The Renewable Solutions Provider

Making a World of Difference

Heating

What is an Air Source Heat Pump?

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LIVING ENVIRONMENTAL SYSTEMS

Air Conditioning | Heating

Ventilation | Controls

ecodan®

Renewable Heating Technology

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Question 1

Who in this room owns a heat pump?

Question 2

Who in this room owns a refrigerator?

Heat Pump Definition

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heat pump

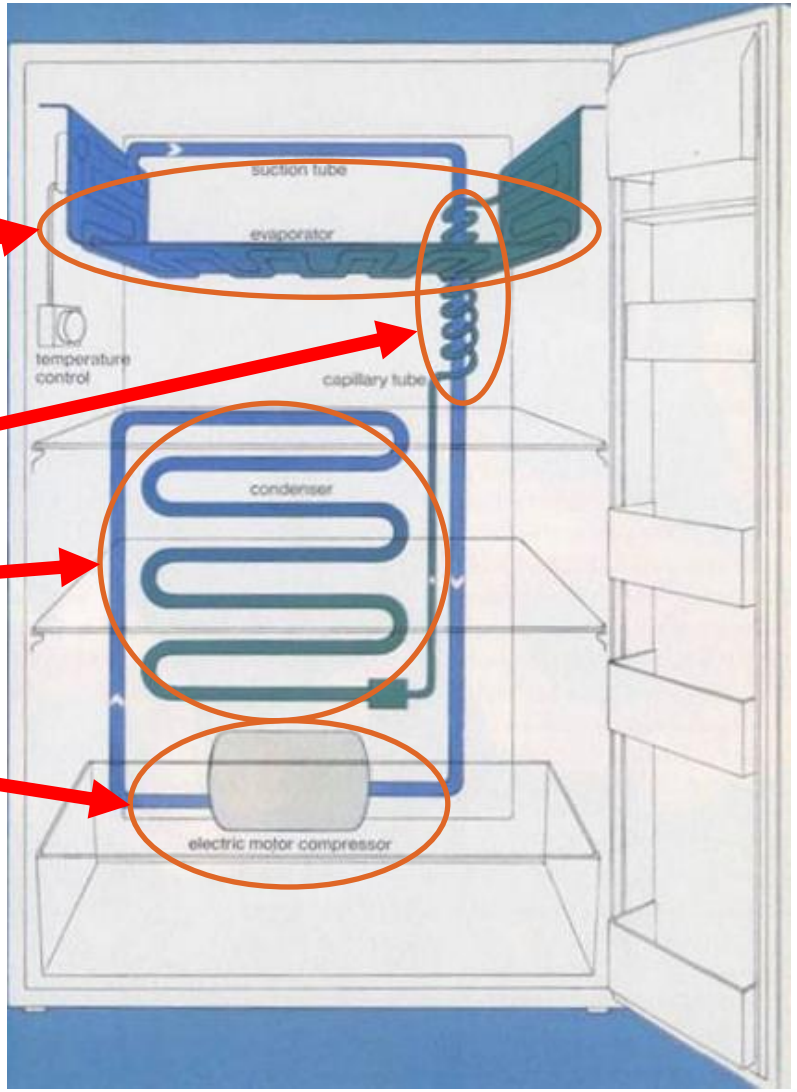
Noun

a device that transfers heat from a colder area to a hotter area by using mechanical energy, as in a refrigerator

Refrigerator Workings

4 main components

- Evaporator
- Expansion Device (capillary tube)
- Condenser
- Compressor



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How a Heat Pump Works

The science part

Understanding Refrigerant

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What is water's boiling point?

100ºC

What is R410A refrigerant's boiling point?

-50 ºC

This allows the heat pump to generate heat, even when the outside temperature is in minus temperatures

Renewable Energy Definition

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renewable energy

Noun

any naturally occurring, theoretically inexhaustible source of energy, such as biomass, solar, wind, tidal, wave, and hydroelectric power, that is not derived from fossil or nuclear fuel

How a Heat Pump Works

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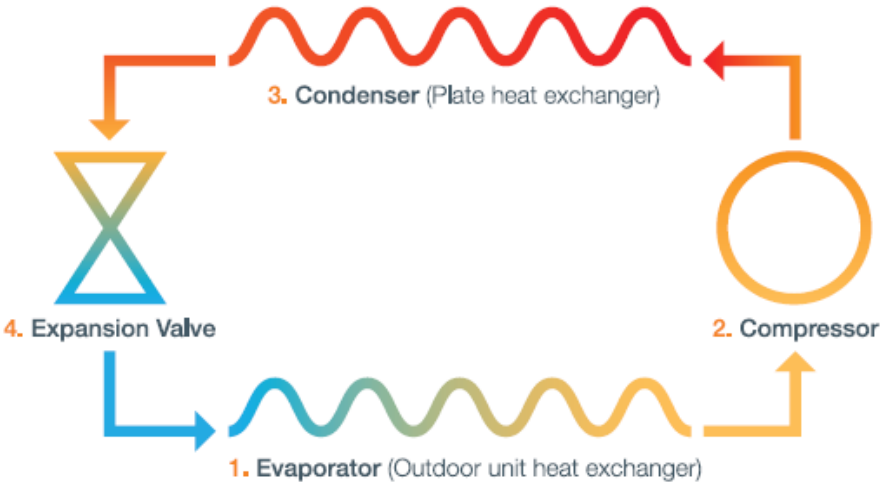
STEP 1. Evaporator (Outdoor unit heat exchanger)

- Cool low pressure liquid refrigerant passes into the evaporator
- Heat energy from outside air passes over the evaporator via a fan
- This causes the refrigerant to increase in pressure and change to a warm vapour



How a Heat Pump Works

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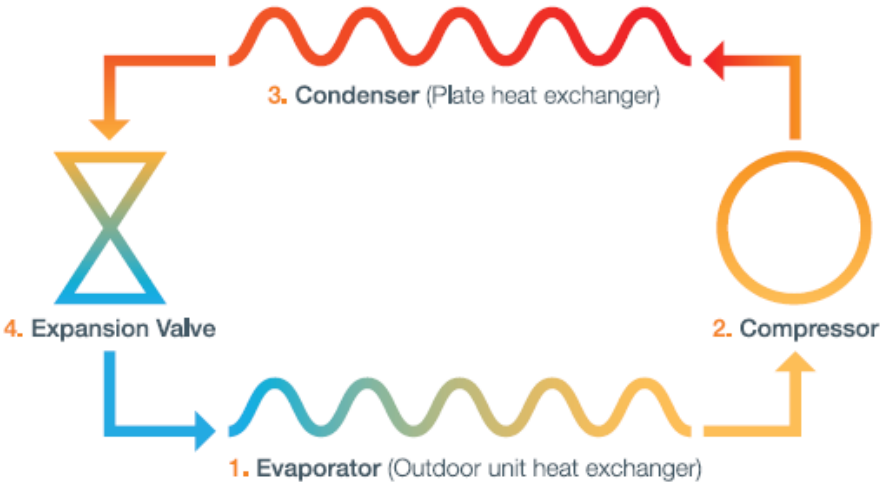
STEP 2. Compressor

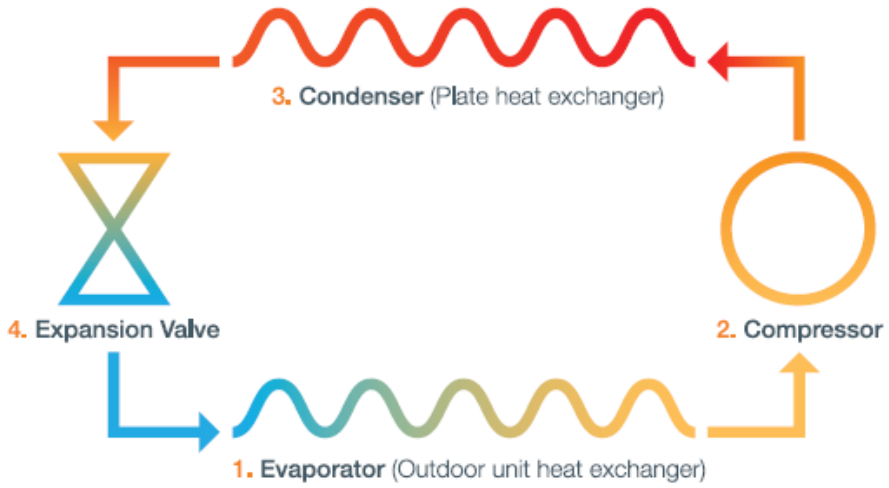
- The warm vapour enters the compressor
- The compressor squeezes the refrigerant and increases the pressure further changing it to a hot high pressure gas
- The temperature increases typically to 60^{0}C as a result of the compression process



How a Heat Pump Works

STEP 3. Condenser (Plate heat exchanger)

- The hot refrigerant gas condenses as it passes through the plate heat exchanger
- Heat is transferred to the cooler water side of the plate heat exchanger and into the primary water circuit
- As it condenses the refrigerant cools and changes from a gas back into a cool vapour



How a Heat Pump Works

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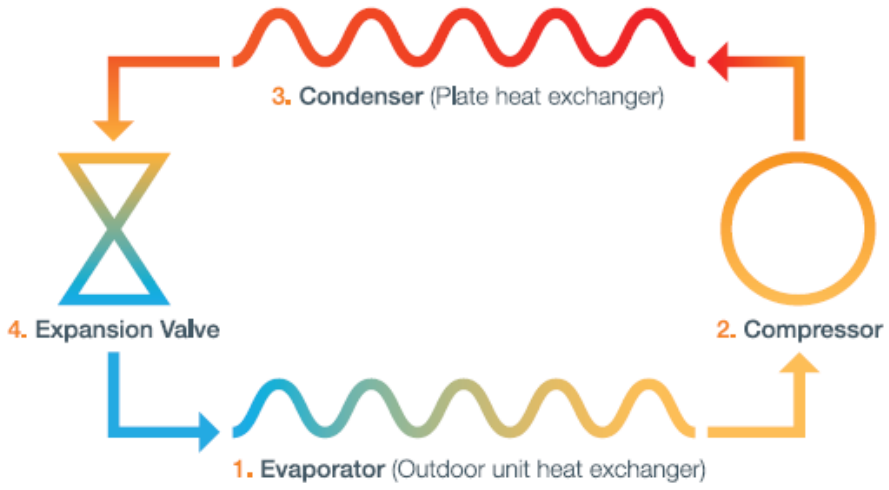
STEP 4. Expansion Valve

- The cool vapour refrigerant must lower in pressure
- The refrigerant passes through an expansion valve to reduce the pressure
- As the pressure drops a further drop in temperature occurs, returning refrigerant to its initial state of a cool low pressure liquid



‘Free’ Renewable Heat Energy

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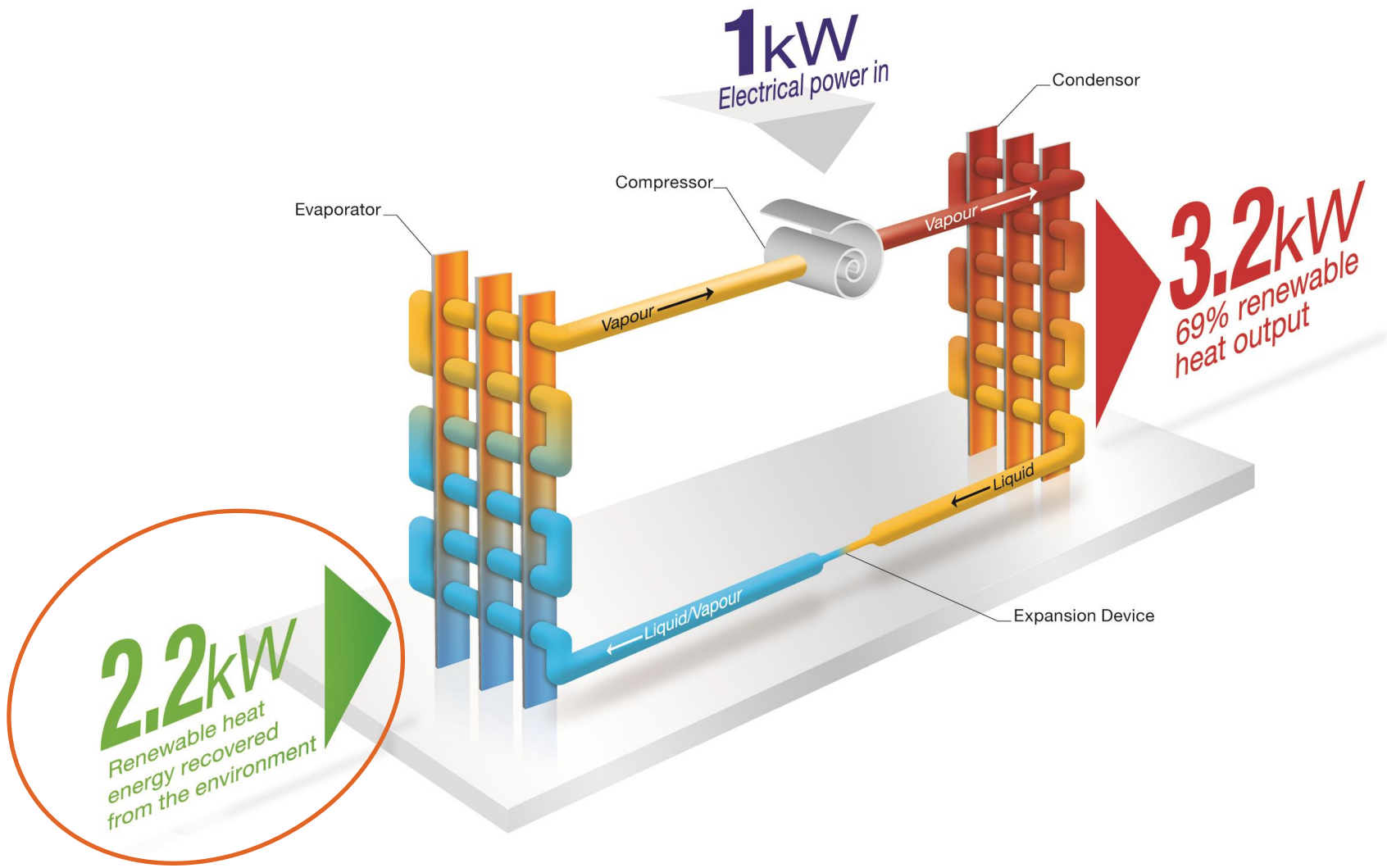

How is it ‘Free’?

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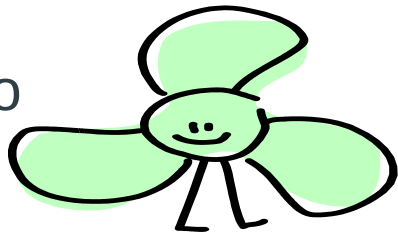
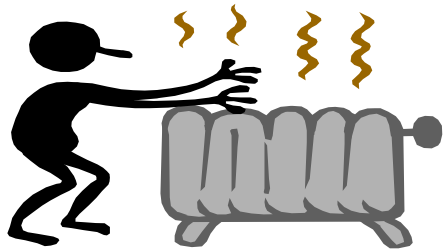
1kW electrical energy **in** from the grid

2.2kW ‘free’ renewable heat energy in, from the environment. As the fan draws in air from outside, the refrigerant evaporates and passes the heat energy into the water circuit allowing the heat pump to heat.



3.2kW of high temperature heat **out**



1kW of paid electricity, generates 3.2kW heat energy

320% efficient!

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Mitsubishi Electric Ecodan

Heat Pump Range 2014

Ecodan Residential Products

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Ecodan® Residential Products			
Model Reference	Monobloc / Split	kW Rating	Diagram
PUHZ-W50VHA, PUHZ-W85VHA2, PUHZ-HW140V/YHA2	Monobloc	5, 8.5, 14	
PUHZ-W50VHA, PUHZ-W85VHA2, PUHZ-HW140V/YHA2 & EHPX-VM2B	Monobloc	5, 8.5, 14	
PUHZ-W50VHA, PUHZ-W85VHA2, PUHZ-HW140V/YHA2 & EHPT20X-VM2B	Monobloc	5, 8.5, 14	
PUHZ-SW40VHA, PUHZ-SW75VHA, PUHZ-SW120VHA & EHSC-VM2B	Split	4, 7.5, 12	
CASCADE 2 x PUHZ-W50VHA	Monobloc	10	
CASCADE 2 x PUHZ-W85VHA2	Monobloc	16	
CASCADE 2 x PUHZ-HW140V/YHA2	Monobloc	28	

*** Splits are also available as a cascade system of 2 units if required**

Ecodan Monobloc Range

PUHZ-W50VHA
5kW

PUHZ-W85VHA2
8.5kW

PUHZ-HW140V/YHA2
14kW

CAPACITIES GIVEN
@ A2 / W35

Ecodan Splits Range

PUHZ-SW40VHA
4kW

PUHZ-SW75VHA
7.5kW

PUHZ-SW120VHA
12kW

CAPACITIES GIVEN
@ A2 / W35

Monobloc / Split Comparison

EHPX-VM2B

2 x 1” Water connections

Water

PUHZ-W85VHA2
Monobloc

EHSC-VM2B

Refrigerant

2 x Refrigerant connections

SW40 ½” & ¼”
SW75 ⅜” & ⅝”
SW120 ⅜” & ⅝”

PUHZ-SW75VHA
Split

Ecodan Hydroboxes

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EHPX-VM2B – Monobloc Hydrobox

- 2 x Water Pipe Connections
- Only compatible with Ecodan Monobloc Heat Pumps

EHSC-VM2B – Split Hydrobox

- 2 x Refrigerant Pipe Connections
- Only compatible with Ecodan Split Heat Pumps

Ecodan Monobloc Cylinders

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Mitsubishi Electric Packaged Cylinder 200ℓ

Pre-plumbed Standard Cylinder 150-300ℓ & Pre-plumbed Solar Cylinder 210-300ℓ

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Heat Loads in Changing Buildings

Changing Dwellings

Victorian House

Minimum boiler output = 10.8kW

1970's House

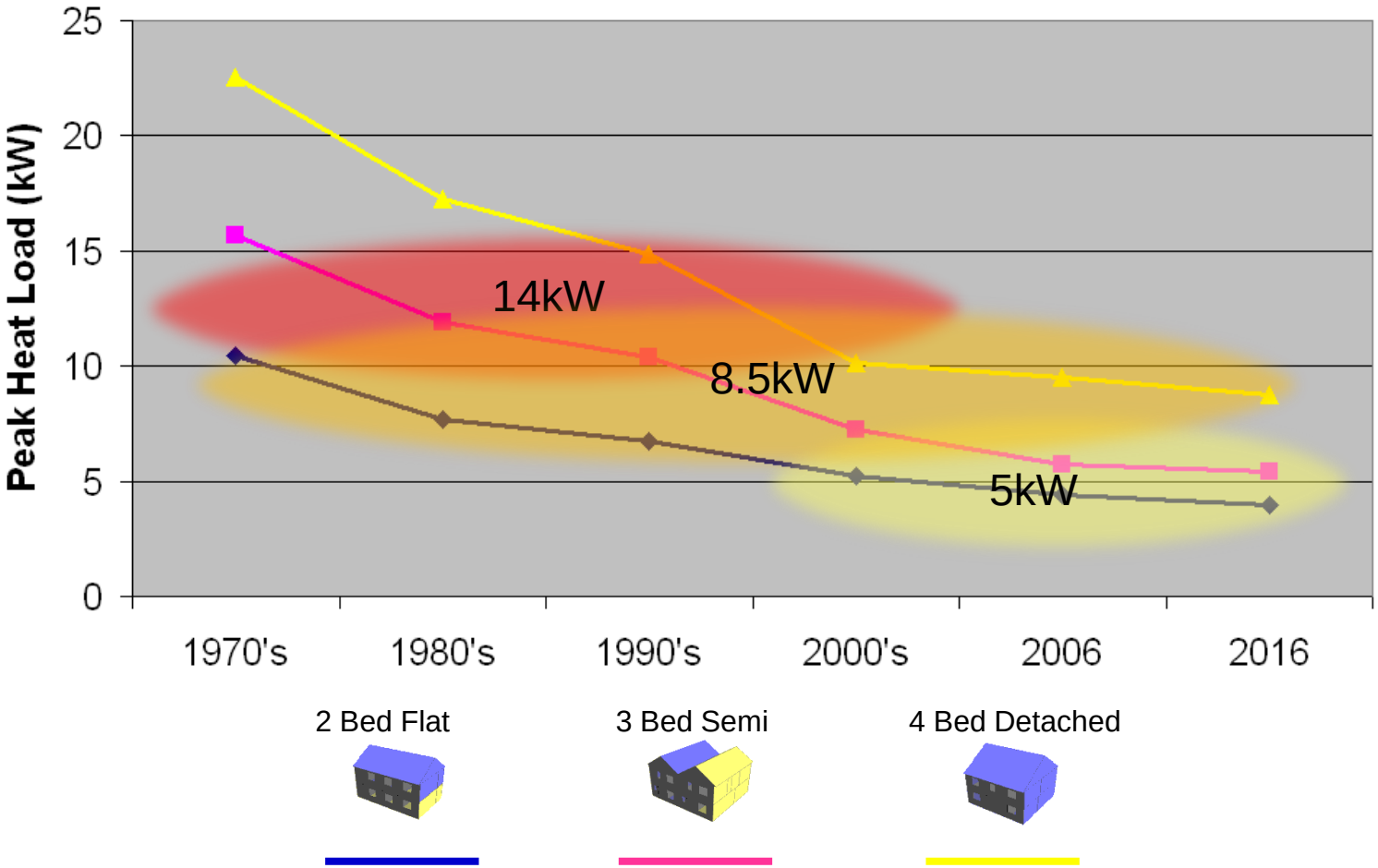
Minimum boiler output = 6.6kW

2006 House

Minimum boiler output = 3.9kW

All 80m^2 floor space, similar shape and -3^{o}C outside, 22^{o}C inside

Changing Heat Loads



Heat Pump Overview

- Heat Pumps have the same technology and components that are in your every day normal refrigerator
- All 4 main components are the same – compressor, condenser, expansion device and evaporator
- You get out more energy than you put in!
- Mitsubishi Electric has an Ecodan heat pump to cover almost every residential application, large or small, old or new

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Thank You