

Panasonic Heat Pump

Information Booklet



- CO₂ footprint reduction
- up to 40-60% on air heating costs
- one unit for a whole house
- provide cooling in summer
- healthier air quality



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What is a Panasonic Heat Pump?

We all agree that global warming is a fact, and the increase in CO₂ in the atmosphere is a contributing factor that the temperature is rising in the world. One way to make your contribution is to generate less electricity in your home and this will also save you money, please see chapter Savings for further information. To generate less electricity you can for example improve your insulation, install heat recovery system or invest in a sustainable energy source, such as an air to air heat pump.

The Air to Air Heat Pump technology

The Panasonic Heat Pump uses air-source heat pump technology. A heat pump is a device that extracts heat from one place and transfers it to another. The heat pump is not a new technology; it has been used around the world for decades. You could compare the technology with a refrigerator, but providing heat.

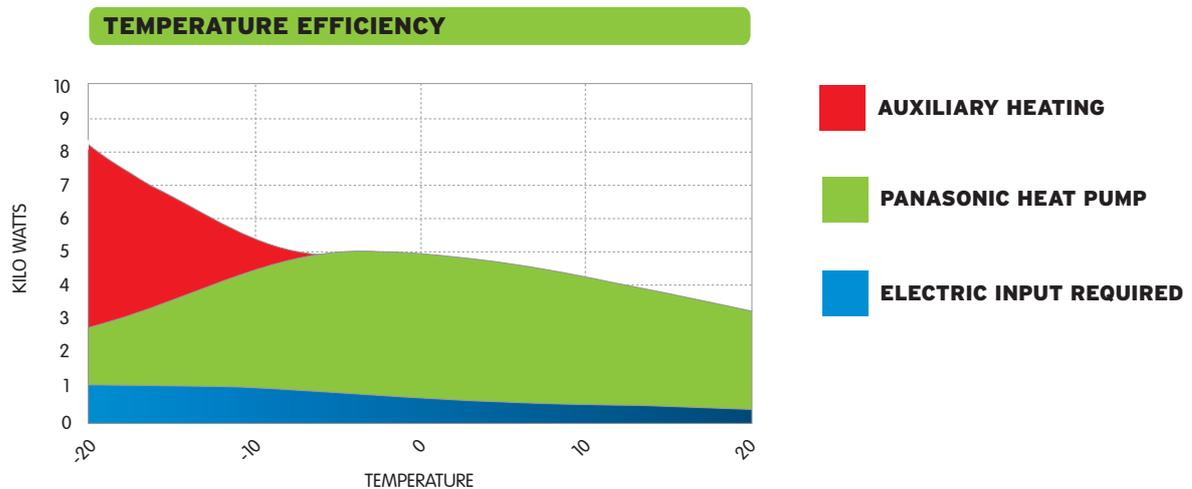
The Panasonic Heat Pump consists of an indoor unit and an outdoor unit. The indoor unit should be placed in an open area giving the unit the ability to circulate the air around the house, for further information please see chapter Installation. The indoor unit circulates between 8,800 and 17,600 cubic feet of air every hour, therefore only one unit is needed for a whole house. Please see the chapter Operation for further information.

The Panasonic Heat Pump produce as much as 4.31 kW (kilowatt) of heating energy from 1 kW electricity supplied, please see chapter Unit testing for further information. As a comparison an electric radiator produces 1 kWh of heating energy from 1 kWh supplied. The best condensing gas boilers produce up to 0.8 kWh per 1 kWh of gas supplied, an oil fired boiler delivers similar efficiency.

Heat pumps produce heat by circulating a substance called a refrigerant through a cycle of alternating evaporation and condensation. A compressor pumps the refrigerant between two heat exchanger coils. In the outdoor unit coil, the refrigerant is evaporated at low pressure and absorbs heat from its surroundings. The refrigerant is then compressed on its way to the indoor unit coil, where it condenses at high pressure. At this point, it releases the heat it absorbed earlier in the cycle.

The Panasonic Heat Pump should supply most of your heating needs down to -15°C, and for those parts of the house it can reach via open doors. An existing heating system to supply hot water is therefore necessary.

Temperature efficiency



The efficiency does decrease with temperature because it is more difficult to extract heat from cooler air. This graph shows how the efficiency is dependent on air temperature. The unit's efficiency will depend on where it is installed. The information below comes from the UK Met office - as can be seen the unit should work well in the majority of the UK.

England

Over England the mean annual temperature at low altitudes varies from 8.5°C to 11°C, with the highest values occurring around or near the coast of Cornwall. The mean annual temperature decreases by approximately 0.5°C for each 100 metres increase in height.

Scotland

Over Scotland the mean annual temperature at low altitude ranges from about 7°C in the Shetland Islands, in the far north, to 9°C on the coasts of Ayrshire and Dumfries and Galloway in the south-west. Due to the environmental lapse rate, there is a temperature decrease of about 0.6°C for each 100 metres rise in height.

Wales

Over Wales, the mean annual temperature at low altitude varies from about 9.5°C to 10.5°C, with higher values occurring around or near the coasts. The mean annual temperature decreases with the environmental lapse rate, by approximately 0.5°C for each 100 metres increase in height.

Northern Ireland

Over Northern Ireland the mean annual temperature at low altitudes varies from about 8.5°C to 9.5°C with higher values occurring around or near the coasts. The mean annual temperature decreases by about 0.5°C for each 100 metre increase in height.

Savings

Tests by the Swedish Energy Agency has confirmed you can reach a saving of 40-60% of your air heating cost by using a Panasonic Heat Pump in the Scandinavian temperature zone.

During 2008 the consumer electricity prices has increased by approximately 20% and the gas prices by app. 25-35%. As consequents the average energy bill for gas/electricity/oil has increase with up to 40% or to an average amount of £1,467/annual.

Gas is currently the cheapest way of heating your house using conventional means. Electricity and oil is generally much more expensive, many house owners experience an average energy bill of more than £ 2,500 for a 3 bedroom house.

Savings with the Panasonic Heat Pump

By installing a Panasonic Heat Pump the air heating cost can decrease enormously. This Heat Pump has been designed to provide air heating needs for an average sized house (for the Medium model up to about 1,400 sqft, and for the Large up to about 1,800 sqft) in temperature zone -15°C upwards. For further information about the efficiency depending on outside temperature please see the chapter Temperature efficiency.

The Panasonic Heat Pump should supply most of your heating needs down to -15°C for those parts of the house it can be reached via open doors. Further, you will of course still need your existing heating system to supply hot water. So even after installing a Panasonic Heat Pump the consumer need to continue to pay for heating of the water and other electricity use. This has a calculated cost of approximately £700, based on usage tests from the Scandinavian market, but will of course vary considerably by the house holds usage of hot water and electricity.

Based on the above the savings can vary depending on

- what kind of energy system you use today
- how well insulated your house is
- the plan/configuration of your house
- single or double glazed windows

These factors have not been included in the savings calculator as it is complex to assign a numeric value to them.

By investing in a Panasonic Heat Pump your return on investment could be around 3,5 years downwards. Go to our web site www.lmg.nu and use our savings calculator, there you can find out how much you can save using the Panasonic Heat Pump.

Benefits

CO₂ footprint reduction

Most scientists now agree that global warming is a fact, and the increase in CO₂ in the atmosphere is a strong contributing factor to the increase in temperature we are seeing. It is becoming important to generate less electricity - you can for example improve your insulation, install heat recovery system or invest in a sustainable energy source, such as an air to air heat pump. Depending on your existing energy source and insulation the decrease will vary, but your effort will definitely reduce the CO₂ footprint you are making today with your existing air heating solution.

40-60% savings on air heating costs

By installing a Panasonic Heat Pump the air heating cost can decrease enormously. This Heat Pump has been designed to provide air heating needs for an average sized house (for the Medium model up to about 1,400 sqft, and for the Large up to about 1,800 sqft) in temperature zone -15°C upwards.

Tests by the Swedish Energy Agency has confirmed you can reach a saving of 40-60% of your air heating cost by using a Panasonic Heat Pump in the Scandinavian temperature zone. Because of the similar climate and rising gas/electricity prices in UK you will likely experience the same kind of savings. Please see chapter Savings for further information.

Improved air quality

The Panasonic Heat Pump has a well developed e-ion Air Purifying System with Patrol Sensor. A revolutionary new mechanism catches dust particles and brings them back to the filter, working with the Patrol Sensor to thoroughly clean the air. When dirt is detected, the air purifying function is started to immediately clean the air in the room. The air will most likely feel cleaner, of course depending on your indoor climate today.

Dehumidifying

The Panasonic Heat Pump do not just clean the air whilst heating, it also has the advantage to dehumidify your house. This will operate side by side with the e-ion Air Purifying System and will contribute to make your indoor climate feel clean and dry.

Anti-allergen
protection

Inactivates more than **99%**
of all filter-captured allergens

Here, inactivate means to suppress normal activity. This inactivation of mite allergens has been verified by the University of Edinburgh in the UK.

Anti-virus
protection

Inactivates more than **99%**
of all filter-captured viruses

Anti-bacteria/
Anti-mould
protection

Enzymatic action eliminates
more than **99%** of
all filter-captured bacteria

Further benefits

Just one unit for a whole house

The Panasonic Heat Pump circulates 8,000 - 17,600 cubic feet of air every hour, this circulation is enough to replace all the warm air inside the house. Therefore is no need for more than one Panasonic Heat Pump for a house up to 1,800 sqft. Just be sure the indoor unit is placed in an open area giving the unit the ability to circulate the air in the house. Please see chapter Operation for further information.

Provide cooling in summer

The Panasonic Heat Pump is optimised for heating usage and for the Scandinavian climate, but not only is the Panasonic Heat Pump a highly efficient heating solution - because of its inverter technology it can also provide cooling during the summer months. However, cooling is generally less cost efficient than heating as warm air seeks to disperse cool air.

Temperature difference reduction

In a typical house during the winter months the temperature difference between floor and ceiling is about 5°C. You can feel this as floors tend to be quite cool, even if the house feels warm. However when using the Panasonic Heat Pump this difference will be reduced to about 2°C, making the floors feel much warmer. This is possible because of the impressive circulation operation that circulates 8,000 - 17,600 cubic feet of air every hour. Please see chapter Operation for further information.

Quiet operation

The Heat Pump works quiet all through the day, only 26dB for indoor unit, this could be compared with the noise level of a refrigerator if you standing 3 feet away. The outdoor unit has a noise level close compared to a quiet washing machine, 46 dB.

Comparison with other sustainable energy alternatives

As energy prices keep rising, selecting an alternative source for heating your home becomes very important. These are some of the alternatives:

Air-to-water heat pumps

As the Panasonic Heat Pump the Air-to-water heat pumps uses the energy available in the air outdoors to heat up water for space heating indoors. Expect to pay £4,000-£6,000 for the total unit. You may also want under-floor heating (another £ 2,500-£3,000) This installation will give you annual saving depending on your existing insulation and out of experience this payback will most likely be around 6 years.

Ground source heat pumps

A ground source heat pump is a heating system that uses the earth's ability to store heat in the ground. With these you need to dig down at least 150 feet of pipes in your garden or ground, the installation often costs around £ 15,000 - £ 20,000. As with air-to-water systems you will also need under-floor heating. With this solution you will most likely experience good annual savings but because of the high installation cost the payback can end up being a much longer time than any other alternatives.

Water-based solar heating

Water-based solar heating uses the sun's energy to heat up water for space heating in your home. The installation involves 350-700 sqft of panels on your roof top, in order to connect them to your water base system. This installation will give you a 100% renewable environmental solution. However, the payback time is difficult to calculate, based on the dependence of the weather and the installation cost which can vary based on the installation base. Therefore the savings will vary noticeable but most likely similar with the ground source heat pump.

Panasonic Heat Pump

The Panasonic Heat Pump uses air-source heat pump technology. A heat pump is a device that extracts air heat from one place and transfers it to another. The installation do not take more than up to a day and is non-intrusive. The investment is approximately £2,000 including the installation. Your annual savings with the Panasonic Heat Pump will be around £600 depending on your insulation and other electricity usage, a payback in 3-4 years time will be experienced calculated on the figures above. Please see the chapter Savings for further information.

Installation

The Panasonic Heat Pump must be installed by a professional installer holding a valid refrigerant handling certificate following the installation instructions supplied with the unit.

The Panasonic Heat Pump consists of an outdoor unit and an indoor unit. The indoor unit should be placed in an open area giving the unit the ability to circulate the air around the house. It should be placed at about 10 feet above the floor, and at least 4" below the ceiling.

The indoor unit is placed on a mounting plate at the chosen location. One small hole - diameter 2" - needs to be drilled through the wall, for getting the isolated copper pipes and electrical cables to be connected to the outdoor unit.

The outdoor unit will be mounted on the wall on the outside of the wall. The distance between the indoor and the outdoor unit should not be more than 50 ft.

Then the two units will be connected by the electricity cable and two insulated high-pressure copper tubes that carry the heating media.



Outdoor unit



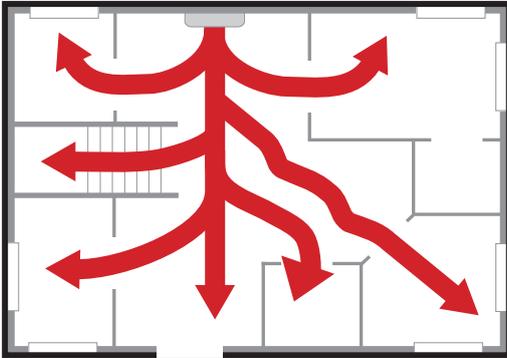
Indoor unit

Installation by steps:

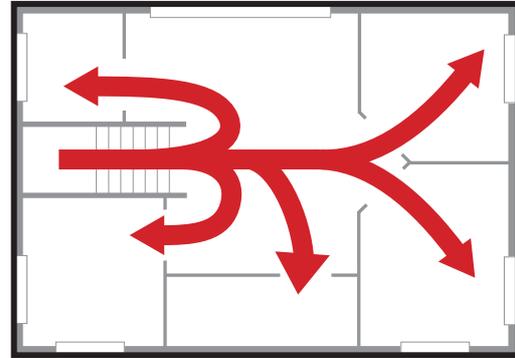
1. Mounting plate installed and 2" hole drilled through the wall.
2. The indoor unit is placed on the mounting plate
3. Pipes and cable is drawn through the wall
4. The outdoor unit is mounted on the outside wall
5. The pipes and electrical cable is connected between the indoor and outdoor unit
6. The installation is controlled and handed over to the user

Operation

Doors should be kept partly open - or at least kept ajar - for the rooms that need to be heated (ventilation grilles can be added for doors that need to be closed).



Air distribution to 1st floor

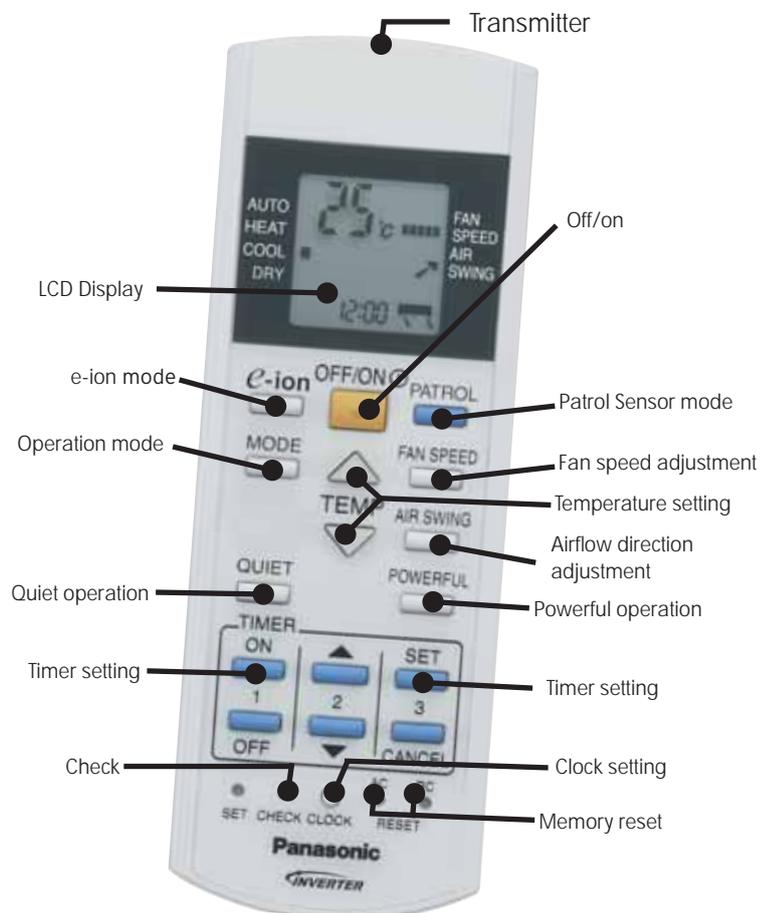


Air distribution to 2nd floor

The warm air will spread around the house as warm air seeks to disperse colder air as it is less dense - the Panasonic Heat Pump circulates 8.800-17.600 cubic feet's of air every hour. This is the total volume of air contained in an average sized house.

Remote control

The heat pump is delivered with a fully functional remote control, including functions for setting the temperature, switching between heating and cooling, timer unit, air direction and activating various filters.



Maintenance

Contrary to normal domestic boilers, the Panasonic Heat Pump is low maintenance. The air filter should be cleaned every two weeks. The outdoor unit should be checked for any debris or leaves that might cover the air inlets once or twice per year. There is no need for an annual inspection.

e-ion AIR PURIFYING SYSTEM

⊘ Do not touch during operation

e-ion FILTERS

- Clean the filters regularly.
- Wash/rinse the filters gently with water to avoid damage to the filter surface.
- Dry the filters thoroughly under the shade, away from fire or direct sunlight.
- Replace any damage filter.
Part no.: CWD00K1001 (Left and Right)

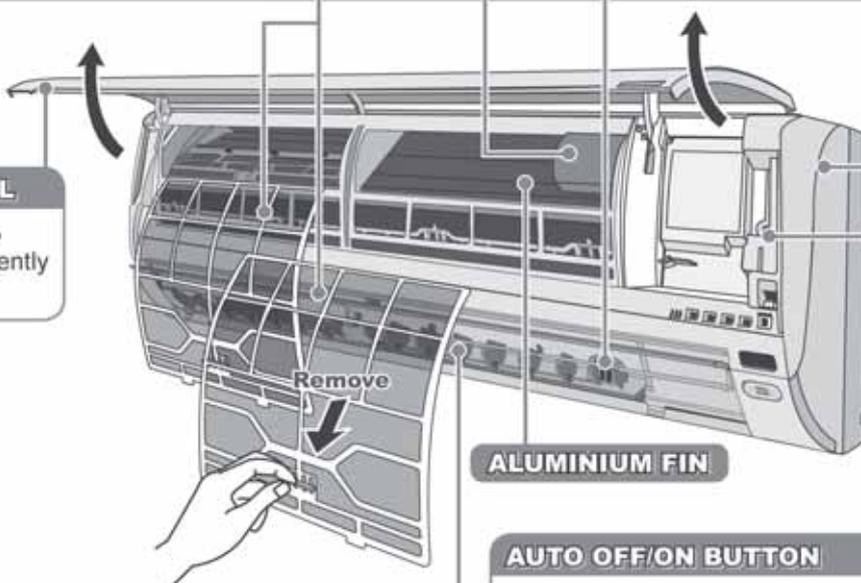
ACTIVE e-ion POWER MODULE

ACTIVE e-ion GENERATOR



Clean with dry cotton bud.

- Active e-ion generator cleaning is recommended every 6 months.



FRONT PANEL

Raise and pull to remove. Wash gently and dry.

AIRFLOW DIRECTION LOUVER

ALUMINIUM FIN

INDOOR UNIT

Wipe the unit gently with a soft, dry cloth.

AUTO OFF/ON BUTTON

To operate the air-conditioner when the remote control is misplaced or malfunctioned.

Action	Mode
Press once.	Automatic
Press and hold until you hear one beep, then release.	Cooling
Press and hold until you hear one beep then release. Press and hold until you hear two beeps then release.	Heating

• To turn off, press the AUTO OFF/ON button again.

Frequently asked questions

How large is the unit?

The outdoor unit measures 21x31x11 (HxWxD) inches, and the indoor unit 11x32x7 (HxWxD) inches.

Where should the indoor unit be placed?

A good location for the indoor unit is in an area where it is given a good ability to distribute the air around the house.

Where should the outdoor unit be placed?

The outdoor unit should be placed in an area that has a fresh supply of air. It should be placed where there is more than 1 metre (40") of free space in front and above the unit. It is also a good idea to place it raised above the ground - most units are installed on brackets bolted to an outdoor wall.

Does it need to be installed by a Corgi approved installer?

No, this should not be necessary. However it must be installed by a competent installer holding a valid refrigerant handling certificate.

Do I need more than one unit?

Normally one outdoor and one indoor unit is sufficient for a house of a size up to approximately 1400 sqft for the medium unit and 1800 sqft for the large unit. We do not recommend that more than one unit is installed for heating purposes - the benefit would not outweigh the cost. Comparable units from other suppliers and manufacturers that have not been optimised for indoor heating in the way the Panasonic Heat Pump has are unlikely to be able to heat a whole house with one unit.

Can I remove my current heating system?

No, we do not recommend you remove your existing air heating system. As discussed earlier in the document, the Panasonic Heat Pump should supply most of your air heating needs down to -15°C, and for those parts of the house it can reach via open doors. Further, you will of course still need your existing heating system to supply hot water.

How long will the unit last?

We expect the unit to last approximately as long as a domestic boiler.

Does it use any dangerous substances such as gas?

No, it uses a refrigerant. The refrigerant used is R410A, which is the most modern type for heat pump applications.

What others say

Swedish Energy Agency

Extract from report: Heat-pumping technologies for a modern society 2005:

"Heat pumps are clever things - in principle you pay for 1 kWh of electricity and get 3-5 kWh of heat and 2-4 kWh of cooling. Heat pumps (in Sweden) are a standard solution for private homes. Heat pumps fit well into future sustainable energy systems."

www.stem.se

IEA Heat Pump Centre

"Heat pumps offer the most energy-efficient way to provide heating and cooling in many applications, as they can use renewable heat sources in our surroundings."

www.heatpumpcentre.org

Swedish Heat pump Association

Extracts from report: Heat pumps - technology and environmental impact July 2005:

"Heat pumps offer an energy efficient way to provide space heating... In comparison to a conventional boiler a highly efficient heat pump system will reduce the use of fossil fuel and reduce hazardous emissions. The heat pump technology in Sweden is today a "conventional" heating system and nobody needs convincing about the efficiency and the functionality of this technology."

www.svepinfo.se

European heat pump network

"Improvements in energy efficiency, leading to lower environmental pollution, particularly by CO₂ can be achieved in many ways. The heat pump, which can be used for heating and cooling buildings as well as in many industrial processes, offers the best prospects for attaining these goals in a wide variety of appropriate applications."

www.ehpn.de

US Department of Energy

"For climates with moderate heating and cooling needs, heat pumps offer an energy efficient alternative to furnaces... Because they move heat rather than generate heat, heat pumps can provide up to 4 times the amount of energy they consume."

www.eere.energy.gov

The Heat Pump Association

"Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Currently heat pump systems can supply as much as 3kW of heat output for just 1kW of energy input."

www.feta.co.uk/hpa

Natural Resources Canada's Office of Energy Efficiency

Extract from report: Heating and Cooling With a Heat Pump 2004:

"A heat pump ... would meet about 80 to 90 percent of the annual heating load."

www.oeenrcan.gc.ca

Quotes

The Guardian, Renewables do add up, 18 September 2008

"We've done the sums, and renewable sources could supply all of our energy. But we've got to make the commitment, and fast"

www.guardian.co.uk/commentisfree/2008/sep/18/energy.energy

The Independent, The future's greener Vertical farms and computerised car convoys could be just around the corner, 11 September 2008

"The point is, changes we will have to make do not need to be negative. The impetus climate change creates could benefit our daily lives."

www.independent.co.uk/environment/green-living/the-futures-greener-vertical-farms-and-computerised-car-convoys-could-be-just-around-the-corner-925394.html

The Times, Fears for elderly as ScottishPower raises gas price by 34%, 29 August 2008

"E.ON, which has 5.5 million costumers in the UK, announced that it would increase prices by 16% for electricity and 26% for gas"

"SSE, the country's second biggest energy supplier, with 8.5 million said that it was increasing electricity and gas prices by 19% and 29% respectively"

www.timesonline.co.uk/tol/news/uk/scotland/article4636750.ece

The Guardian, My plan for zero carbon Britain, 21 August 2008

"Now is the moment for us to choose a green, renewable future, where Britain relies on its immense natural resources, instead of sticking with old technologies we know are destroying our planet."

www.guardian.co.uk/commentisfree/2008/aug/21/greentech.energyefficiency

The Times, Consumers face up to 40% rise in energy bills as gas price soars, 18 June 2008

"Consumers could be hit by energy price rises of up to 40% this year as power companies struggle to maintain profitability in the face of a trebling in wholesale gas prices"

www.business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article4160856.ece

The Telegraph, Push for sustainable energy from householders, 2 June 2008

"Encouraging householders to produce their own sustainable energy could cut the UK's CO2 emissions by 30m tonnes by 2030." "It clearly shows that with the right policies in place, the ability for citizens to save money, make a marked difference to tackling UK emissions and future-proof their homes in a world of uncertain and unprecedented energy price movements is substantial."

www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/06/02/eawind102.xml

The Independent, The Home Ecologist, 2 April 2008

"Since 1997, Germany has installed over 300,000 home renewable energy systems. But the UK has barely managed 10,000. The result: installation costs in Germany are now half those in the UK."

www.independent.co.uk/life-style/house-and-home/property/donnachadh-mccarthy-the-home-ecologist-803413.html

Independent testing

Manufacturer/Model	Panasonic Heat Pump			
Heating capacity	3,6 kW (nominell)			
Energy Savings in various cities and houses				
Malmö (8,2 °C)				
Energy need 9 100 kWh/p.a.	6 100 kWh/p.a.			
Energy need 16 600 kWh/p.a.	10 400 kWh/p.a.			
Borås (6,1 °C)				
Energy need 11 000 kWh/p.a.	7 000 kWh/p.a.			
Energy need 16 600 kWh/p.a.	11 200 kWh/p.a.			
Borås (1,3 °C)				
Energy need 15 400 kWh/p.a.	8 100 kWh/p.a.			
Energy need 28 000 kWh/p.a.	12 000 kWh/p.a.			
Measure points - outside temperature:	+7°C	+2°C	-7°C	-15°C
Heating in kW				
Compressor running at 100%	3.6	3.8	3.2	2.4
Compressor running at 75%	2.7			
Compressor running at 50%	1.8	1.9		
COP (Coefficient of Performance)				
Compressor running at 100%	4.2	3.0	2.5	2.1
Compressor running at 75%	4.1			
Compressor running at 50%	4.2	3.1		
Lowest outside temperature	-20°C			
User manual	Good			
Refrigerant	R410A			
Additional information	<ul style="list-style-type: none"> • Normal filter • Fine filter with anti-bacterial, anti-virus and anti-allergenic function • Ionising air cleaner 			

Heating capacity: Measured at outside temperature of +7°C and indoor temperature +20°C.

Energy savings in various cities and houses: Calculated from average yearly temperature in Malmö, Borås and Luleå, with heating able to reach all rooms. The actual savings may be smaller since the test assumes ideal conditions. The energy saving is calculated compared to electrical heating. The energy need only covers heating. Energy needs for hot water and electricity are additional.

Heating in kW: The heating generated by the indoor unit at +20°C indoor temperature, at highest fan speed, the air vent at minimum resistance and with normal filter. The test was performed at varying outdoor temperature, relative humidity and heating generated at a load of 100, 75 and 50 percent. The EN Standard for air-source heat pumps has set -15°C as the lowest test temperature.

STEM

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Panasonic Heat Pump

- CO₂ footprint reduction
- up to 40-60% on air heating costs
- one unit for a whole house
- provide cooling in summer
- healthier air quality

About LMG International Ltd

LMG was founded in 1997 and has an installed base of 150.000 units. Therefore the company also has a high knowledge and a solid experience in the sustainable energy market. In June 2007 the company was taken over by a group of international investors and LMG International was founded in 2008. LMG International was established to market eco-friendly and innovative heating solutions. The company aiming for a better indoor climate, lower heating costs and to decrease the CO₂ emission. The main focus for LMG International is to deliver the benefits of sustainable energy systems and make a contribution for the global warming.

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