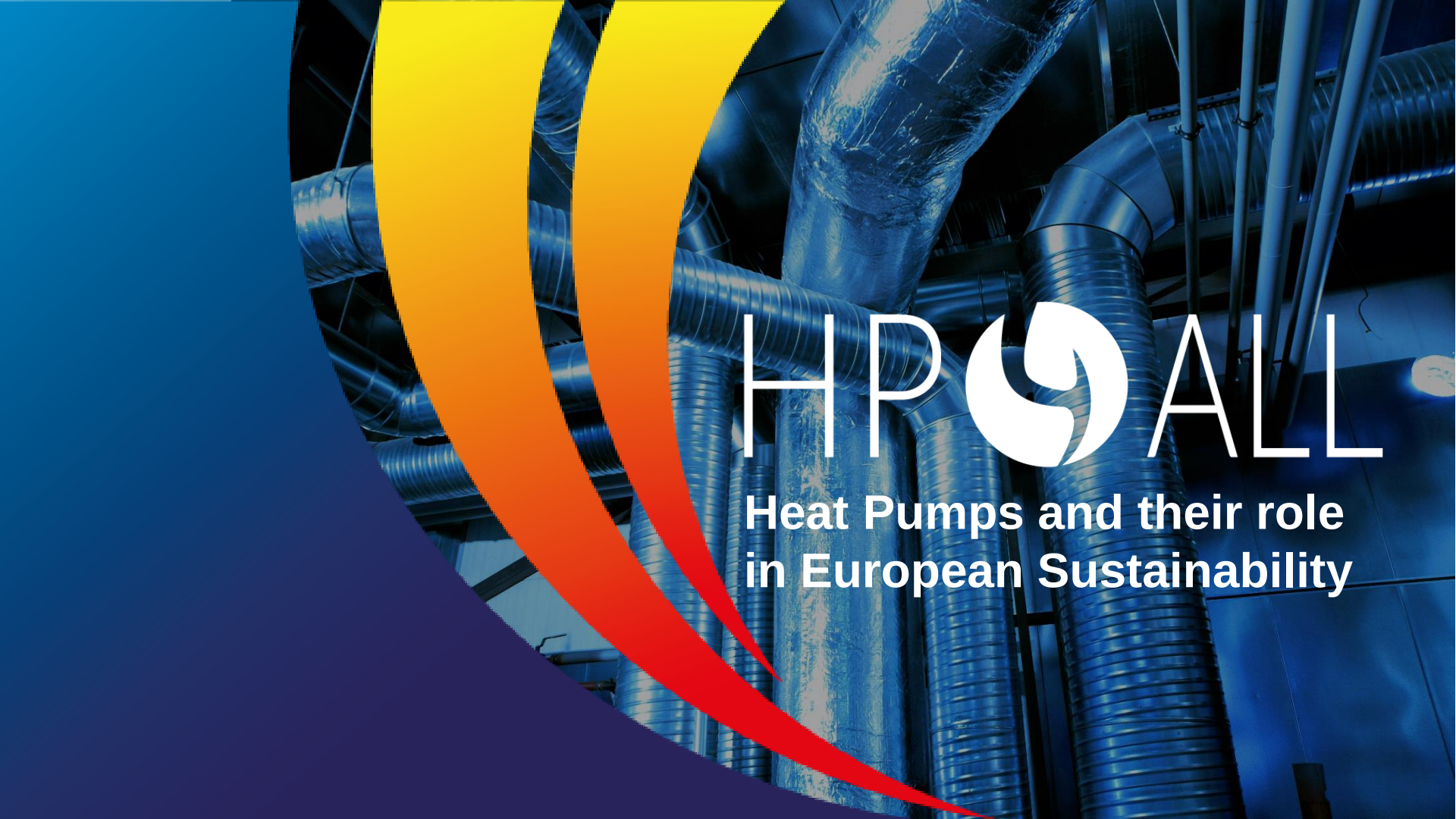


The background of the slide features a photograph of industrial pipes, likely in a data center or industrial facility, with a blue color cast. Overlaid on the left side is a large, curved graphic element that transitions from yellow at the top to orange in the middle and red at the bottom. The text 'HP ALL' is centered in the upper right portion of the image.

HP ALL

Heat Pumps and their role
in European Sustainability

Today's Session:



- HP4ALL Overview
- Heat pump systems
- Heat Pumps: the Irish Context
- The HP4ALL Project
- Monitoring and Evaluating
- Questions



Horizon 2020
European Union Funding
for Research & Innovation

This project has received funding from
the European Union's Horizon 2020 research and innovation programme under
grant agreement No 891775

HP4All brings together leading experts across Europe to enable capacity and skills development within the Heat Pump sector and to ensure that the energy efficiency gains afforded by heat pumps are realised.

HP4All, following a holistic, systemic point of view, will work both with the supply side (manufacturers, SMEs, installers etc) and demand side (building owners, public sector etc.).

This way, the project will enhance, develop and promote the skills required for high quality, optimised Heat Pump (HP) installations within residential/non-residential buildings bringing Europe to the forefront of the climatization sector



Heat pump systems



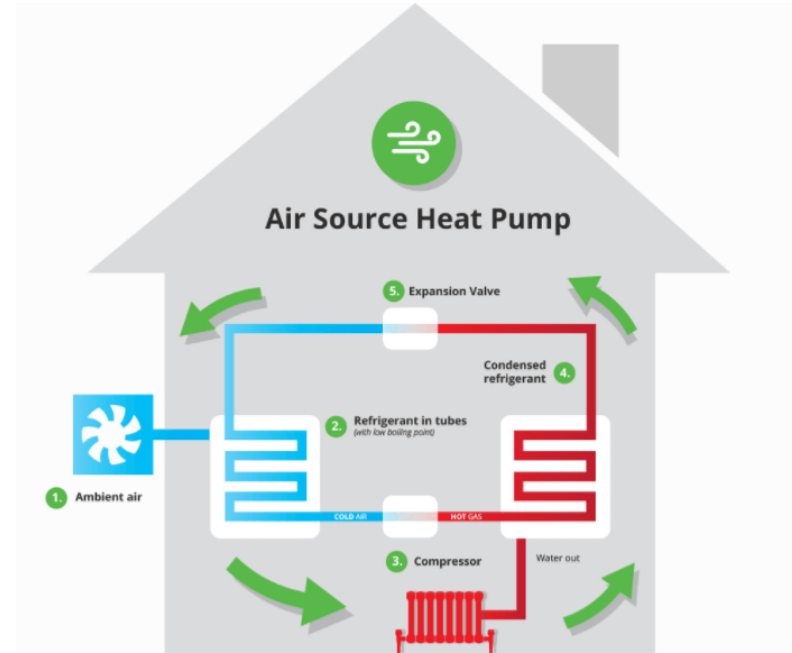
What is a HP?

Heat pumps are similar to refrigerators and air-conditioning systems

They use a refrigerant cycle to extract very low grade heat (usually under 25 °C) and upgrade it to a higher Temperature.

A Heat Pump refrigerant Cycle consists of:

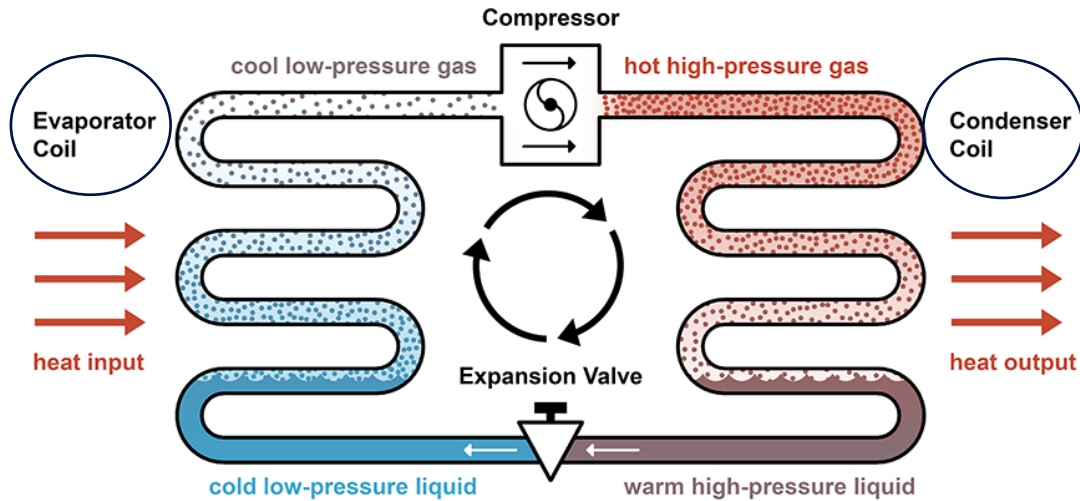
1. Evaporating phase:
 - a) heat energy is taken from the ambient air by the outdoor unit
 - b) and compressed using a compressor converting the refrigerant into a gas.
2. Condensing phase:
 - a) The heat is then extracted from the gas in the indoor unit for use.
 - b) This liquifies the gas so an expansion valve is used to remove pressure.



Source: Remodelling Calculator

Refrigerant Cycle – Heat Pump

The Vapor-Compression Refrigeration Cycle



Source: RVR Technology



Source: SEAI

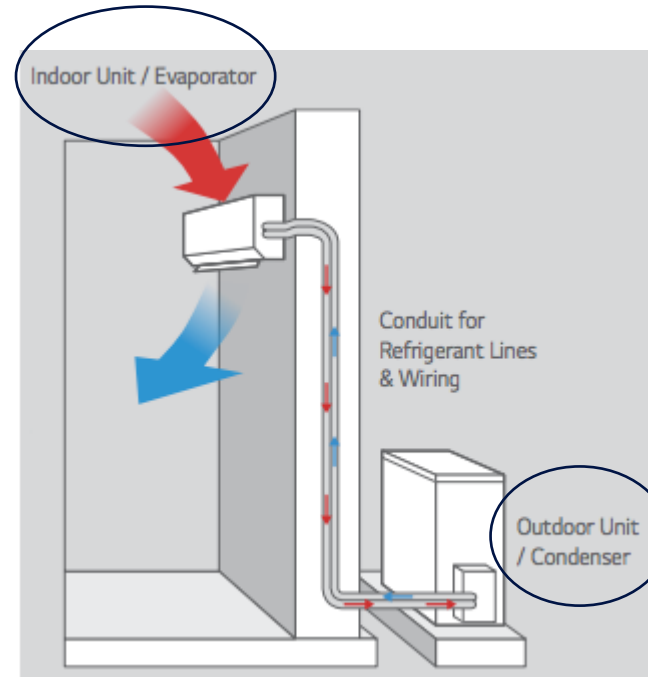
Refrigerant Cycle - Air Con

Evaporator and Condenser roles are reversed (compared to a Heat Pump)

The Evaporator unit pulls the heat out of the air inside

The Heat from cycle is expelled to the outside air

Also can act in heating mode as a Heat pump



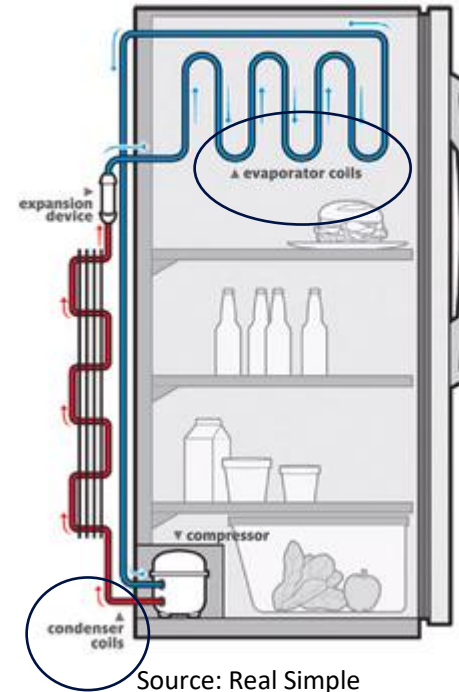
Source: Acsis air conditioning warehouse

Refrigerant Cycle - Refrigerator

Evaporator and Condenser roles are reversed (compared to a Heat Pump)

The Evaporator unit pulls the heat out of the Refrigerator

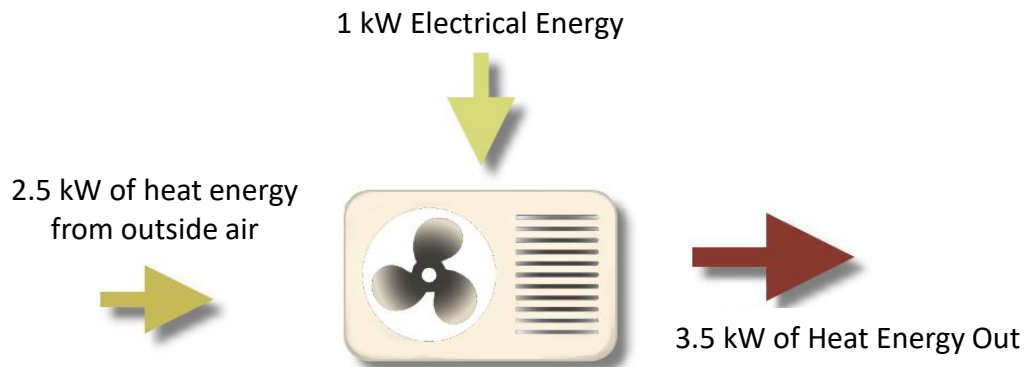
The Heat from the cycle is expelled to the outside air / back of the refrigerator



Refrigerant Cycle - Efficiency

The efficiency of heat pump, refrigerator or air conditioning system is often described in the form of “COP” or the coefficient of performance

It is a ratio of useful heating (or cooling) and electrical energy required.

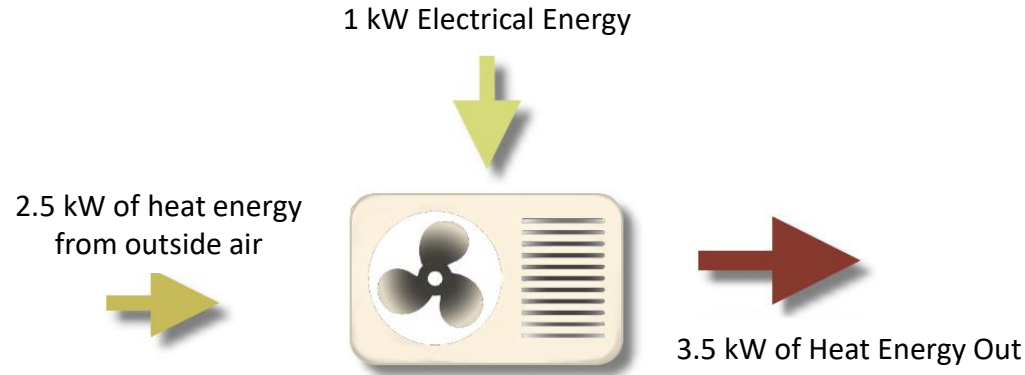


$$\text{Heat Energy Out} / \text{Electrical Energy} = \text{COP}$$
$$3.5\text{kW} / 1 \text{ kW} = 3.5 \text{ COP}$$

Source: Green Business Watch

Refrigerant Cycle - Efficiency

Compared to Conventional Heating systems...



Heat Energy Out / Electrical Energy = COP
 $3.5\text{kW} / 1\text{ kW} = 3.5\text{ COP}$ **Or 350% Efficiency**

Source: Green Business Watch

Boiler Efficiency and Ratings

A	90% +	
B	86% - 90%	
C	82% - 86%	
D	78% - 82%	
E	74% - 78%	
F	70% - 74%	
G	below 70%	

Source: My Plumber.co.uk

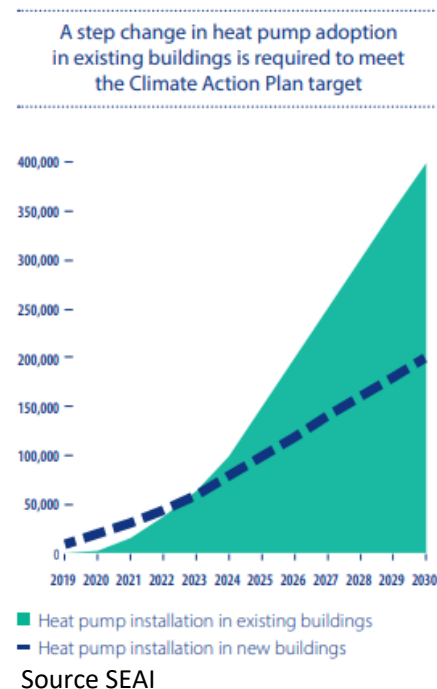


Heat Pumps: The Irish Context



Source SEAI

- The Irish Government have plans for a huge increase in Heat Pumps installations! 600,000 to be installed by 2030!
- There are some risks that come to mind... surrounding the installation of this many units... Competency of installation
- In Action 66 of the climate action plan that specifically mentions upskilling approx. 300-500 heat pump installers. This is important as installers are a factor that can affect Heat Pumps performance.





The HP4ALL Project

- Increasing Heat pump Skills
- Increasing Demand for those skills



In Ireland we aim to host:

1. **Homeowner events:** To increase the knowledge of people who live with Heat pumps.
2. **Installer Events:** To increase the knowledge of those installing Heat Pumps in residential and non-residential settings.
3. **Specifier/Designer Events:** Boosting the knowledge of those who are procuring heat pumps and designing heat pump installations.

Ireland is only one of 3 pilot regions:

1. Upper Austria are focusing on Large scale Heat Pump installations, Leaders ESV
2. Spain are focusing on the public sector residential housing, Leaders FCTA

Homeowner Events:

Estate Events / Heat Pump Roadshow will include:

- TUS Basic overview of Heat pump systems, “Why Heat pumps?”
- Heat pump manufacturer / Designer control strategy presentation
- Q&A sessions.

It is hoped a unit from Manufacturers will be available to show homeowners how to control their unit.

There is huge interest in this venture by County Councils, 12 events planned.



Source: Gannon Homes

Contractors events will consist of:

- TUS learning unit, the main contractor will choose the best suited:
 1. Fabric
 2. Airtightness & Ventilation
 3. Heat Pumps and Emitters
- Deep retrofit presentation / Manufacturer Presentation
- Q&A sessions.

This is an excellent opportunity for Networking and Knowledge transfer.

We are reinforcing the message!



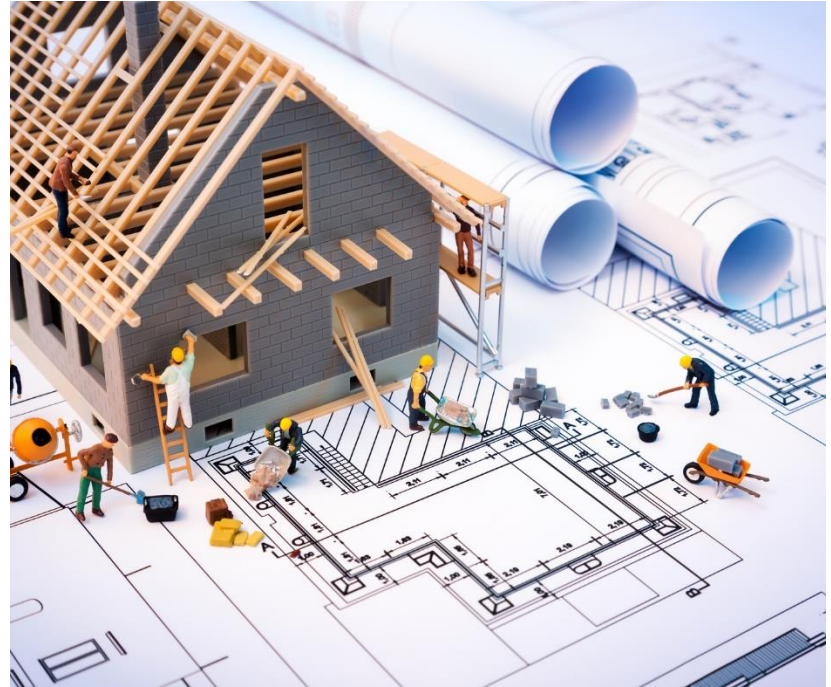
Source: Irish Times

Specifier/Designer Events:

Specifier/Designer events will consist of:

- TUS Learning units for Installers and Homeowners
- Heat pump manufacturer / Designer control strategy presentation
- Deep retrofit presentation / Manufacturer Presentation
- Guest Speakers for Large scale Heat Pump installations
- Q&A sessions.

Aim to upskill the entire heat pump value chain!



Source: Reliant Construction



Monitoring and Evaluating



Impact of Training on Efficiency:

Based on multiple Heat pump field surveys, heat pump research projects, and behavioural research projects; the impact of training on efficiency of Heat Pumps is stated by HP4ALL to be 7% on COP.

Information for Project Coordinators
Energy savings triggered by skills projects

Detailed analysis from the
second phase of the Energy
Saving Trust's heat pump field
trial

ANLAGE 1

Verallgemeinerte Methoden zur Bewertung von Energieeffizienzmaßnahmen

29.06.2016

FINAL REPORT ON ANALYSIS OF HEAT PUMP DATA FROM THE
RENEWABLE HEAT PREMIUM PAYMENT (RHPP) SCHEME

TRAINING MATERIAL ON ENERGY
EFFICIENCY IN PUBLIC BUILDINGS

Technical aspects



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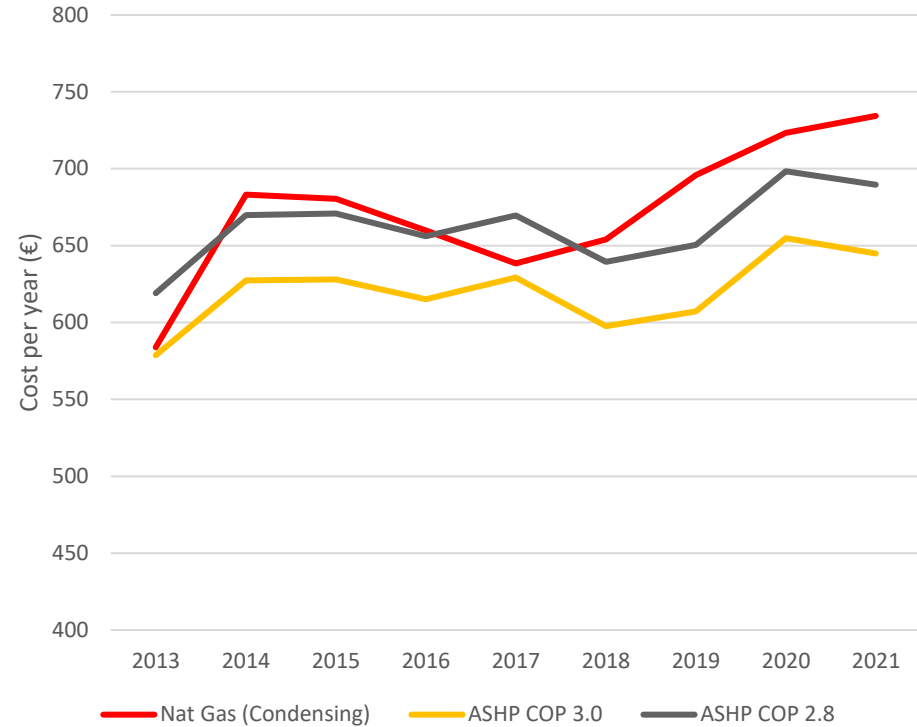
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Impact of Training on Efficiency:

7% increase in efficiency may not sound overall impressive, however when looking at the running cost.

The graph on the right shows the running cost for a BER B2 rated house for:

1. a good heat pump operation (COP3.0) (Yellow)
2. a 7% less efficient Heat pump (COP2.8) (Grey)
3. a new natural gas boiler (Red).



Irish pilot Targets:

TUS is tasked with engaging with and provide training to:

100 Homeowners / End users

150 RESI installers, **15** non-RESI installers

10 RESI Specifiers/Designers, **5** non-RESI Specifiers/Designers

Total Project Targets:

HP4ALL in Figures

Primary Energy
Savings

2

GWh/year

400

People Trained

Renewables
production

2

GWh/year

Reduction of

628

tCO₂/year

1

Heat pumps
benchmarking
tool



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The HP logo is a white circle containing a stylized 'H' and 'P' that form a continuous, swirling shape.

HP ALL

Questions?

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