Centre in Scotland is reaping the rewards of installing a Mitsubishi Electric Ecodan CRHV monobloc ground source heat pump.

The inverter-driven Ecodan CRHV heat pump at the Glencorse Centre in Auchendinny, just south of Edinburgh, provides a simple, renewable solution.

The Ecodan CRHV is heating the brand new, state-of-the-art community centre, which offers an inspirational space for local people to meet, socialise and take part in numerous leisure activities. The original village hall which stood on the site was built in the 1970's, but by 2007 it had come to the end of its lifespan and health a safety regulations forced its closure, leaving the community without a vital resource.

The £1.2m replacement was funded by Midlothian Council, Scottish Rural Development Programme and Charity Bank and provides a fit-for-purpose facility which is environmentally sound and meets the changing needs of the community.

The centre's hot water is supplied by a small boiler but the inclusion of the latest model in the Ecodan range of heat pumps, means the CRHV will deliver 36kW of renewable heating via an underfloor heating system, ensuring that the centre's heating bills are kept to a minimum.

Energy efficiency and sustainability were the key requirements for this project and in addition to the inclusion of the Ecodan CRHV, a number of other energy saving initiatives were specified throughout the building.

However, with the cost of heating accounting for such a large proportion of the projected energy use this was one area where efficiency was vital and this is where the Ecodan CRHV system has proved its worth.

Alan Cameron of Livingston Mechanical Services which installed the Ecodan system says:

"In a community building of this type there is always a requirement for energy efficiency, but because it is in a rural, off-gas location the choices are limited. By specifying the Ecodan ground source heat pump to serve the underfloor heating throughout the building, we came up with a solution which is both simple to operate and one which will be significantly cheaper to run throughout the lifetime of the building than other traditional methods of heating."

The Ecodan CRHV is a practical alternative to more traditional methods of heating and its efficiency has already been demonstrated in this installation which achieved an average Seasonal Coefficient of Performance (SCOP) of 4.08, operating at an average flow temperature of 50ºC in the first six months of operation.

Individual units offer 60kW capacity and up to 16 units can be linked together to offer full multiple unit cascade control, delivering up to 960kW of renewable heating.

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, 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 in line with the Partner Programme terms of conditions, as long as:

- The purchase is registered with Mitsubishi Electric
- The system is installed and commissioned by an Accredited Mitsubishi Electric Heating Partner[12]
- Annual maintenance is carried out in accordance with Mitsubishi Electric's terms and conditions

12 All CAHV/CRHV/Cascade applications must be commissioned by Mitsubishi Electric to obtain the warranty.

Ecodan from Mitsubishi Electric provides a renewable energy solution, efficiently meeting the energy demands of today and beyond.

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