Department for Energy Security & Net Zero

Retrofitting heat pumps in Non-domestic buildings:

lessons from Project 60

Market Characteristics
Online Guidance for Building Owners
Information Gaps

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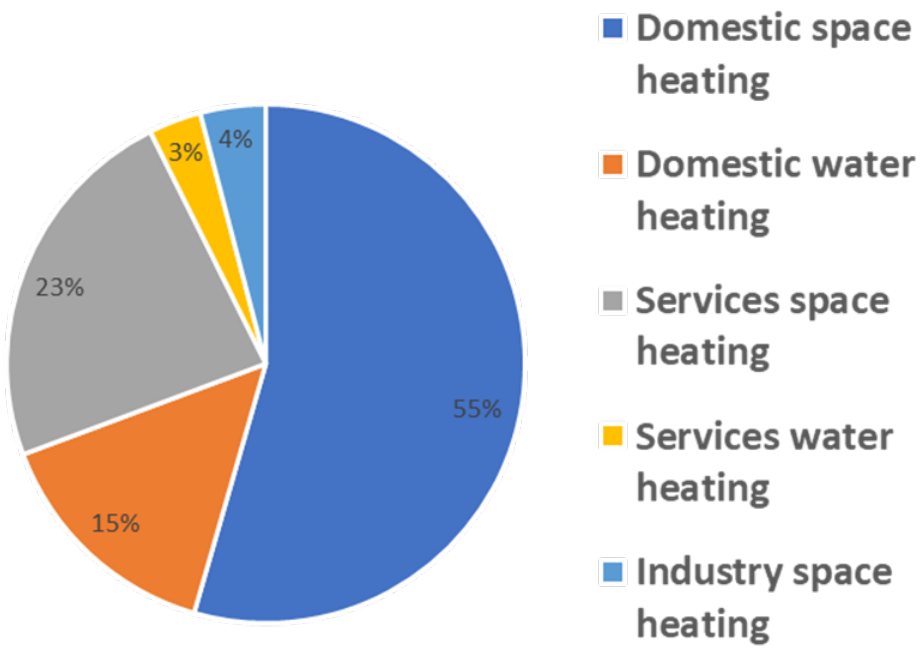
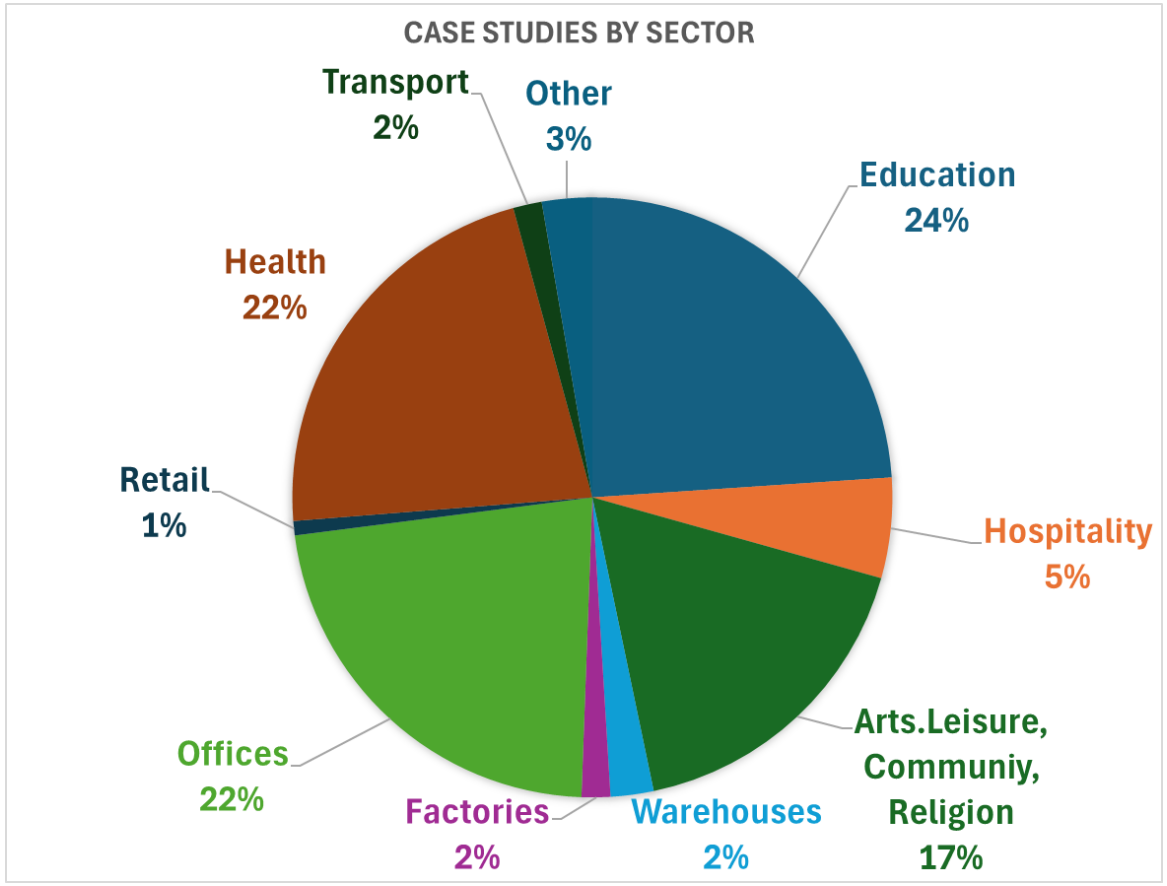
The Non-Domestic Heating Sector is Important

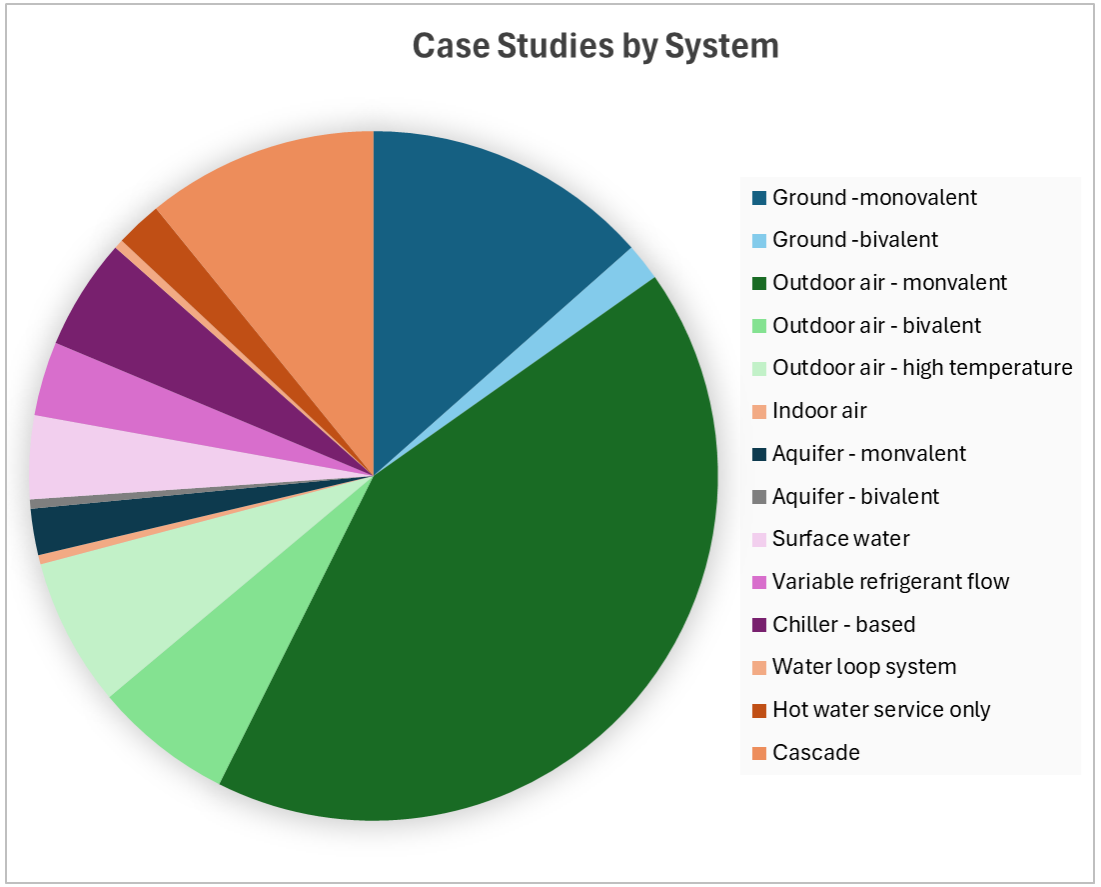
- Accounts for about 1/3 of building heating energy in the UK
- About 2M existing buildings
- About 15k new buildings per annum

  (<1% of stock)
- Perhaps 100k+ pa replacement boilers
  - *Few reliable statistics*



Complex: Market sectors; Heat Pump Options





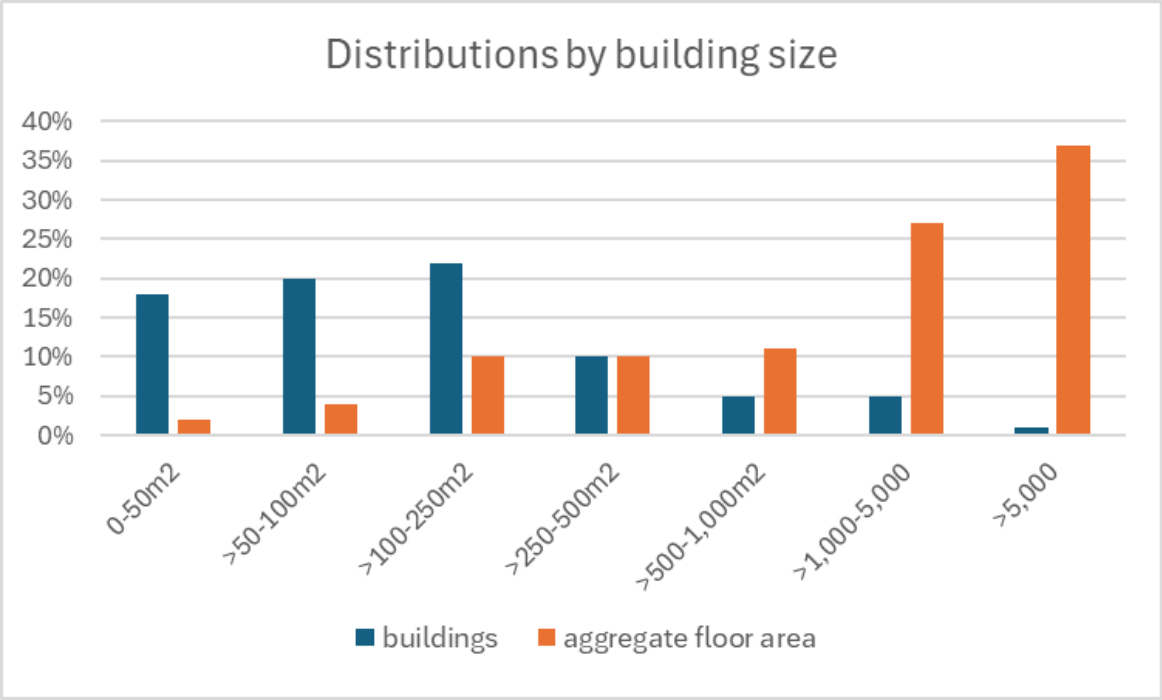
SECTORS: Public sector and offices dominate

HP Systems: ASHP-green; GSHP - blue

From Project 60 Retrofit Case Studies

UK Nondomestic Building Stock

- Most heating energy (and carbon emissions) is from a few large customers:
- But most heating systems (and potential retrofits) are in smaller buildings
- Typically occupied by smaller enterprises: probably with relatively informal procurement routes for HVAC

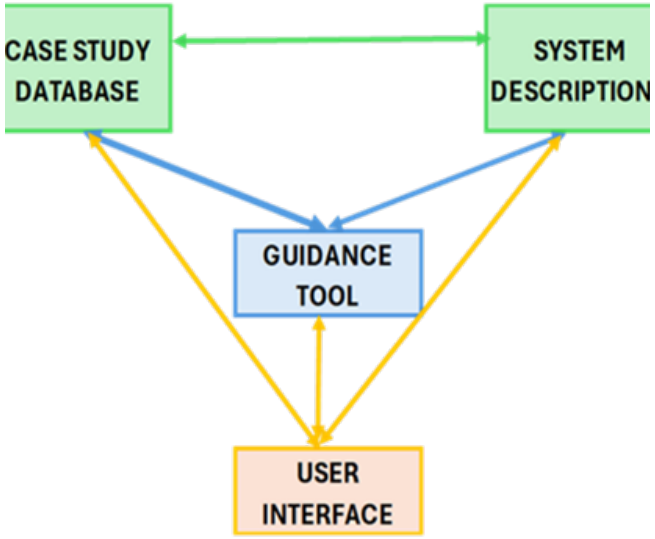


IEA HPT Project 60: web-based guidance

Target Audience

First-time buyers of HP retrofits, especially those without established links to experienced suppliers

Only a first step: initial "homework" as a preparation for first meetings with suppliers



Objectives

- Simple to use, accessible advice to support the initial selection of feasible systems
- Evidence of the practical application of relevant systems in non-domestic buildings

Deliverable

- Interactive web-based guidance

How does the guidance tool work?

Questions

Asks basic questions to eliminate infeasible options and to highlight important missing information.

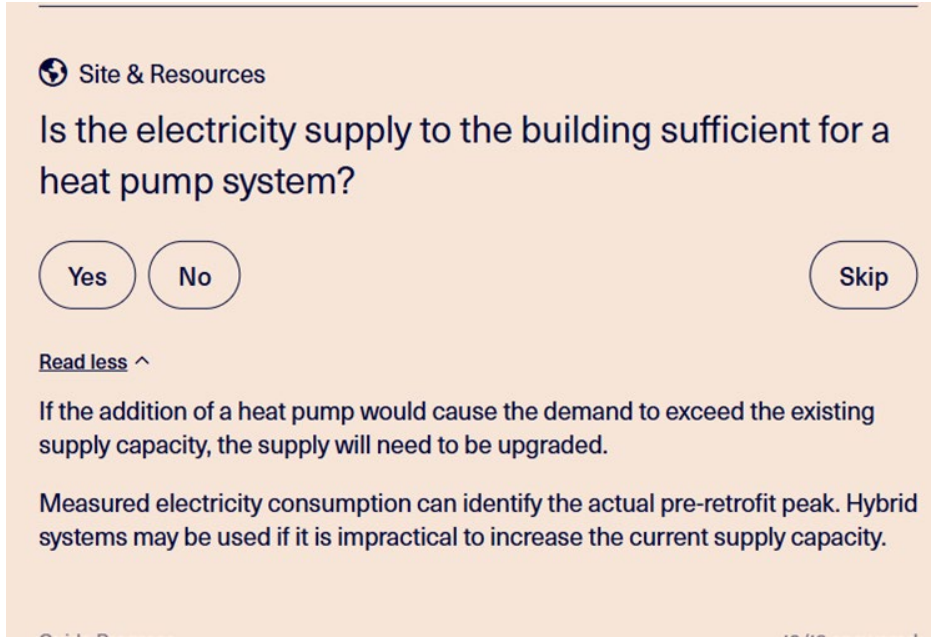
Possible systems

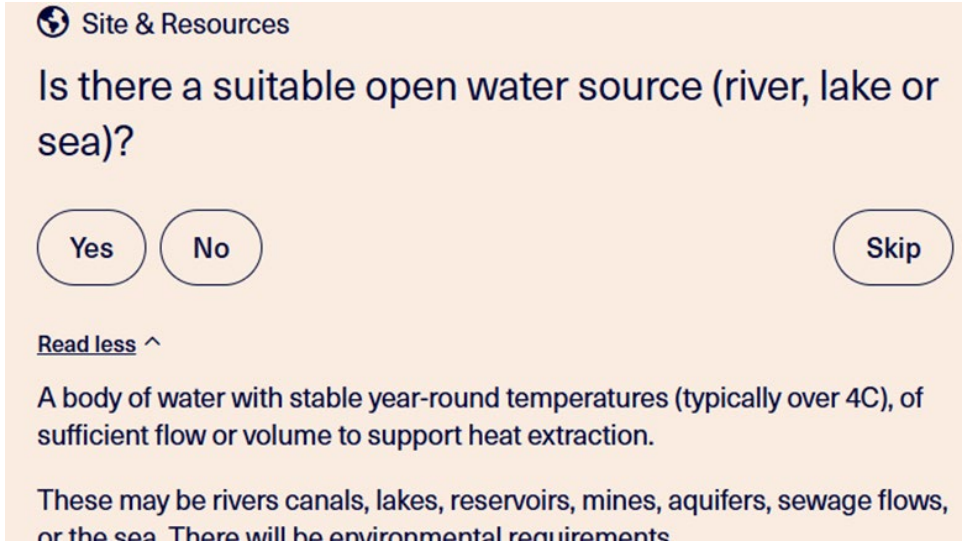
Lists systems that have not been ruled out and provides short descriptions of them, as a basis for more detailed discussion with suppliers.

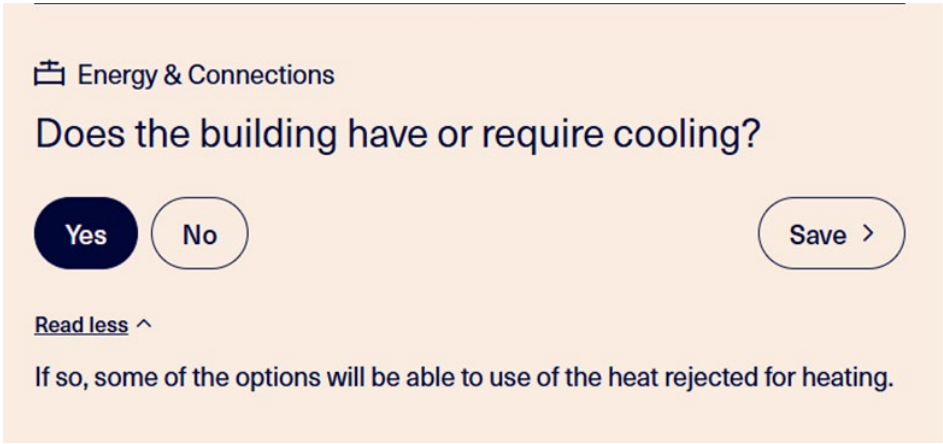
Relevant examples

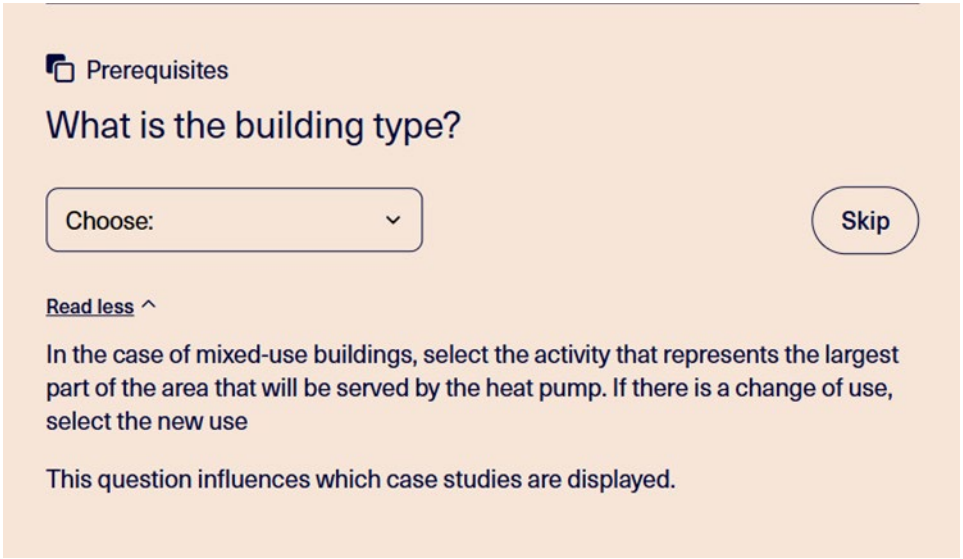
Selects summaries of relevant existing retrofits, to provide reassurance that they are not stepping into the unknown.

Examples of User Questions









Possible Systems

Find heat pump solutions for non-domestic building retrofits

When you answer the questions, you will see a list of systems that are compatible with your responses and summaries of existing retrofits. You can click for more detailed information on each of the systems or example retrofits. If you can't answer a question, you can skip it or explore how much difference a "yes" or "no" answer makes. If there is a difference you will need to make further enquiries or consult your supplier.

Get quick results with our Smart Guide

Use our wizard to find the right heat pump and knowledge for your project

Restart guide →

Filter

Add filter parameters to refine your search

Reset

Systems 3

Cases

Prerequisites

Building · Previous system · Floor area · Country · Fabric/HVAC upgrade

Site & Resources

Outdoor space · Cold climate · Ground space · Aquifer access · Water access · Waste heat source · Exhaust air source · Electricity supply

Energy & Connections

Central hydronic system · Air conditioning · Radiant system · Steam system

High Temperature Ground Source Heat Pump System (bivalent)

Capital Cost: Moderate
Carbon Savings: Moderate
Outdoor Space Requirements: Low
Peak Electricity Demands: Low

High Temperature Ground Source Heat Pump System

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Ground Source Heat Pump System (bivalent)

Capital Cost: Very High
Carbon Savings: Moderate
Outdoor Space Requirements: Very High
Peak Electricity Demands: Low

System details

Ground Source Heat Pump System (bivalent)

Capital Cost
Very High

Carbon Savings
Moderate

Outdoor Space Requirements
Very High

Peak Electricity Demands
Low

The combination of high efficiency but high cost can be make ground source heat pumps financially attractive as the "base load" element of a hybrid system (with a lower-cost, less efficient top up element). Bivalent (also known as hybrid) systems combine a heat pump with another form of heating and can avoid the cost of upgrading heat emitters. This may result in a lower upfront cost, especially if an existing boiler is retained, but if the secondary heating is fossil-fuelled, the carbon savings will be lower. Care is needed with controls and pipework design to ensure that the secondary heating is only used when high heat demand are present.

Relevant Examples

Filter
Add filter parameters to refine your search
Reset

Systems 3 | Cases

Prerequisites
Building | Previous system | Floor area | Country | Fabric/HVAC upgrade

Site & Resources
Outdoor space | Cold climate | Ground space | Aquifer access | Water access | Waste heat source | Exhaust air source | Electricity supply

Energy & Connections
Central hydronic system | Air conditioning | Radiant system | Steam system

AT 1 Cascaded GSHP in a hospital

Building Type: Health
HVAC System: Central Hot Water → Ground Source Heat Pump System (Bivalent)
Fabric/System Changes: Low
Floor Area: 5000 M2 Or More
Country: Austria

Read more

NL 2: Greenhouse heating by extension of aquifer heat pump system

Building Type: Arts, Community And Leisure
HVAC System: Central Hot Water → Ground Source Heat Pump System (Bivalent)
Fabric/System Changes: Low
Floor Area: 5000 M2 Or More
Country: Netherlands

Read more

UK 33 Aquifer system in a luxury hotel

More information

Grantley Hall Heat Pump Installation – Pure Renewables

Building Type: Hospitality
HVAC System: Central Hot Water → Water Source Heat Pump Systems
Fabric/System Changes: Medium
Floor Area: 5000 M2 Or More
Country: UK

Read more

UK 18: VRF retrofitted to 19th century hotel

More information

Building Type: Hospitality
HVAC System: Central Hot Water → Variable Refrigerant Flow System
Fabric/System Changes: Low
Floor Area: 1000 - 5000 M2
Country: UK

Read more

ITA 1 City Hotel Energy Upgrade

Building Type: Hospitality
HVAC System: Central Hot Water → Air Source Heat Pump System
Fabric/System Changes: Low
Floor Area: 5000 M2 Or More
Country: Italy

Read more

Case Study

Building Type: Hospitality
HVAC System: Central Hot Water → WSHP Monovalent
Fabric/System Changes: Medium

Floor Area: 5000 M2 Or More
Country: UK

he historic 47-room five-star Grantley Hall Hotel is located 90m above an aquifer that can provide source water at a temperature of 14 C. This is used as input, via a heat exchanger, to eight heat exchangers, nominally rated at 66kW each but capable of delivering nearly 90kW with this source temperature. Rooms are heated by a mixture of radiators and underfloor heating. Solar panels and anew energy manage,ent system were also installed.

More information

Information gaps

- Actual costs and performance levels of installations
  - Even anonymously
- “Deep dive” operational information on specific systems
  - Data not available within the project timescale
- Little detailed market information
  - Some may exist behind paywalls

Status

- Work on the project finished at the end of 2025
  - Volunteers have provided initial feedback
  - Final report and guidance tool soon to be released

- Updates and maintenance
  - Participants have short-term access but limited resources
  - Will then be handled by the Heat Pump Centre, the programme office of HPT TCP by IEA

Future Needs

- Dissemination
  - The tool needs to be visible to potential users
  - Feedback and development

- Desirable developments
  - Greater variety of case studies from more countries
  - Fill Information gaps
    - Measured performance and costs
    - Market information
  - Versions for specific regions or other applications

Direct Access to the Tool:

Disclaimer

This tool has been developed within the HPT TCP Project 60, and the project participants have verified its outputs. The outputs from the tool do not necessarily represent the views of the HPT TCP and its individual member countries.

Comments & Questions

This is version 1.0 of the tool. In case you have any comments regarding the functionality of, or outputs from, the tool, or if you have possibilities to complement the tool with more case studies, please contact the Heat Pump Centre and write "Project 60 System and Case Studies Smart Guide" in the topic field. Such information will be considered in a future possible revision of the tool.

https://heatpumpingtechnologies.org/project60/smart-guide-start/the-smart-guide/

Department for Energy Security & Net Zero

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Heat Pump Centre: https://heatpumpingtechnologies.org/about-hpt-tcp/heat-pump-centre/