

The Renewable Solutions Provider

# Making a World of Difference

## Community Heating Schemes



Air Conditioning | Heating  
Ventilation | Controls



## 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 and ventilate our buildings in some of the most energy efficient ways possible.**

Mitsubishi Electric has recently developed a range of heat pumps specifically designed for use with community heating schemes. Mitsubishi Electric's Ecodan heat pumps provide 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.





The Ecodan range of renewable heat pumps: Perfectly suited for community heating schemes



# The issues driving the need for renewable heating in our communities



How heat is provided to community schemes 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<sub>2</sub> emissions by 80% by 2050<sup>1</sup>
- Reducing the UK's reliance on fossil fuels
- Meeting increasingly tough legislation
- Incorporating renewable energy

In 2007, fuel use for space heating and hot water in the UK totalled 535TWh, with the residential sector accounting for an estimated 78%.<sup>2</sup>

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<sub>2</sub> 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.<sup>3</sup>



1 [www.decc.gov.uk/en/content/cms/emissions/carbon\\_budgets/carbon\\_budgets.aspx](http://www.decc.gov.uk/en/content/cms/emissions/carbon_budgets/carbon_budgets.aspx)

2 Digest of UK Energy Statistics, 2008.

3 [www.decc.gov.uk/en/content/cms/meeting\\_energy/renewable\\_ener/renewable\\_ener.aspx](http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renewable_ener.aspx)



# The legislative drivers for renewable heating

There are many legislative drivers that are now encouraging local authorities and owners of multi dwelling and high rise building stock to change the way that hot water and space heating is provided.

## Local Authorities and Housing Associations:

Local authorities play an important role in helping to deliver national carbon reduction targets, and their role as social landlords is an important one on the road to hitting the UK's ambitious targets. DECC (Department of Energy & Climate Change) has recognised that community based heating systems are a real and proven way of cutting carbon and lowering tenant bills in multi dwelling buildings.

The Committee on Climate Change have indicated that district and community heating, long term, should only be from low-carbon based systems, as gas-fired combined heat and power (CHP) will eventually become incompatible with national carbon budgets.<sup>4</sup>



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## The Code for Sustainable Homes:

The Code for Sustainable Homes is one part of the growing body of legislation aimed at reducing CO<sub>2</sub> emissions. The Code was introduced in 2006 and uses a rating system of one to six stars to depict the overall sustainable performance of a dwelling, with three stars being the standard for the current 2010 Building Regulations.

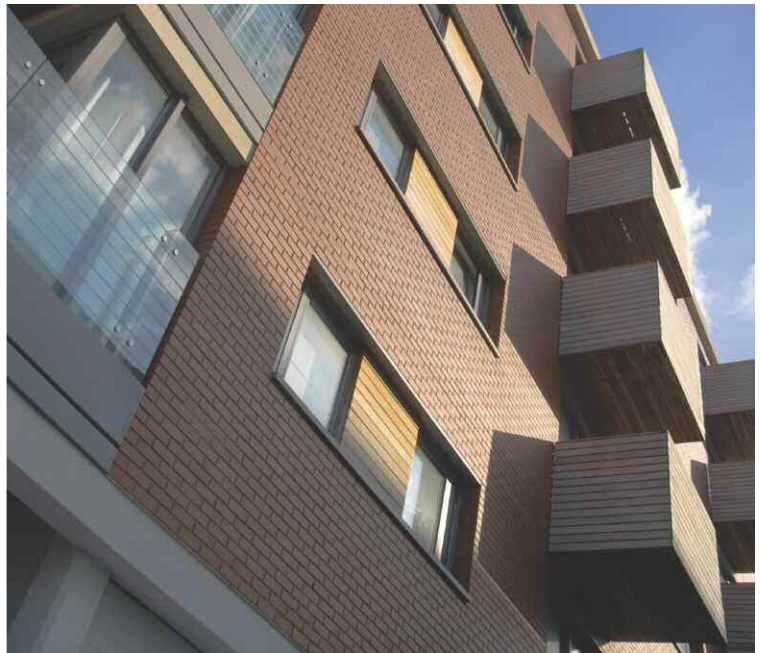
Code Level 4 CO<sub>2</sub> emission reductions can be achieved by the deployment of Ecodan air source heat pumps and when used with other sustainable building methods, even higher levels can be achieved.

# The legislative drivers for renewable heating

## Environmental Performance Certificates (EPC's):

Environmental Performance Certificates or EPC's are now a requirement for all residential properties sold, purchased or rented in the UK. Giving information on the energy performance in terms of cost and CO<sub>2</sub> emissions, allows the residing tenants or owner to identify where improvements can be made to the fabric of the building, as well as the heating systems within it.

Local authorities are under increasing pressure to reduce their carbon emissions and heating systems utilising low carbon and renewable technology could make a contribution to this. Every building is different, but where direct electric systems are being replaced, the improvements in EPC ratings across housing associations building stock will be significant.



## Replacing Traditional Systems:

Gas appliance installations have been avoided in high-rise dwellings since the 1960's due to a gas explosion in a tower block in London. The consequences of which are that many high rise buildings are left with little choice but to install inefficient and costly direct electric heating systems.

Many traditional systems fitted to multi dwelling buildings (such as storage heaters) offer the occupant little or no control on how and when the heat is delivered. In comparison, a community based heat pump system or individual system would dramatically cut bills and give full comfort control to the occupants.

# Renewable heat from heat pumps is the answer



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.<sup>6</sup>

Heat pumps are already recognised as a low carbon alternative to traditional systems such as direct electric, these type of systems being commonly found in high rise and multi dwelling buildings. The environmental impact of heat pump systems will also decrease as the electrical distribution grid becomes cleaner, and decarbonising the grid is of course a major part of the UK's carbon reduction plan.

Using advanced heat pumps specifically designed to deliver heat in the UK climate, Mitsubishi Electric meet these tough energy challenges head on.

Mitsubishi Electric's heat pumps are already fully accepted within the commercial sector, where they are used in buildings of all kinds, right up to multi storey office blocks. Using the same proven heat pump technology found in these systems we are now able to deliver an effective, low carbon, low maintenance sustainable solution to solve the legislative and social economic challenges faced by the owners and occupants of multi dwelling buildings.

Classified by the UK Government and European Union as a renewable technology<sup>5</sup>, our Ecodan heating products come in a range of sizes and options to meet the required demands.

#### Renewable heat pumps:

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



<sup>5</sup> European Parliament & Council, Renewable Energy Directive 2009/28/EC.

<sup>6</sup> 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.



# High Rise Community Heating Application

High rise buildings lend themselves well to centralised community heating systems; roof space and ground level areas offer the opportunity to locate the heat pumps without disturbing or giving up internal space. These systems are low maintenance and because they are a mechanical installation, fit into the normal regime and skills of local facilities management. Ecodan systems are modular, simple to design and their flexibility means if capital investment is limited, they could offer the whole or just part of the solution.

Perfect opportunities for these systems are: ■ Social housing ■ Care homes ■ Student accommodation

## Example using Ecodan CAHV Air Source Heat Pump Systems:

**1**  
Heating loads are very dynamic within these types of buildings. The Ecodan can cascade and modulate to ensure only the energy required is delivered

**2**  
Can deliver direct hot water through heat interface units, stored cylinder hot water or just heating, making it extremely flexible

**3**  
Works with radiators or under floor heating

**4**  
Lower temperature heating circuit means lower heat loss to corridors and communal space

**5**  
Secondary heat source can be injected into the system, e.g. solar thermal or CHP/district heating systems



## Centralised Systems: Heat Interface Units (HIU)

Heat Interface Units (HIU) allow for a hydraulic break in the system giving the apartment/flat autonomy from the larger system. They offer simplicity to the installation and ensure each flat looks similar and is installed in the same way, making maintenance more predictable.

The industry for HIU's is well advanced with many different options available, including recessed units to avoid tampering, and from the users point of view they look and feel like a normal boiler. These units perform an important task in delivering the heating and hot water, plus also allowing each flat to control their own system, whilst feeding back usage information centrally for the purpose of billing.



# Low Rise Community Heating Application

Low rise buildings allow for a wider range of solutions with both centralised and stand alone heat pump systems available to suit the style of building and space. Ecodan can either be used centrally or offer a full packaged cylinder and heat pump solution to each flat with Mitsubishi Electric's simple to use but advanced controls.

Ecodan systems are now a widely used and accepted technology, giving both the users and local authorities the opportunity to reduce running costs and decrease their carbon emissions.

## Example using Ecodan PУHЗ Air Source Heat Pump Systems:



1

Can deliver direct hot water, stored cylinder hot water or just heating, making it extremely flexible

2

Ecodan PУHЗ units offer solutions where line of sight is an issue under planning

3

Packaged Ecodan systems can be used on each flat, offering advanced controls and cylinder options

## Tenants Benefits

The drivers for replacing the heating systems in these types of buildings may be to reduce carbon and increase renewable credentials, but tenant satisfaction is always paramount. Removing heating systems like direct electric and storage heaters will significantly improve comfort levels and offer a level of control many will have craved.

Many social housing tenants are on pre-paid meters which are on average 20% more expensive, but by moving to centralised plant means that the electricity consumed for heating will no longer be within the flat. This will provide instant savings through the bulk purchase of electricity across multiple flats, on top of the vastly increased savings due to the efficiency of an Ecodan heat pump.

### High Rise Community Heating Project

For housing associations with high-rise blocks of flats, heating options have often been restricted to expensive-to-run storage heaters or electric wet heating systems.



For a Scottish housing association that was looking for energy efficient, cost-effective heating that would also reduce their carbon footprint, Ecodan air source heat pumps provided the answer.

In what appears to be the first UK example of air source heat pumps being used in such numbers in a high-rise installation, over 100 properties are now benefiting from having their heating and hot water needs met by Ecodan, reducing tenant's fuel bills and lowering the social housing provider's carbon emissions by over 11,000 tonnes per annum.

Completed in September 2011, the project involved the installation of 112 individual PUHZ Ecodan units fitted to two Glasgow tower blocks, each 15-storeys high. All of the properties benefitted from external wall insulation, loft insulation, new UPVC double glazing and new roofs to assist with lowering the heat loss by more than half. All the flats also had new wet heating systems, including high efficiency heat pump cylinders.

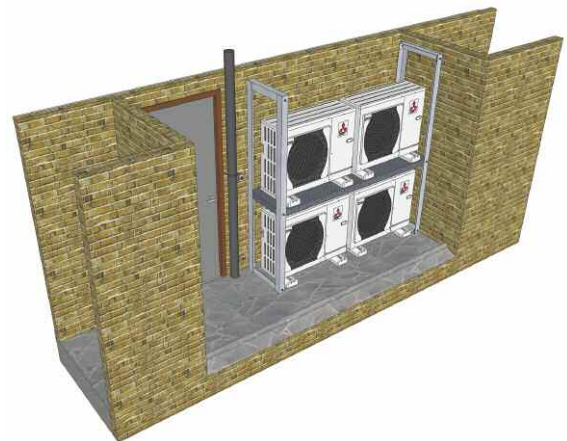
Each of the flats had an average annual heat and hot water consumption of 7,000 kWh. Heating bills with the old electric storage systems were on average £598 per annum. With Ecodan alone this project is estimated to provide in the region of a 40% reduction in heating and hot water production costs, equating to a £250 saving per flat and £58,000 across the entire scheme.

Estimates assume that the COP of the heat pumps is 2.9, yet live data from the monitored installation shows an average COP in excess of 3 over the winter period, suggesting that the savings will be higher than predicted.

The local community was heavily involved at each stage of the refurbishment to ensure complete buy-in from the tenants. This included several open days to keep the tenants up to date at each critical stage, and to inform them of how to get the best out of their systems.

Tenants have seen a real difference in their heating bills, while having a much better standard of living thanks to the complete package of improved insulation from UPVC double glazing, along with the high efficiency air source heat pumps.

Direct feedback and the monitored performance of Ecodan provides evidence that the thorough nature of the design procedures and the efficiency levels of the units, have benefited the tenants in real energy bill savings. High levels of system performance are particularly essential in the social housing market where tenants are often in vulnerable circumstances or fuel poverty.



The installed Ecodan's have already proved themselves robust enough to cope over the winter of 2011/2012. They clearly demonstrate that the technology is more than suitable for installation in all types of UK properties and applications, including high rise tower blocks.

# Low Rise 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



# Real time monitored data and costs



With so many of our high rise and low rise buildings often utilising direct electric as their primary heat source, Ecodan can truly deliver the required difference.

Tenants could see bills conservatively reduce by over 50%,<sup>7</sup> and if on pre-pay meters this figure could be even higher, resulting in the carbon emissions of these buildings seeing reductions of the same order. This would make a significant contribution to local targets, especially when a typical high rise block of one hundred flats using direct electric could be producing as much as 750 tonnes of CO<sub>2</sub> annually.

In order to bring further confidence to this, a dedicated new website, **'the Ecodan dashboard'** has been designed to demonstrate the effectiveness of Ecodan in the UK.

The site shows real data gathered from properties around the country currently using the Ecodan system, along with details of the age and type of property.<sup>8</sup> Visitors can find out how a unit is performing and see the running costs, CO<sub>2</sub> emissions and energy consumed, in comparison to gas, oil and direct electric systems.

**A visitor to the dashboard can quickly see the annual performance of each monitored property. In addition, the dashboard shows the average outdoor and indoor temperatures, as well as the highest and lowest outdoor temperatures during any given period.**

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



<sup>7</sup> Compared to systems using direct electric as their primary heat source.

<sup>8</sup> Many factors affect the performance of an Ecodan air source heat pump; and in turn the data displayed on this website. These figures should only be used as a guide to indicate how well an Ecodan air source heat pump can perform if the system incorporating that heat pump is designed, installed, commissioned and operated correctly.



## Ecodan Monobloc Systems



■ PUHZ-W50VHA2(-BS)



Manufactured in the UK

■ PUHZ-W85VHA2(-BS)



■ PUHZ-(H)W112-140VHA(2)/YHA2(-BS)



■ CAHV-P500YA-HPB

Simple to install, cost effective for the homeowner and with outstanding energy efficiency, Ecodan is ideal for community heating schemes.

Ecodan air source heat pumps can operate singularly, or form part of a multiple unit system. 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 Ecodan CAHV 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 systems are perfectly suited to a wide range of applications.

### Key Features

- Inverter-driven technology
- No need for gas supply, flues, ventilation
- Multiple unit cascade control of up to 688kW capacity
- Ability to rotate units based on accumulated run hours
- Provides from 25°C up to 70°C water flow temperatures without boost heaters
- Helps achieve Level 4 of the Code for Sustainable Homes
- Operates with outside temperatures as low as -25°C
- Recognised by the Noise Abatement Society for industry leading low noise levels (PUHZ)



Certificate Number: MCS 1110002  
 Product Title: Heat Pumps  
 Product Reference: PUHZ-W50VHA2(-BS), PUHZ-W85VHA2(-BS), PUHZ-W112VHA(-BS), PUHZ-HW140VHA2(-BS), CAHV-P500YA-HPB

OUTDOOR UNIT		PUHZ-W50VHA2(-BS)	PUHZ-W85VHA2(-BS)	PUHZ-W112VHA(-BS)	PUHZ-HW140VHA2(-BS)	PUHZ-HW140YHA2(-BS)	CAHV-P500YA-HPB
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++	A++	A++	A++	A++	A++
	$\eta_{s,e}$	127%	128%	125%	126%	126%	125%
	SCOP	3.25	3.27	3.20	3.22	3.22	3.19
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A++	A++	A++	A++	A++	A+
	$\eta_{s,e}$	162%	162%	164%	157%	157%	139%
	SCOP	4.12	4.12	4.18	3.99	3.99	3.54
HEAT PUMP COMBINATION HEATER - Large Profile <sup>1</sup>	ErP Rating	A	A	A	A	A	N/A
	$\eta_{h,w}$	99%	97%	100%	96%	96%	N/A
HEATING <sup>2</sup> (A-3/W35)	Capacity (kW)	4.8	8.3	11.0	14.0	14.0	42.6
	Power Input (kW)	1.63	2.96	3.65	4.81	4.81	15.2
	COP	2.95	2.80	3.01	2.91	2.91	2.80
OPERATING AMBIENT TEMPERATURE (°C DB)		-15 ~ +35°C	-20 ~ +35°C	-20 ~ +35°C	-25 ~ +35°C	-25 ~ +35°C	-20 ~ +40°C
SOUND PRESSURE LEVEL AT 1M (dBA) <sup>3,4</sup>		45	48	53	53	53	59
LOW NOISE MODE (dBA) <sup>3</sup>		40	42	46	46	46	Variable
FLOW RATE (l/min)		14.3	25.8	32.1	40.1	40.1	126
WATER PRESSURE DROP (kPa)		12	13.5	6.3	9	9	18
DIMENSIONS (mm) <sup>5</sup>	Width	950	950	1020	1020	1020	1978
	Depth	330+30 <sup>6</sup>	330+30 <sup>6</sup>	330+30 <sup>6</sup>	330+30 <sup>6</sup>	330+30 <sup>6</sup>	759
	Height	740	943	1350	1350	1350	1710 (1650 without legs)
WEIGHT (kg)		64	77	133	134	148	526
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	380-415v, 50Hz	380-415v, 50Hz
	Phase	Single	Single	Single	Single	3	3
	Nominal Running Current [MAX] (A)	5.4 [13]	10.3 [23]	11.2 [29.5]	14.9 [35]	5.1 [13]	17.6 [52.9]
	Fuse Rating - MCB Sizes (A) <sup>8</sup>	16	25	32	40	16	63

<sup>1</sup> Combination with EHPT20X-MHCW Cylinder

<sup>2</sup> Under normal heating conditions at outdoor temp: -3°CDB / -4°CWB, outlet water temp 35°C, inlet water temp 30°C.

<sup>3</sup> 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.

<sup>4</sup> Sound power level of the PUHZ-W50VHA2 is 61dBA, PUHZ-W85VHA2 is 62.5dBA, PUHZ-W112VHA is 65dBA, PUHZ-HW140YHA2 is 67.5dBA and CAHV-P500YA-HPB is 70.7dBA. Tested to BS EN12102.

<sup>5</sup> Call: 01223 800000

<sup>6</sup> MCB Sizes BS EN60898-2 & BS EN60947-2.

<sup>7</sup> Flow Temperature Controller (FTC) for standalone systems PAC-IF062B-E Dimensions WxDxH (mm) - 520x150x450

$\eta_{s,e}$  is the seasonal space heating energy efficiency (SSHEE)  $\eta_{h,w}$  is the water heating energy efficiency

# Making a world of difference with Ecodan



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

Mitsubishi Electric's commitment to the environment



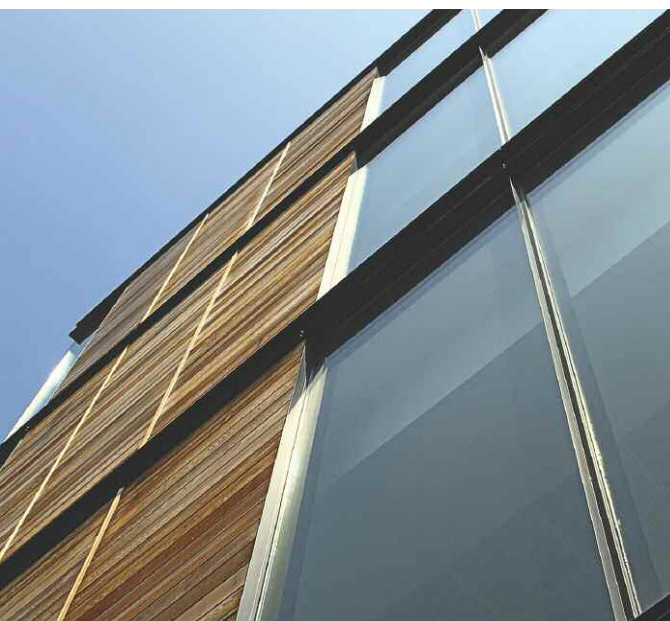
**Community heating delivered to multiple residential properties using an Ecodan offers a real opportunity for reductions in running costs and carbon emissions.**

With renewable energy targets and carbon reduction pressure on our legacy stock coming up to similar levels as our new buildings, we need to start taking real steps towards finding a solution.

Mitsubishi Electric are 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. We also partner with Sustainable Energy Europe, whose aim is to raise awareness of energy use within Europe.

Installing and running Ecodan systems as part of a community heating scheme, can not only deliver carbon emissions reductions today, but as the electrical grid becomes cleaner with the advent of solar PV, wind farms and high efficiency power stations, these buildings will continue to deliver increased emission savings long into the future.

**This legacy stock of buildings is not going away, but with the help of Ecodan technology we have a real opportunity to deliver highly efficient renewable heating solutions to tenants, whilst providing hard cash savings through the reduction of running and maintenance costs.**





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





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Printed in September 2015 SAP No.255493



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to the environment



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