MITSUBISHI ELECTRIC
HEATING SYSTEMS

ecodan™

Advanced Heating Technology

The perfect solution for **Low Carbon**

Domestic Space and Water Heating

Helping you to comply with

The Code for Sustainable Homes

A new era in the provision of domestic space and water heating

The name Mitsubishi is synonymous with **excellence**

Known the world over, Mitsubishi is a trusted global leader associated with a variety of products and services. Founded in 1907, the company known today as Mitsubishi Electric, quickly rose to the forefront of the heating and cooling industry, a position we still enjoy today.

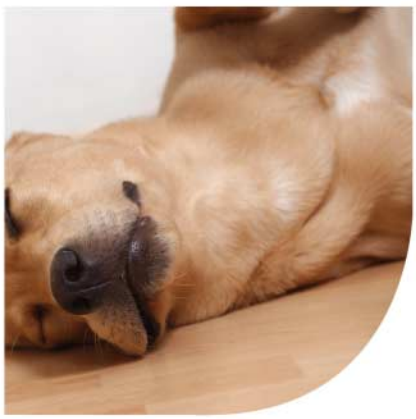
Increasing attention is being paid to the cost and the environmental impact of heating homes in the UK. As a leading manufacturer of energy efficient heat pump systems, we constantly strive to meet and exceed the increasing demands placed on our industry. The drive to reduce energy consumption and the impact it's use has on the environment is crucial and increasingly important to us all. The need to be more energy conscious and environmentally responsible, has long driven Mitsubishi Electric to spend millions of pounds and huge amounts of resource on researching and developing the solutions of the future. As market leaders, at the forefront of the very latest technology, we pride ourselves in providing high performance and competitive systems on which you can rely. Amongst such developments is the advanced heat pump technology used in Ecodan.

Responsible manufacturing

Mitsubishi Electric boasts an explicit commitment to sustainable business practices such as energy and resource efficiency, minimising ecological impacts of our products and reducing greenhouse gas emissions. We are the only manufacturer in the industry recognised by Portfolio 21 as one of the top five companies in the world for our sustainable environmental policy. All of our factories are also ISO 14001 registered, the international standard that specifies a process for controlling and improving a company's environmental performance and with the advent of our Green Gateway Initiative, we strive to constantly promote best practice.

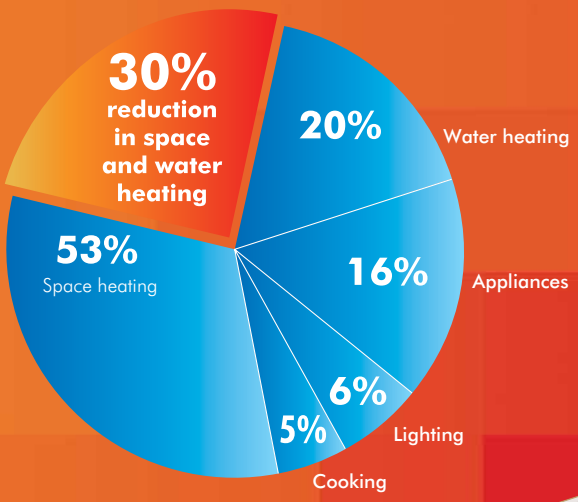
The Forest Stewardship Council (FSC) is an international network promoting responsible management of the world's forest. The paper this brochure is printed on supports the development of responsible forest management worldwide. The wood comes from FSC certified, well managed forests, company controlled sources and/or recycled material.

Providing perfect solutions for today and the future



Ecodan™ heat pump has the potential to reduce a home's CO_2 emissions by up to 50%

By simply using a Mitsubishi Electric Ecodan heat pump to provide domestic space heating and hot water, it is possible to greatly reduce CO_2 emissions. Using proven heat pump technology widely used in the heating and cooling industry, Ecodan upgrades naturally occurring energy from the air and uses this to provide domestic space heating and hot water. Heat pump technology has been used around the world for decades and Mitsubishi Electric have developed this technology for domestic application to produce **Ecodan - one of the most advanced, efficient heating systems available today.**



User friendly

From a user's perspective, when compared to traditional means of domestic heating, Ecodan is easy to install, reduces CO_2 emissions by up to **50%** and offers a **30%** saving on running costs. This is only made possible through the application of the most advanced heating technology in production to date. **Ecodan provides the perfect solution to help new build homes adhere to The Code for Sustainable Homes.**

THE CHALLENGES

The Code for Sustainable Homes legislative requirements

Increasing demand from home owners and house builders for greener solutions

Recognition that gas and oil based solutions have an increasingly limited life span due to cost / availability pressures - need to plan for long term future

Internal pressures to be a more environmentally responsible organisation

Recognition that all the above are going to increase rather than decrease

THE SOLUTION

Ecodan™
a new generation heat pump helps achieve Level 3 of The Code for Sustainable Homes

Cost effective when compared to alternative solutions for reducing CO_2 emissions

Easily installed - only requiring water and electric connections

Low operating costs

Minimal maintenance

Reliable

Designed for domestic use

ecodan™
Advanced Heating Technology

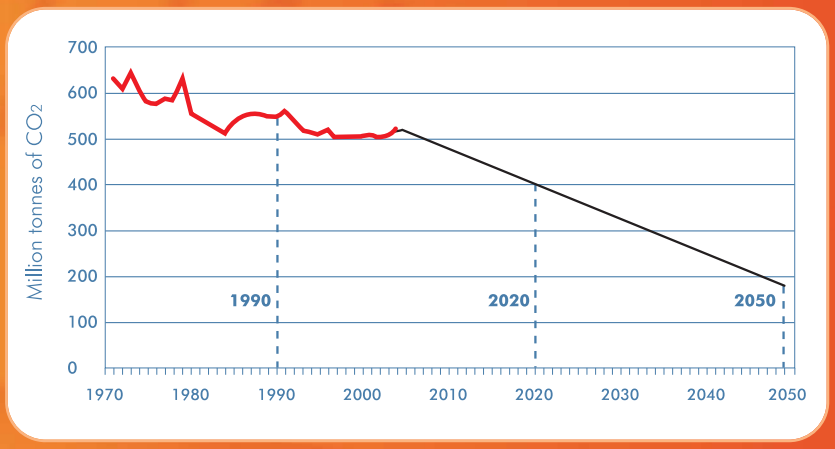
Recognising the need to change our approach to energy use

Global warming is a reality that we must all now face and as legislation drives the increased use of sustainable energy, the need for energy efficient homes, with minimum CO_2 emissions is greater then ever.

Recent rises in energy bills adversely affect us all. With costs set to continue to rise and natural energy resources proven to be diminishing, it is crucial that we consider alternative, more efficient means of providing and utilising energy.

Reducing the impact on our environment

Global warming is confirmed as being closely linked to carbon emissions and as a result the UK Government has determined that this country will play a major part in helping to reduce such emissions. The Government introduced the Sustainable Energy and Climate Change Bill with the long-term goal being to cut CO_2 emissions by 60% from 1990 levels by the year 2050. New legislative powers and improved ways in which CO_2 reductions are monitored and reported will also be introduced.



Total CO_2 Emissions

Source:
International Energy Agency

The Stern Report

Head of the Government Economic Service, Sir Nicholas Stern, was recently commissioned by the Government to review the economics of Climate Change. The conclusion of the review is essentially optimistic and finds that there is still time to avoid the worst impacts of Climate Change, if we act now and act internationally. Governments, businesses and individuals need to work together to respond to the challenge and strong, deliberate policy choices by governments are essential to motivate change. Delaying action, even by a decade or two, however, will take us into dangerous territory. If no action is taken to reduce CO_2 emissions, the concentration of greenhouse gases could reach double it's pre-industrial level as early as 2035, thus increasing average temperatures by 2°C. In the longer term, there would be more than a 50% chance that the rise would exceed 5°C. This would be very dangerous indeed and is equivalent to the change in average temperatures from the last Ice Age to today. The cost of stabilising the climate is significant yet manageable, but delay would be dangerous and much more costly. Emissions can be cut through increased energy efficiency, changes in demand and through the adoption of clean power, heat and transport technologies.

As energy used in buildings is responsible for almost 50% of the UK's carbon burden, the commercial and residential building sectors are under close scrutiny as far as energy efficiency is concerned.

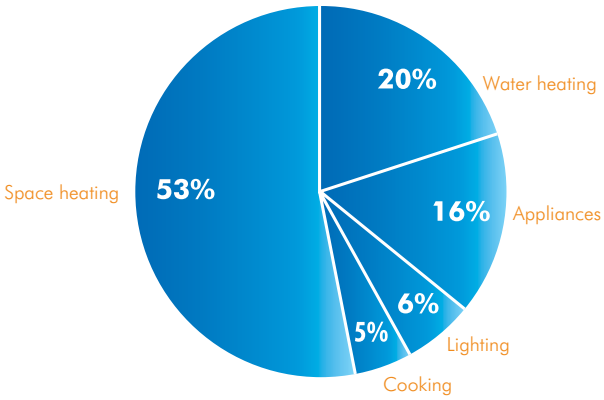
That said, more than a quarter of the UK's CO_2 emissions are as a direct result of us heating, lighting and running appliances in our homes.

Domestic space and water heating produce over 70% of an average home's CO_2 emissions, therefore reducing these is of paramount importance. It's no surprise, that in order to reduce CO_2 emissions, we need to focus our efforts on seeking new, more effective means of heating homes.

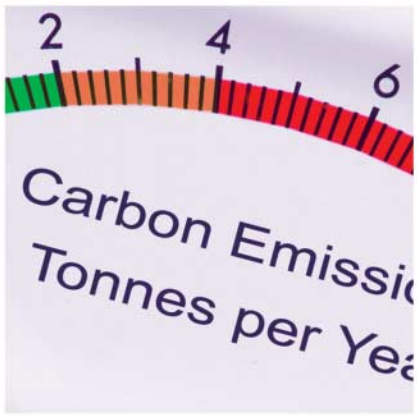
Central and local government are using legislation and strict guidelines to ensure that homes are as energy efficient as possible. In the social and private housing sector, designers, builders and installers increasingly need to utilise new and advanced technologies to ensure they meet the new ruling designed to cut CO_2 emissions and make better use of energy.

26% of the UK's CO_2 emissions comes from domestic heating, lighting and appliances

The average UK household produces over 4 tonnes of CO_2 per year, with a typical breakdown being:



We need to reduce the requirement for heating, ensuring that we heat by the most efficient means possible



Ecodan™ reduces CO_2 emissions in new and existing homes

New Homes

CO_2 emissions reduced by **30%**

There is currently a substantial under supply of housing in the UK. In order to meet the demand for new homes, the housing sector is set to increase its build rate by 23% over the next 20 years. This means that by the year 2050, over a third of the UK's housing stock will have been built inside of four decades. The Government is therefore focussed on using this growth as the ideal opportunity to cut energy use and water consumption in homes and is introducing legislation and guidelines in support of this.

The Code for Sustainable Homes

Introduced in 2006, The Code for Sustainable Homes is part of the growing body of legislation aimed at reducing CO_2 emissions. Using a rating system of one to six stars to depict the overall sustainable performance of a house, with one star being above the standard of the current Building Regulations. **Code Level 3 CO_2 Emission Reductions can be achieved by the deployment of Ecodan advanced heating technology, in conjunction with notional energy saving methods such as improved thermal insulation.**

CO_2 Emissions Reduction Targets

	CO_2 Emissions
Code level (Stars)	Percentage improvement on Part L 2006
1*	10%
2**	18%
3***	25%
4****	44%
5*****	100%
6******	Zero Carbon

Existing Homes

CO_2 emissions reduced by **50%**

The potential for reducing CO_2 emissions as well as the energy demands of existing homes is even greater than with that of new build. Existing energy use is likely to be much higher than in a new build, due to lower insulation levels and older heating systems with low efficiency.

Existing homes may also have the potential to benefit from Government grant funding in the near future as heat pump technology receives the recognition it deserves. Please refer to the latest Micro Generation Listing. **For further details and the latest information regarding any grants, please visit www.redbooklive.com**

As a further incentive for home owners to consider systems such as the Mitsubishi Electric Ecodan, the cost of VAT is reduced to only 5% in recognition of heat pump status as a low carbon technology as opposed to the 17.5% applicable on all traditional heating systems.

Why Ecodan™ is more efficient than other forms of heating solutions

With conventional boilers, 1kW of input energy provides less than 1kW of output energy or heat. With Ecodan, every 1kW of input energy is converted into an average of 3.6kW of output energy or heat, making it more than three times as efficient as conventional boilers and a natural choice for low cost heating and hot water.

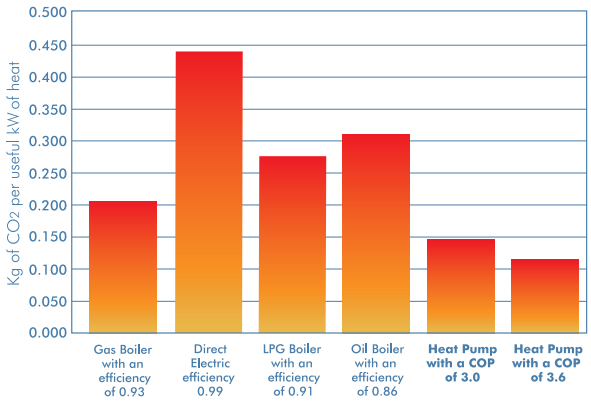
The Co-efficient of Performance (COP) of a heat pump is the ratio of the heat delivered, divided by the power consumed. The modern heat pump technology used in Ecodan and given in this example has the seasonal COP rating of 3.6.

By 2016, over 720,000 tonnes of CO_2 emissions per annum could be saved if all the 200,000 residential properties built each year installed heat pumps. If a heat pump also replaced 10% of the gas boilers sold each year in existing properties, the potential annual saving would increase to over 2 million tonnes of CO_2 by 2016.

By transforming the energy found naturally in outdoor air and using that to help provide cost effective heating, we've already established the efficiency of Ecodan and the fact that it 'upgrades' energy. Take that one step further and consider using Ecodan powered by electricity from a renewable energy source such as wind, biomass, solar or tidal and you could have a heating system that is zero carbon rated.

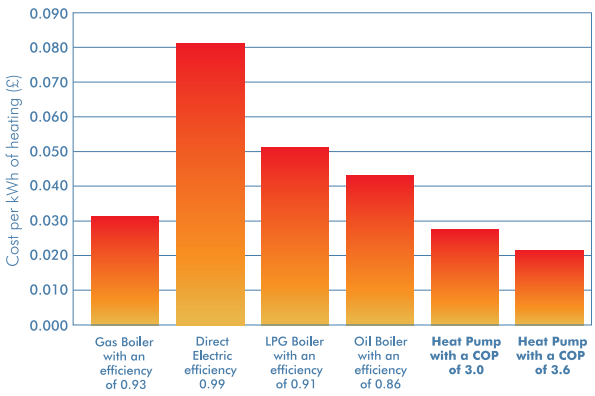
Another advantage with Ecodan is it's ease of installation and design flexibility. A perfect answer to those wide areas of the UK that are not perhaps on, or likely to be on the National Gas Grid. This negates the need to consider the more costly options of electricity or oil and removes the need to negotiate the enormous expense and disruption of extending the National Gas Grid. Whatever the location, simply install Ecodan and enjoy efficient, effective heating and hot water at a fraction of the alternative cost.

CO_2 emissions for various heating systems



Fuel	CO_2 levels per KW
Oil	0.26
LPG	0.25
Gas	0.19
Electricity	0.43

Running costs for various heating systems



Suppliers fuel prices in the above running cost graph are correct as of January 2008 covering postal area LU5.

Ecodan™'s advanced heating technology explained

The advanced heating technology used in heat pumps make them ideal for use in the UK's ambient temperatures and hence perfect for the domestic market.

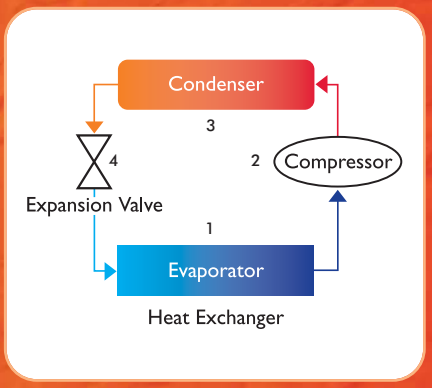
The technology inside the heat pump is similar to any domestic refrigerator, which uses a vapour compression cycle. The main components in the heat pump are the compressor, the expansion valve and two heat exchangers (an evaporator and a condenser).

1 Refrigerant in the evaporator is colder than the heat source. This causes the heat to move from the heat source (in this case the outside air) to the refrigerant, which then evaporates.

2 This vapour moves to the compressor and reaches a higher temperature and pressure.

3 The hot vapour now enters the condenser and gives off heat as it condenses.

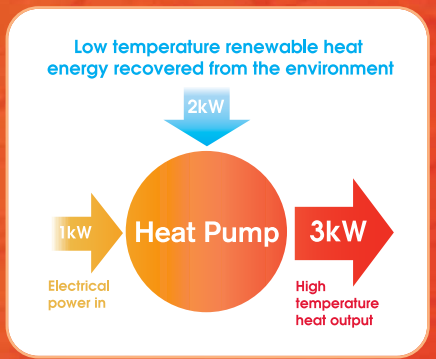
4 The refrigerant then moves to the expansion valve; drops in temperature and pressure; and then returns to the evaporator.



What makes Ecodan™ unique?

Inverter-driven technology

At the heart of Ecodan is a modern, inverter-driven heat pump compressor which converts free energy from the air and upgrades it to higher temperatures suitable for heating. The inverter control regulates the system so that heat output modulates to match the exact capacity required, meaning the boiler will only consume the exact energy needed at any given time and thus increase efficiency further.



The **performance** characteristics of Ecodan™

Low starting current

Ecodan operates on a standard single phase power supply and has very a low starting current of 5 amps, which reduces power requirement further still.

Low noise levels

Crucial to residential applications, the Ecodan offers one of the lowest noise levels available. Older heat pump technology is likely to have operating noise levels between 52 and 55dBA, whereas Ecodan is a good 3dBA lower at only 49dBA. Well within acceptable levels and effectively 'half' of that associated with the older technologies, 3dBA is the equivalent to a 50% reduction in noise levels.

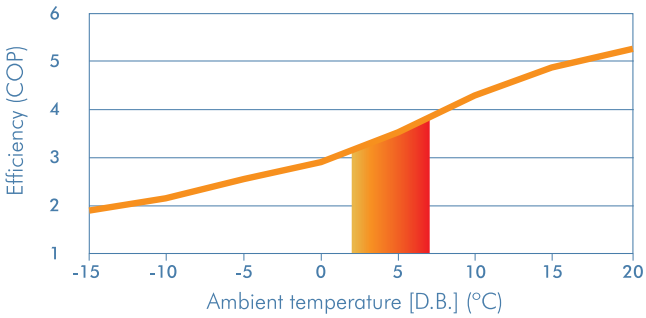
Easy to install

The Ecodan heat pump is a self contained unit which only requires water and electric connections.

Highest efficiency

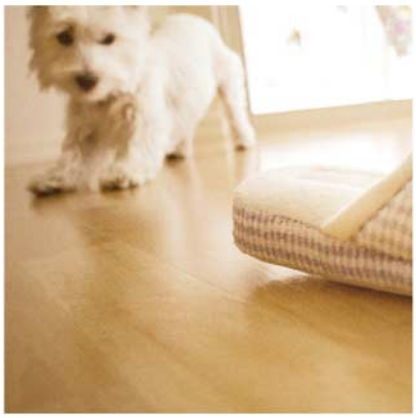
With the UK's ambient temperatures, Ecodan is perfectly designed to operate at optimum performance throughout the year. Ecodan can generate hot water up to 60°C, it also has the ability to operate in the unlikely event of the outside temperature plummeting to -20°C.

COP ratings against typical UK heating range



Ecodan efficiency against ambient temperature using average flow temperature of 45°C. Shaded area shows typical UK heating range (2°C to 7°C) at which COPs of 3.1 to 3.7 are achievable.

Ecodan™ heat pumps are perfect for the UK domestic market



Ecodan™ in operation

Ecodan heat pumps are ideal for use in a variety of house sizes or styles and it's carefully developed control system is designed to work perfectly to provide hot water to either traditional radiators or under floor heating systems.

Traditionally heat pumps have been seen as only suitable for under floor heating, however with the advanced control system of Ecodan and it's ability to provide optimum variable flow temperature control, radiators can now be easily provided with the hot water they need and prove to be a very efficient option.

How the delivery of heat differs when comparing Ecodan™ to traditional radiator systems

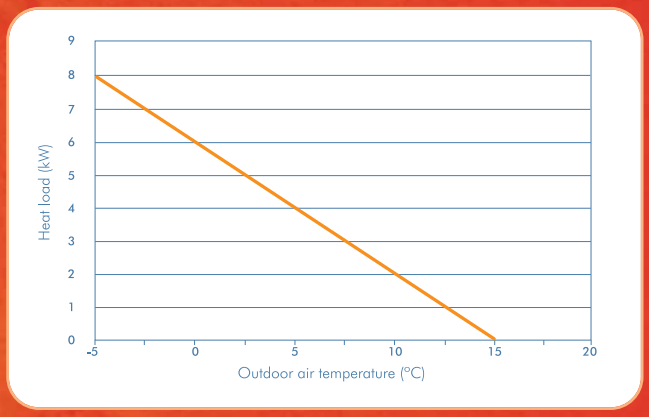
Full space heating capacity is required at -5°C

No space heating capacity is required at 15°C

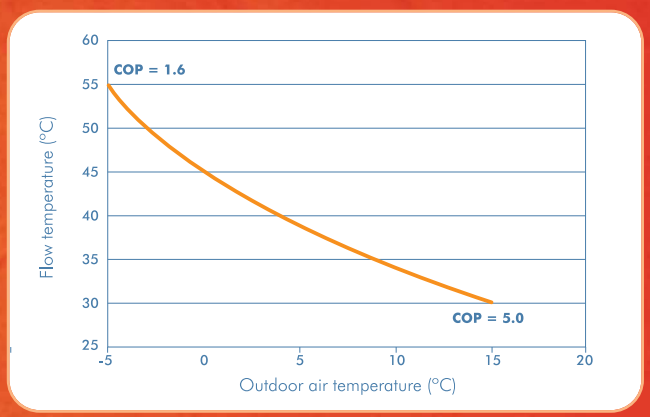
Capacity control in radiator systems, with a fixed flow temperature is controlled by Thermostatic Radiator Values (TRV). These operate by turning the radiators on and off to maintain the desired comfort level. For example at 2°C, with 55°C flow temperature, the radiators will be on 50% of the time and off for the other 50% of the time.

The Ecodan will vary the flow temperature automatically, based on the ambient temperature to keep the house warm. Operating at these lower flow temperatures significantly improve efficiency.

Typical heat load of a house to achieve indoor comfort



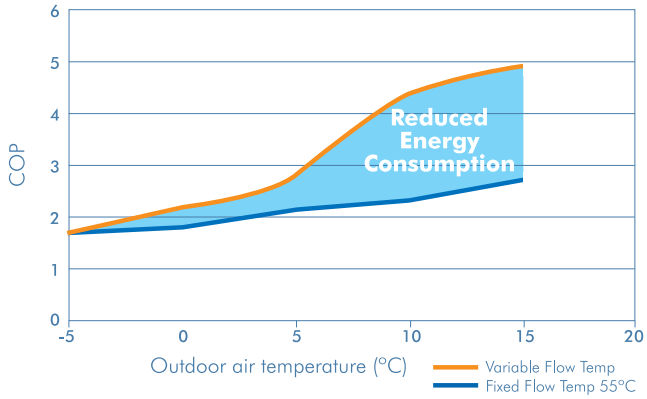
Flow temperature requirement vs outside air temperature



Reduced energy consumption

Energy savings of over 30% are achieved by using a heat pump with a variable flow temperature as opposed to a fixed speed temperature.

Efficiency comparison with fixed and variable flow temperature



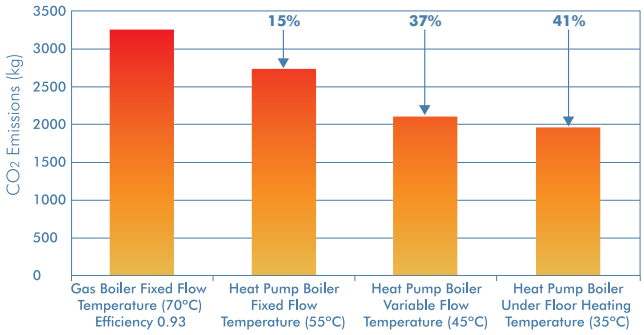
When installing a heat pump with a fixed flow temperature of 55°C, annual running costs for a three bedroom house are comparable when compared to a traditional gas boiler. If variable flow temperature with radiators and under floor heating is used, the running cost savings are over 20%.

Improved level of comfort

In using lower flow temperatures a more consistent heat output is achieved, the Ecodan therefore gives a greater level of comfort, lower CO_2 emissions and reduced running costs when heating the home.

This is an alternative to high temperature radiators that give an on-off burst of heat in a bid to maintain the desired room temperature. Homes can now enjoy a constant, controlled living environment, whilst benefiting from reduced running costs and lessening the impact on our environment.

Annual CO_2 emissions for a three bedroom house



Greater comfort, lower CO_2 emissions and running costs reduced by 23%

when compared to a traditional gas boiler of 93% efficiency

Proven heat pump technology

Heat pumps are widely and successfully used throughout Europe, with approximately 250,000 heat pumps installed in domestic applications in 2006 alone. Last year in France 50,000 were installed in domestic properties. The French Government recognises the efficiency of heat pumps and therefore promotes their use with a 40% tax incentive to help meet their commitment towards the Kyoto Protocol.

The Swedish are also looking towards reducing their domestic CO_2 emissions using heat pump technology. Last year alone sales of heat pumps were in the region of 80,000 units. In Sweden there are other driving factors increasing the market for heat pumps, one of the main ones being that they have very little natural oil or gas reserves, relying mainly upon their hydro and nuclear power stations for electricity generation. Over the coming years the Swedish Government is planning to reduce their dependency on oil fired heating.

Mitsubishi Electric - specialists in heat pump technology

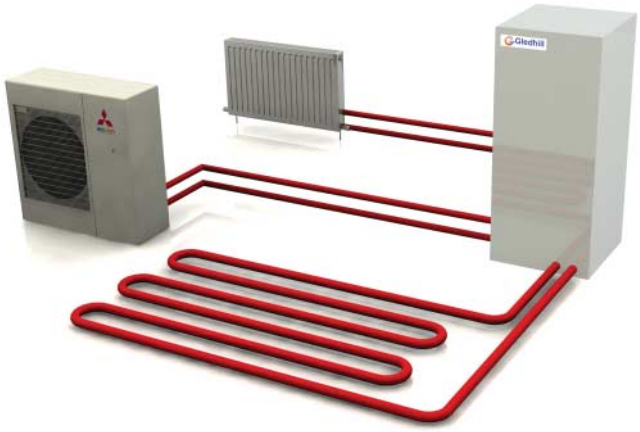
With years of experience at the forefront of advanced heating and cooling technologies, Mitsubishi Electric pride ourselves on the highest level of product research and development, ensuring the utmost efficiency across the range. We continually invest millions of pounds and years of extensive testing into each and every one of our products, earning us the deserved position of a market leader.

Ideally suited to the domestic market

Perfect for use in applications where there is a need for domestic space heating and the provision of hot water, Ecodan can be readily supplied as either a packaged system, that includes an approved water tank designed to perfectly compliment the way in which Ecodan operates, or it can be used with existing or alternative water storage tanks. However, it's important to stress that the selection of the hot water storage tank is crucial to the overall performance of the system.

The Ecodan™ packaged system

To optimise the entire range of benefits that Ecodan has to offer, we strongly recommend an approved packaged solution. Extensive research and development and careful consideration has been given to matching the unique operation of Ecodan with a perfectly suited means of storage and control.



Ecodan™ used with alternative components

It is possible to connect the Ecodan system to an alternative water storage tank, but consideration must be given to the fact that whilst the space heating will be largely unaffected, the tank selection will affect the water heating performance. It is important to note that a standard tank installed for use with an alternative boiler will result in lower efficiency from Ecodan in the water heating cycle.

Optimum control

Space heating is optimised by the specifically designed Ecodan controller. This will interface with standard S plan central heating and hot water systems and allow use of Ecodan with other hot water cylinders (of suitable specification) and under floor heating systems.

Specification:

- Programmable flow set points for both the central heating and hot water
- Outside air weather compensation
- Immersion heater boost mode

Perfect for providing domestic space heating and hot water

Low carbon technologies

As well as being compared with alternative forms of domestic heating, Ecodan is likely to be compared to alternative means of reducing CO_2 emissions from the home, such as:

Wind turbine
Solar water heating
Solar PV
Micro CHP
Biomass

When comparing Ecodan against alternative microgeneration technologies, capital outlay is key and the potential for reducing CO_2 emissions proves extremely favourable.

The Mitsubishi Electric **Green Gateway Initiative**™

The Green Gateway Initiative has been created by Mitsubishi Electric Living Environmental Systems UK. It is the Company's pro-active response to climate change. The point of difference is that Mitsubishi Electric will actively use its market footprint to influence people's buying decisions and help businesses and consumers make the right choices. Our Green Gateway Initiative breaks down into the following 10 component initiatives, Initiatives 3 & 10 being the most relevant to the domestic market at this stage:

Initiative 1	**Replace Old Equipment**
Initiative 2	**Affect Purchasing Behaviour**
Initiative 3	**Heat Pumps for Heating**
Initiative 4	**Free Cooling and Heat Recovery**
Initiative 5	**Improved Specification and Design**
Initiative 6	**Decision Support Tools**
Initiative 7	**Installation and System Commissioning**
Initiative 8	**Better Maintenance**
Initiative 9	**Controls**
Initiative 10	**Residential**

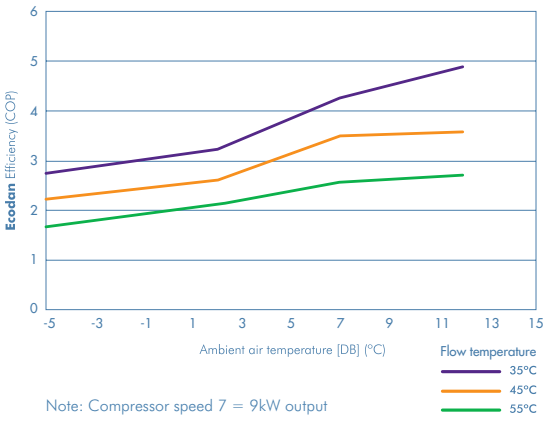
For further information, please visit **www.greengatewayinitiative.co.uk**

BRE tested

Independent testing on the Ecodan system has been carried out by the BRE. The BRE is a world leading testing, training and certification organisation, specialising in the testing and certification of construction related products.

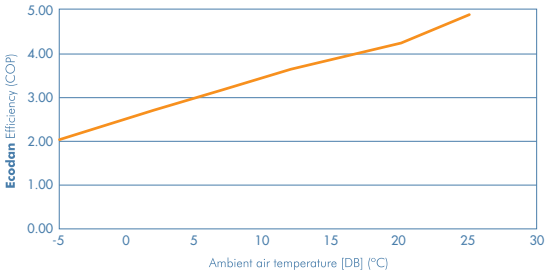
Performance tests of a 9kW Ecodan air to water heat pump were carried out at BRE for Mitsubishi Electric according to the requirements of BS EN 14511. The hot water cylinder was a BoilerMate HP-DEM supplied by Gledhill Water Storage Ltd. The tests were carried out in BRE's HVAC test facility's environmental chamber. The testing method involved heating 180L of water from 12°C to 55°C confirming heating performance down to -5°C. The findings were excellent.

BRE test data - Ecodan efficiency test



Note: Compressor speed 7 = 9kW output

BRE test data - hot water cylinder heat up



Note: Compressor speed 4 = 6kW output

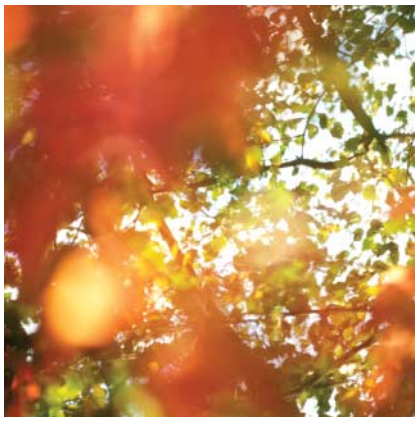
Compressor Speed 7 heat output kW			
Air Dry Bulb temp	35°C	45°C	55°C
12	9.1	9.1	9.8
7	8.8	9.3	8.8
2	8.0	8.3	8.25
-5	7.75	8.1	7.25

Using data to calculate the seasonal performance of **Ecodan**™, the findings are:

Water heating
COP 3.2 (tank to 55°C)

Space heating COP 3.6
(variable flow temperature)

Average overall COP of 3.45



Refurbishment case study

A four bedroom house in Bedfordshire is the first home in the UK to benefit from the new, revolutionary Ecodan heat pump. As a result CO_2 emissions from the home's heating system were reduced by **50%** and the overall carbon emissions from the property by an impressive **34%**.

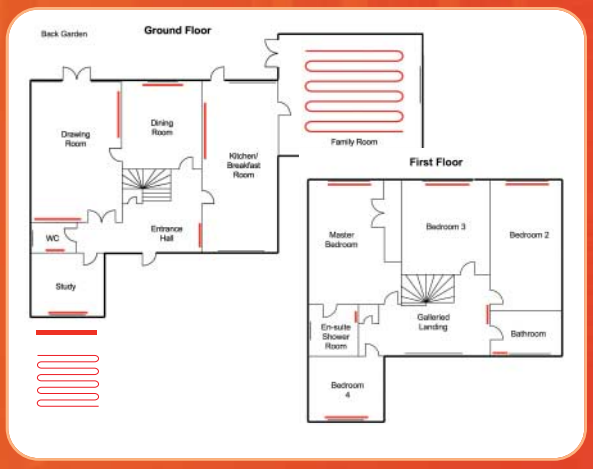
The homeowner sought to reduce his carbon footprint and by installing Ecodan was able to do so, whilst at the same time, providing an ideal case study for the advanced heating system in operation.

Built in 2000, the four bedroom detached house has double glazed windows as well as loft and wall insulation. The existing heating system was previously run by an 80% efficient gas boiler providing 23.2kW of heat output from an input of 29kW. Based on the existing radiators it was calculated that the total heat output of the radiators was 13.4kW under standard boiler conditions with a flow temperature of 70°C and the hot water demand of the home totals 140 litres per day.

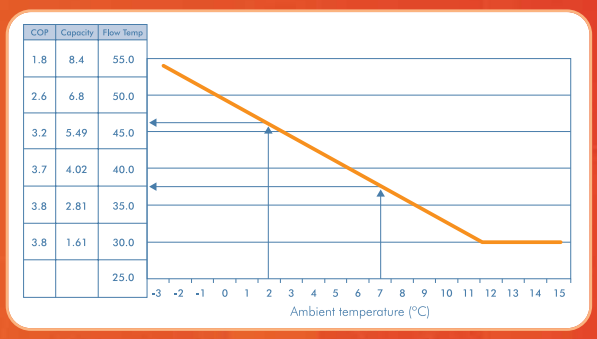
Using the Ecodan heat pump, the heat load of the house was calculated to be 8kW. Operating at a flow temperature of 55°C the heat output of the radiators will be 8.4kW, confirming that Ecodan is fully capable of meeting the heating demand of the house, using the existing radiators. In addition, one area of the house was changed to under floor heating.

The heat load of a house varies with ambient temperature. Traditional systems would vary the output from the radiators by turning them on and off frequently with Thermostatic Radiator Valves (TRV's), in order to meet the fluctuating demand.

As the ambient temperature increases, the heat load of the house decreases. The highly efficient Ecodan varies radiator heat output by changing the flow temperature, ensuring the highest level of COP possible. With average UK winter temperatures ranging between 2°C and 7°C, Ecodan operates at average flow temperatures between 35°C and 45°C providing the highest levels of energy efficiency.



Flow temperature vs ambient temperature



When comparing the existing gas boiler to using Ecodan to provide domestic space heating and hot water, the reduction in CO_2 emissions from the home are startling. The Ecodan with a seasonal COP of 3.4 emits 0.13kg of CO_2 per kW of heat provided to the house, compared to the 80% efficient gas boiler, which emits 0.24kg of CO_2.

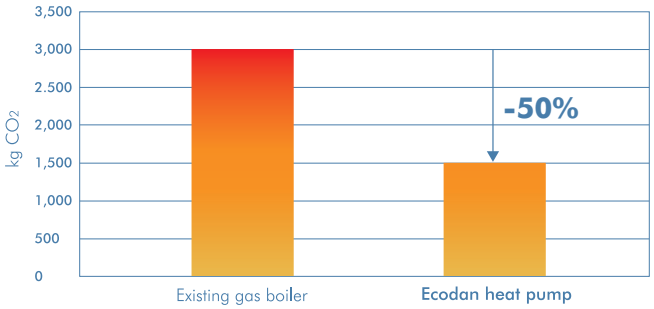
This works out to 1,619kg of CO_2 emitted per year when using Ecodan, as opposed to a massive 3,040kg of CO_2 using the existing gas boiler. This clearly demonstrates a reduction of 50% with the help of Ecodan.

When taking into account this property's CO_2 emissions, including that from lighting, appliances, space and water heating, the existing gas boiler accounted for 73% of the total CO_2 emissions. This is dramatically reduced when using Ecodan, with the total CO_2 emissions reduced by 34%.

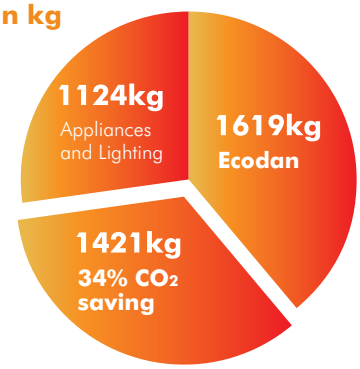
The annual gas bill to operate the existing gas boiler was £560. The estimated electricity running costs of the Ecodan are £358, which represents a saving of £202 (36%) per year.

In the past there was an issue with the noise levels of air sourced heat pumps. The newly developed Ecodan however, offers one of the lowest possible sound levels at 49dBA. External noise levels on the patio at the back of the house with the unit in operation were measured at 39dBA. This is very quiet when you consider that a modern computer has a noise rating of 37 to 39dBA, proving that sound levels are no longer an issue with the introduction of the advanced Ecodan system.

Heating CO_2 emissions



Whole house CO_2 savings in kg



50%
reduction in CO_2 emissions

41%
reduction in running costs

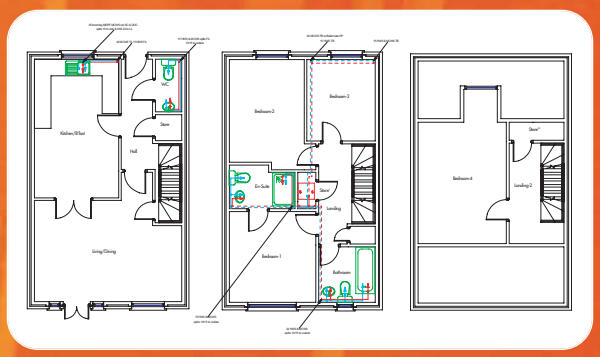
First heating quarter

New Build case study

Ecodan heat pumps are ideal for use on new-build projects. The low running costs and excellent heating performance make Ecodan an attractive option for homeowners, housing associations and developers alike. Highfield Orchard in Shrewton, Wiltshire, consists of eight executive homes. The developer specified Ecodan to supply the space heating and hot water for a number of reasons.

As the site is off the gas grid, the developer originally considered oil. However, this was ruled out as both the installation and running costs were considerably higher than Ecodan. Highfield Orchard saw Ecodan as a highly cost effective solution for this development.

All the properties have underfloor heating systems. These use lower flow temperatures than radiators and are a more efficient heat emitter. Underfloor heating helps to maximise the long-term energy and running costs savings available from Ecodan.



The Highfield Orchard site includes varying sizes of property, with heating loads between 5.2kW and 8.3kW. Ecodan uses the latest inverter technology to ensure that the system delivers exactly the right performance to match the load requirement of each property. That meant that the developer was able to specify the same system for every house, without the need to re-size or order different units.

Furthermore, Ecodan is supplied as a sealed system so it does not have to meet the new F-Gas Regulations. As a result the developer does not have to find specialist refrigerant handlers to install the equipment. Ecodan is straightforward to install, using normal plumbing skills.

At Shrewton, Ecodan is linked to a Gledhill BoilerMate HP DEM Water Storage unit. This system designed for use with Ecodan includes pumps, valves and a specially designed control system to optimise the overall system efficiency. Installers simply have to link the flow and return to the Gledhill Boilermate and then to the central heating system as they would with a traditional condensing gas boiler.

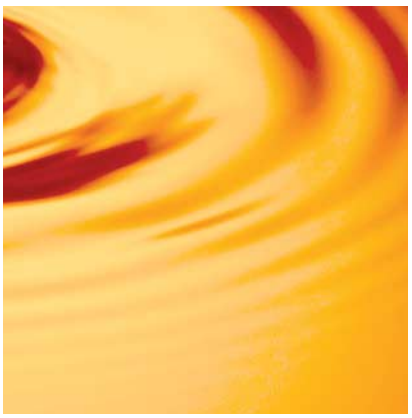
For any housing developer, the real test of the technology is its popularity with buyers. Heat pumps have certainly met with approval at Highfield Orchard and the developer considered the Ecodan an excellent selling point: it is viewed as 'sustainable'; has low running costs; and also leaves extra space in the kitchen where a conventional boiler would normally be positioned.

Perhaps most importantly, homeowners will notice very little difference in use between Ecodan and 'traditional' gas fired central heating - unlike some other sustainable heating systems. Even the user controls for Ecodan operate in the same way to those found on a traditional domestic heating system. Ecodan certainly makes it easier for homeowners to significantly reduce carbon emissions while cutting their energy bills.

CO_2 emissions and running cost comparison - Ecodan versus traditional oil boiler

4 Bed Terrace	Carbon (Kg)	Actual Running Cost (£)
Ecodan	2405	443
Oil Boiler	5129	730
3 Bed Terrace		
Ecodan	2055	380
Oil Boiler	4384	624

Predicted figures - typical usage patterns



Support Network & Warranty

In support of the Ecodan system, we've put in place all the before and after sales service you'd expect from a leading manufacturer such as Mitsubishi Electric. We recognise that our continued success relies heavily on having satisfied customers who experience high performing products that are efficient, effective and most importantly reliable. By investing 4% of our total turnover into research and development of new products and services, we aim to provide just that.

Approved Ecodan™ Installers (AEI)

Our Heating Partner Programme is an initiative that's designed to raise standards throughout the heating industry and our way of ensuring our customers receive an assured, uniform and professional service on which they can rely. For total confidence in our products and service, the installation of the Ecodan system must be carried out to the highest standards and should only be fitted by a highly trained, Mitsubishi Electric Approved Ecodan Installer. All approved installers have received specific, in depth training by experienced engineers, covering all aspects including Sales, Technical, Installation, Commissioning and Maintenance.

State of the art training

Mitsubishi Electric provide the highest level of training designed to enable engineers to design, install and maintain our advanced systems. All courses are taught by experienced engineers with a wealth of knowledge of our product range, the industry and all current legislation. Located around the UK, our training facilities boast, training and demonstration suites where theory and practice is readily explained, providing the perfect setting in which to gain in-depth knowledge of our products. As part of the course, attendees will be given useful boiler and radiator sizing software tools to assist in the design of the system.

Warranty

Home owners can benefit from an exceptionally high value 3 year warranty on the Ecodan Advanced Heating System. It's important to note however, that the warranty will only be honoured subject to the following conditions:

- To validate the warranty, the purchase of Ecodan must be registered with Mitsubishi Electric
- The system must be installed and commissioned by a Mitsubishi Electric Approved Ecodan Installer
- Periodic maintenance must be carried out as agreed and all maintenance reports must be made available to Mitsubishi Electric on request

ecodan™
Advanced Heating Technology

Air Source Heat Pump

Specifications

Dimensions	Height	943mm	
	Width	950mm	
	Depth	330+30mm*	
Weight		79kg	
Airflow		55m³/min	
Sound level (heating)		49 dbA▲	
Guaranteed operating range (outdoor)	Heating	-20~ +35°C	
Power supply	Phase	ø	1
	Voltage	V	230
	Frequency	Hz	50
Heating (A2/W35)	Capacity	kW	8.5
	COP		3.40
	Power Input	kW	2.35
	Nominal Water Flow	L/min	25.8
Heating (A7/W35)	Capacity	kW	9.0
	COP		3.70
	Power Input	kW	2.43
	Nominal Water Flow	L/min	25.8

5kW and 14kW arriving summer 2008

*Grill ▲At distance of 1m from outdoor unit

Nominal operating condition			Nominal operating condition		
Heating (A2/W35)	Outside air temperature (dry)	+2°C	Heating (A7/W35)	Outside air temperature (dry)	+7°C
	Outside air temperature (humid)	+1°C		Outside air temperature (humid)	+6°C
	Water temperature (inlet/outlet)	+30/+35°C		Water temperature (inlet/outlet)	+30/+35°C

The low carbon alternative to traditional boilers

ecodan™
Advanced Heating Technology

The future of domestic heating

Like all new technologies, Ecodan is an investment in the future. Developers, housebuilders and homeowners want to be assured that technology they purchase today will be relevant and useful for many years to come. Ecodan has been designed with the future very much in mind.

Already, legislation is forcing housebuilders and homeowners to consider energy use in their properties. Part L of the Building Regulations sets targets for carbon emissions from homes and these targets are set to rise over the next five to ten years. Ecodan is at the cutting edge of low-energy performance and will enable homes to meet these targets long after they are built.

The Home Information Pack will also take into account the energy used in domestic properties and homeowners using Ecodan will know that their energy use will always be less than homes with traditional gas-fired boiler systems, or electric heating.

A growing number of Local Authorities include targets for use of renewable energy sources, such as wind or photovoltaics, on new-build sites. Currently, these targets can range from 10% to 20% of a planned site's predicted energy that must be sourced from on-site renewables. It is sensible to minimise energy use in the dwellings on such sites to keep the requirement for high capital cost renewables to the minimum. Ecodan cuts the energy needed by homes, reduces the burden on renewable sources, and helps to minimise the carbon footprint of the site overall.

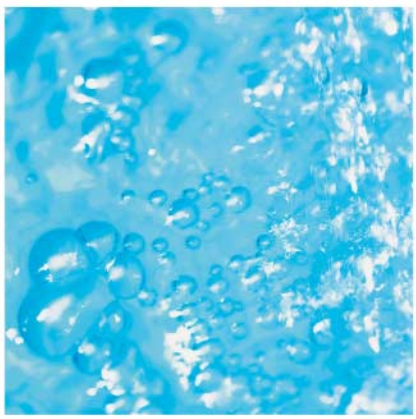
The Mitsubishi Electric Ecodan is designed to meet the demands of today's domestic hot water and heating requirements. Simple to install, cost effective for the end-user and with outstanding energy efficiency, Ecodan is ideal for designers, installers and users.

Inverter-driven heat pump technology offers a low carbon alternative to traditional boilers in modern buildings, whether they are new build or refurbishments.

Outstanding benefits over traditional boilers:

- 30 - 50% reduction in CO_2 emissions
- Low running costs
- Easy to install - self contained unit only requiring water and electric connections
- No gas supply, flues or ventilation required
- No need for groundwork or external pumps
- Single phase power supply with a low starting current
- Ideal for underfloor heating or low temperature radiators
- Low maintenance
- Reduced VAT from 17.5% to 5% for domestic applications
- Comparable installation costs to a modern gas-fired condensing boiler
- Low noise

Simple to install and cost effective heating solutions from Mitsubishi Electric



Approved Ecodan™ Installer

Mitsubishi Electric is investing in the future of Ecodan with its own accredited training programme for installers. Its Heating Partner Programme will ensure that Ecodan is correctly installed at customer sites and operating at maximum energy efficiency. Mitsubishi Electric is committed to ensuring that Ecodan customers can find reliable, knowledgeable technical experts who can offer help and advice on-site and during the lifetime of the product.

A key element of this launch is the Heating Partner programme giving businesses the opportunity to become an Approved Ecodan Installer (AEI), through detailed training and support. This opportunity is available to both existing Mitsubishi Electric Air Conditioning Partner Programme members and other companies wishing to install Ecodan Heat Pumps.

Ecodan is a factory sealed air sourced heat pump, connected by flow and return water pipes to either a hot water storage tank and/or central heating. When installed within a domestic environment this product comes under various domestic related building regulations, for example Part P and G3. In order for us to ensure Ecodan installations meet these and our own installation requirements each company that applies to become a Heating Partner must meet with the specific industry and programme standards.

Unvented Hot Water Certificate: It is a requirement under G3 of the building regulations that anyone installing, commissioning or maintaining an unvented hot water storage vessel (a component of Ecodan) is competent to do so.

We accept Unvented Hot Water Certificates from the following: Logic, City & Guilds 6019, NIC, BPEC & Building Engineering Services (CITB).

City & Guilds 6084 (Certificate in Energy Efficiency in Domestic Heating). This course has been designed to enable plumbing & heating engineers to confirm their competence in:

- The design, installation, service & maintenance of unvented hot water storage systems
- The understanding of central heating & hot water storage systems design & installation issues as they relate to energy conservation measures as detailed under part L1 of the building regulations

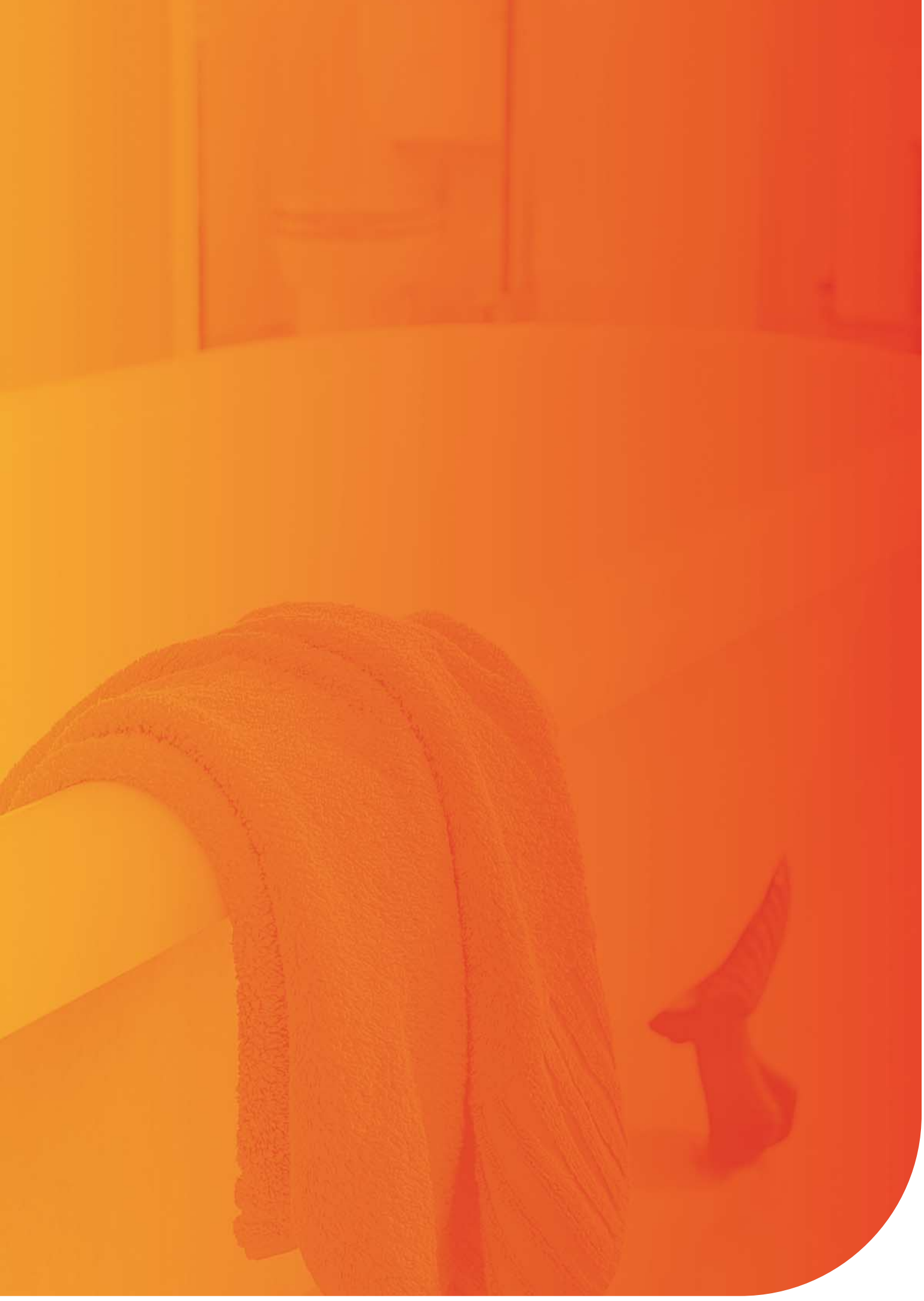
We also accept Energy Efficiency in Domestic Heating Certificates from the following: Logic, NIC, BPEC & Building Engineering Services (CITB).

The Approved Ecodan Installer accreditation will ensure that Ecodan is correctly installed at customer sites, and therefore operating at its maximum energy efficiency. The performance characteristics of a heat pump are substantially different from traditional boiler products. To ensure that the reputation of Ecodan and air sourced heat pumps are developed correctly, we only supply via installers who have attended and passed the relevant training.

MITSUBISHI ELECTRIC
HEATING SYSTEMS

ecodan™
Advanced Heating Technology

Approved Installer



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