

## E-SEASONAL USER GUIDE



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## 1 Introduction

E-seasonal is a web application designed to help users compare and optimise different MHI air-conditioning systems. By providing detailed insights and performance metrics, the tool enables users to make informed decisions about the most efficient and cost-effective solutions for their specific needs. It helps to identify the most energy-efficient systems by comparing their performance across different seasons, leading to significant cost savings on utility bills. It also provides detailed comparisons of various systems, including energy consumption, performance metrics, and cost analysis, helping users choose the best option for their needs. By promoting the selection of energy-efficient systems, E-seasonal contributes to reducing carbon footprints and supporting environmental sustainability.

This guide will help you navigate and utilise the features of E-seasonal effectively.

## 2 Getting Started

E-seasonal can be accessed through the following link: <https://eseasonal.mhiae.com/>

It is compatible with most web browsers with the following being recommended for the best user experience:

- Chrome
- Edge

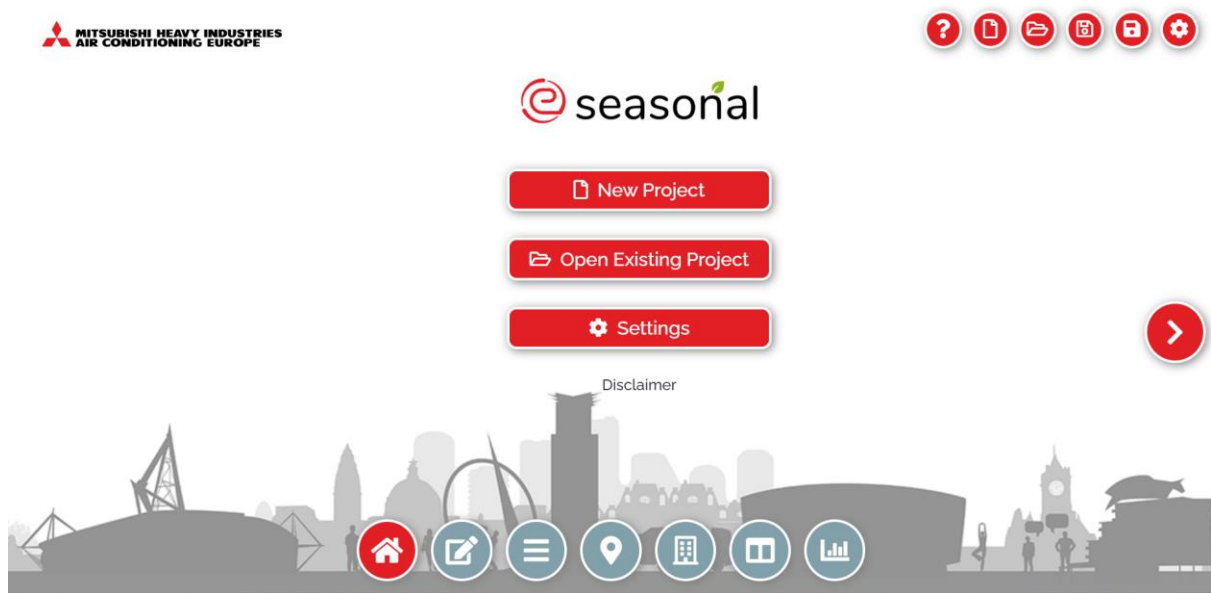
## 3 Navigating the Dashboard

The main dashboard offers quick access to key features such as creating a New Project, opening an Existing Project, and accessing Settings. These options are available in the centre of the screen or from the small icons in the top right corner.

At the bottom of the screen, users will see the steps required to create a project and generate a report. These steps include:

- Project Name
- Project Details
- Location
- Building
- Solutions
- Comparison

Users can navigate through these steps by clicking on the respective icons or by using the Next/Previous arrow button to move forward/backward.



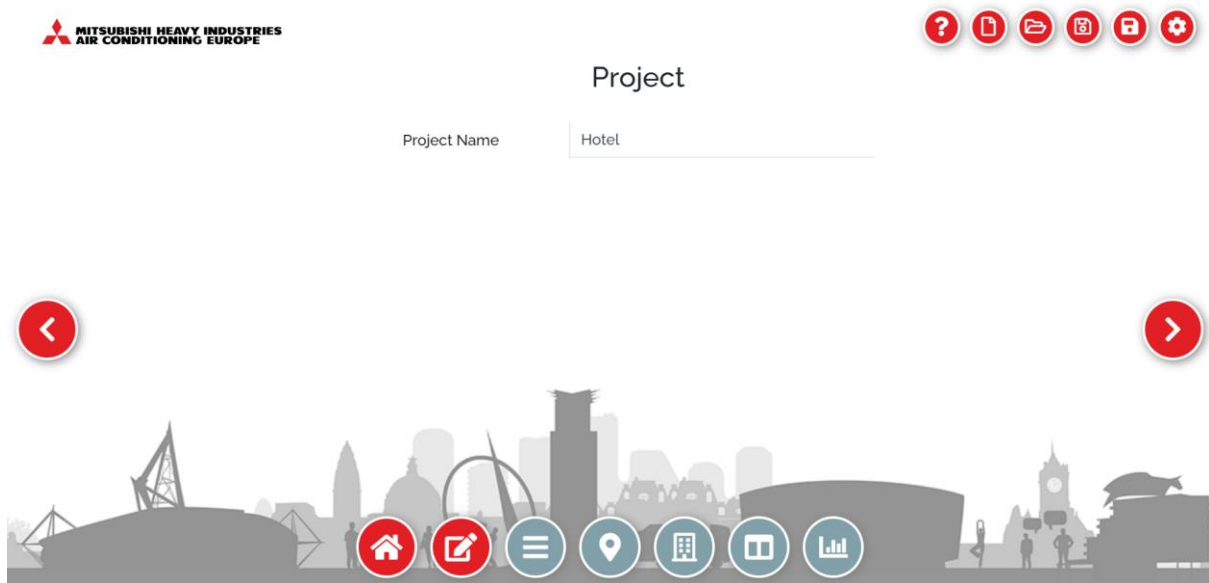
## 4 Creating a New Project

### 4.1 Start a New Project



## 4.2 Specify a Project Name

This is a mandatory information and information will be shown on the final report.

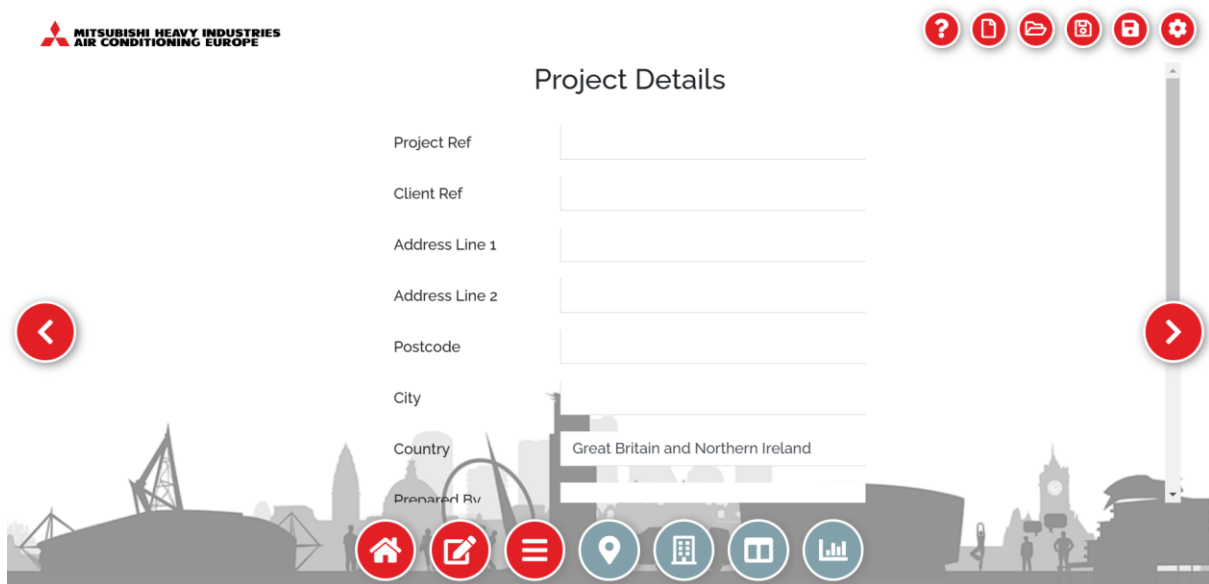


The screenshot shows the 'Project' form. At the top left is the Mitsubishi Heavy Industries Air Conditioning Europe logo. At the top right are six red circular icons: a question mark, a document, a folder, a camera, a save icon, and a settings gear. The title 'Project' is centered. Below it, the 'Project Name' label is followed by a text input field containing the word 'Hotel'. At the bottom, there is a navigation bar with a red left arrow, a red right arrow, and a series of icons: a home icon, a pencil icon, a menu icon, a location pin icon, a building icon, a document icon, and a bar chart icon. The background features a grey silhouette of a city skyline.

## 4.3 Specify Project Details

Information will be shown on the final report.

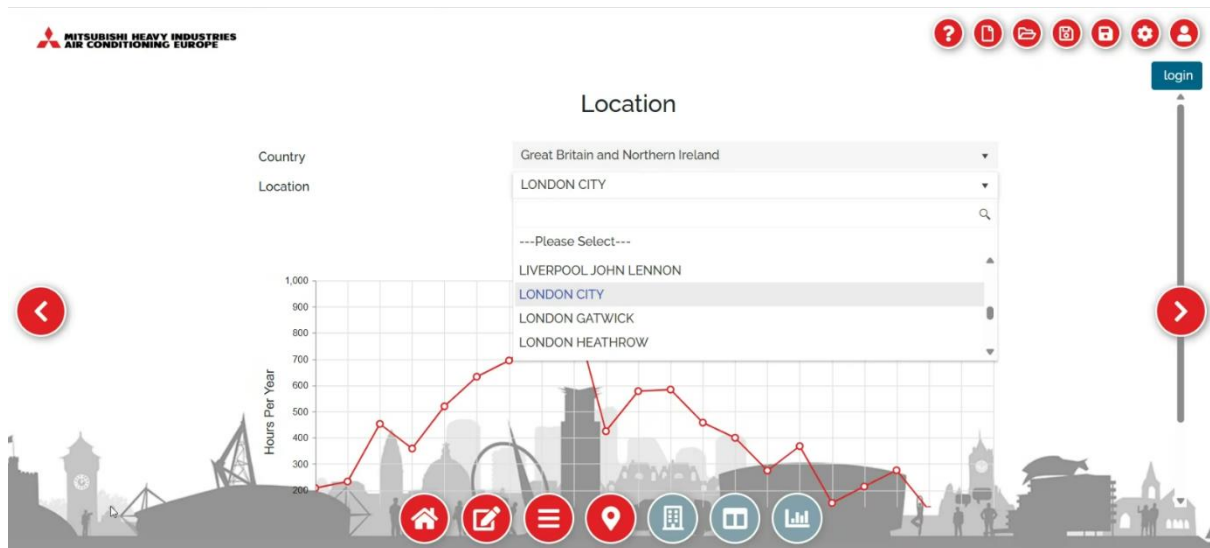
(Scroll down or zoom out to see all the entry fields)



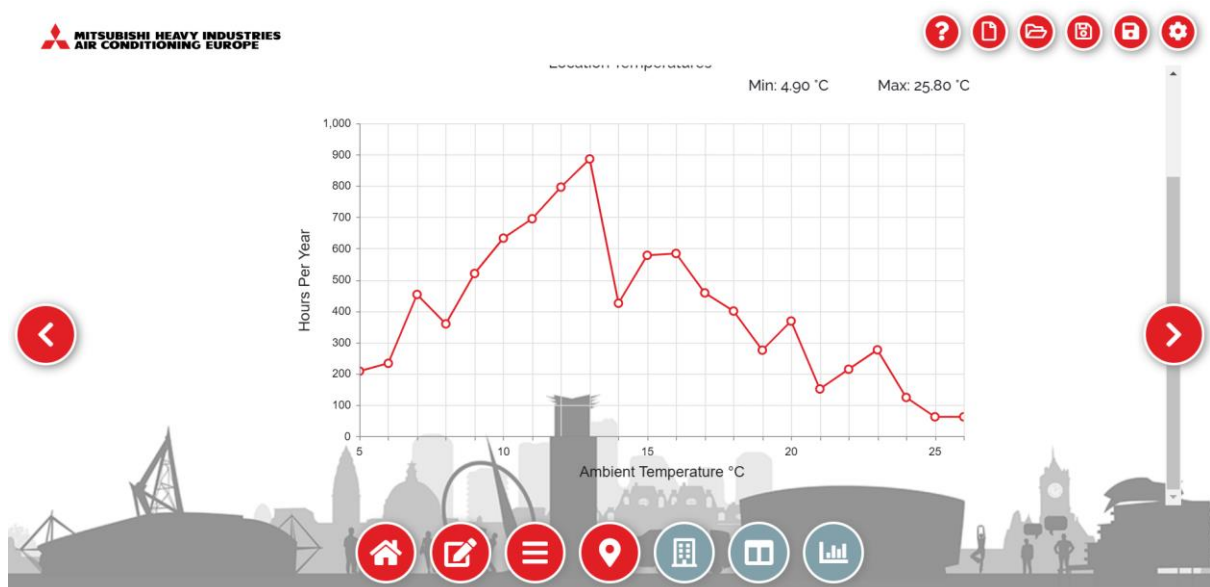
The screenshot shows the 'Project Details' form. At the top left is the Mitsubishi Heavy Industries Air Conditioning Europe logo. At the top right are six red circular icons: a question mark, a document, a folder, a camera, a save icon, and a settings gear. The title 'Project Details' is centered. Below it, there are several input fields: 'Project Ref', 'Client Ref', 'Address Line 1', 'Address Line 2', 'Postcode', 'City', and 'Country'. The 'Country' field is currently set to 'Great Britain and Northern Ireland'. At the bottom, there is a navigation bar with a red left arrow, a red right arrow, and a series of icons: a home icon, a pencil icon, a menu icon, a location pin icon, a building icon, a document icon, and a bar chart icon. The background features a grey silhouette of a city skyline.

## 4.4 Select a Location

Note: The locations listed are sourced from the ASHRAE database. If a specific location is not available, users are recommended to select the nearest available location.

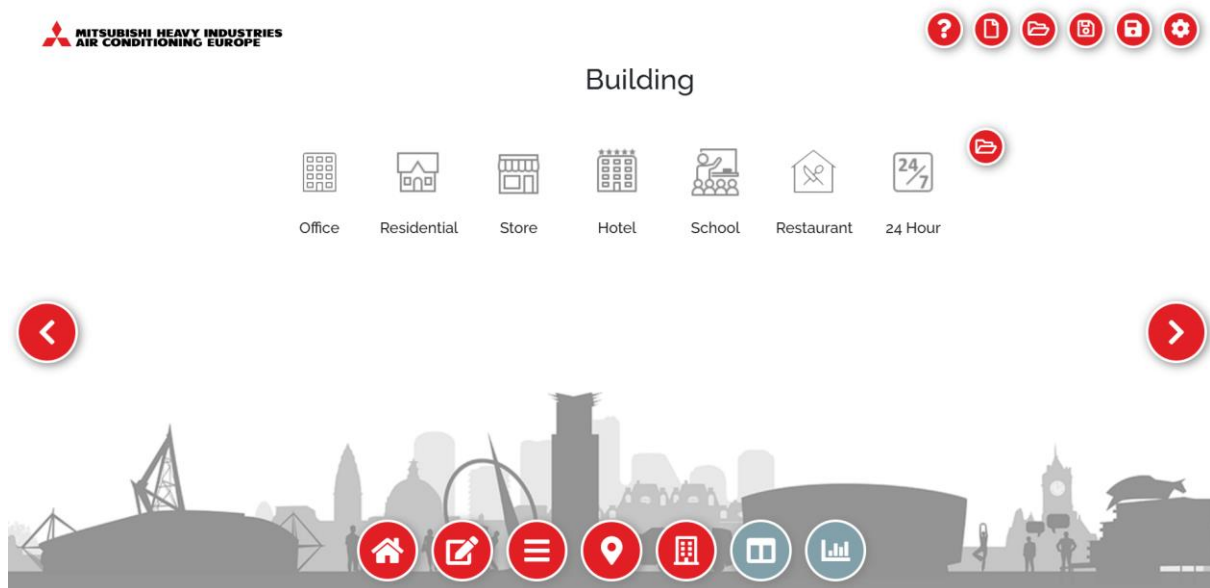


After selecting the location, the corresponding temperature graph will be displayed. The X-axis represents Ambient Temperature, and the Y-axis represents Hours Per Year. It can indicate the ambient temperatures at which the air conditioner is most likely to operate the most frequently. Additionally, the minimum and maximum annual temperatures are shown at the top of the graph.

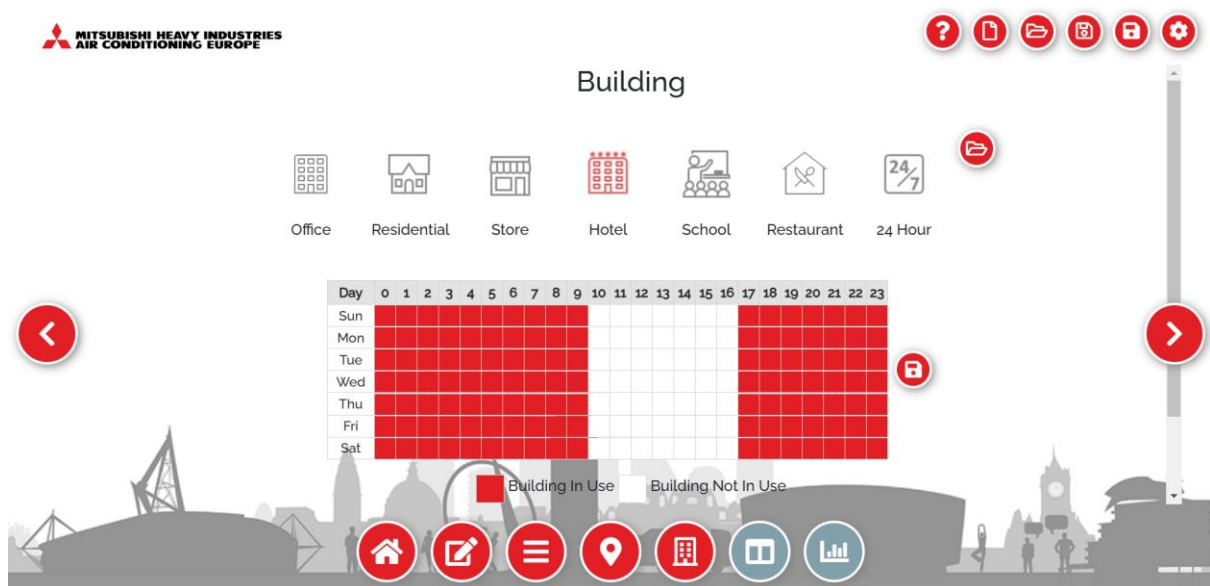


## 4.5 Select a type of Building

There are 7 pre-configured types of building.



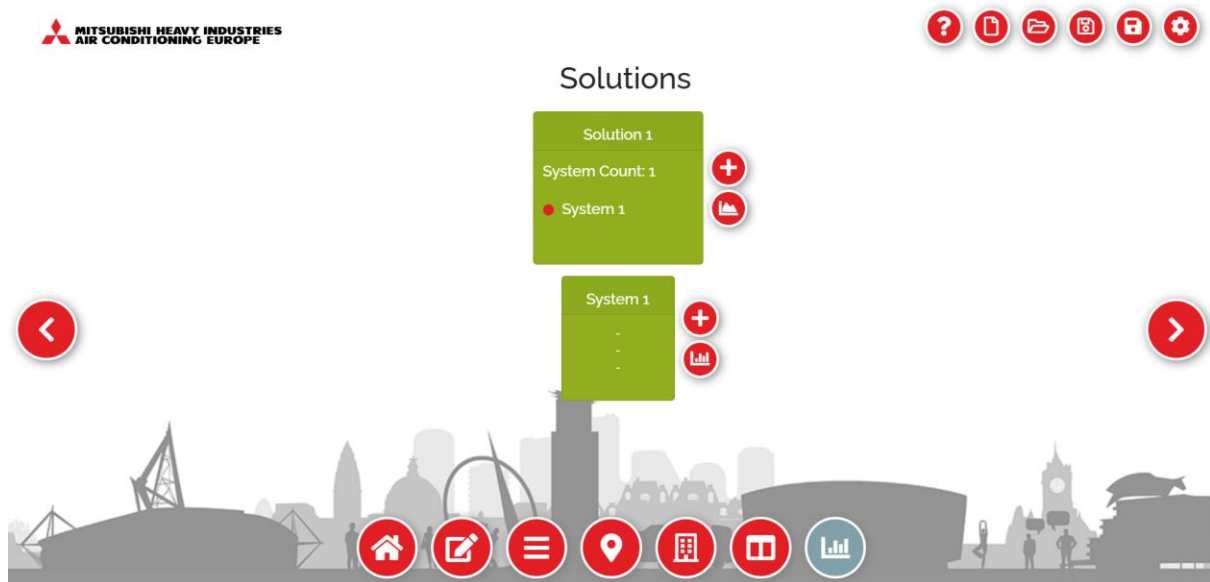
When a type of building is selected, a table will appear with days listed in the rows and hours in the columns (where column 0 represents midnight to 1 am, and so on). Red cells indicate that the air-conditioning system is operating (Building in Use), while white cells indicate that Building Not In Use.



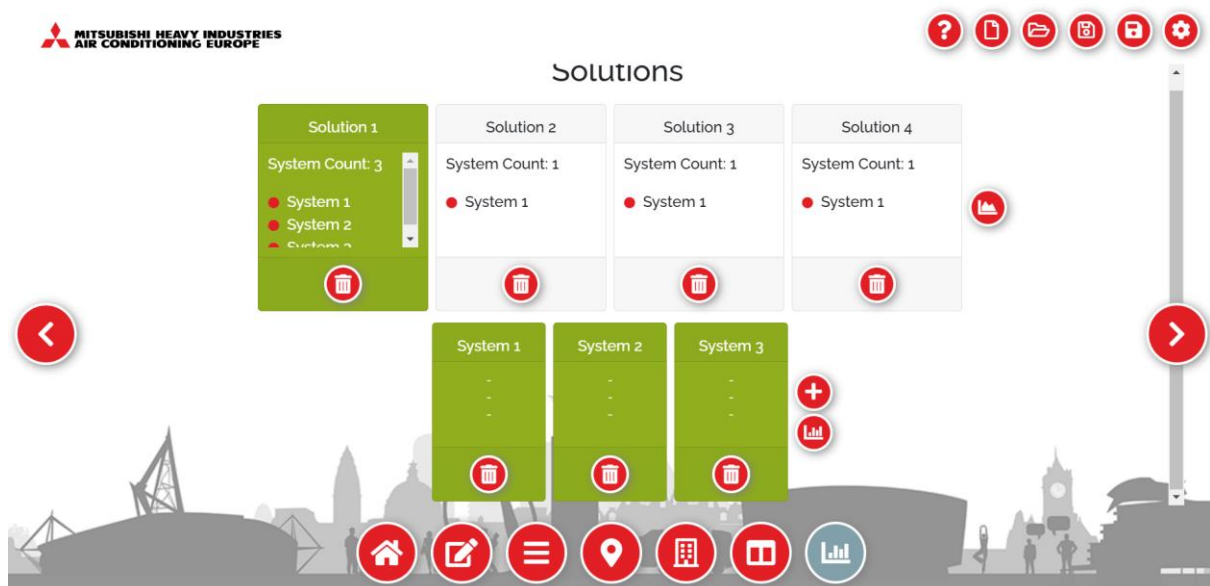
Note: it is also possible to manually click on the cells to toggle them between red and white. If users want to save a specific building type, use the save button and then open any saved building type using the Open icon.

## 4.6 Define Solutions and Systems

On this screen, users can configure air-conditioning systems, each characterised by a single outdoor unit. It is possible to set up to 10 systems per Solution and create up to 4 Solutions for comparison purposes.



To add a new Solution, click the + icon. New Solution tabs will be automatically added, each with a different colour for easy differentiation. Similarly, to add a new System, click the + icon, and new System tabs will be added with the same colour as their associated Solutions. Users can rename Solutions and Systems by clicking once on their titles. To delete a Solution, press the Delete icon.





## 4.7 Configure a System

To configure a System, double click on the system box. Then select an MHI product using 4 drop-down lists. It is also possible to change the quantity if identical Systems are used in the same Solution.

Edit System: System 1

The screenshot shows the 'Edit System: System 1' interface. On the left is a vertical sidebar with buttons: '<< Hide', 'Product' (highlighted in red), 'Design Condition', 'Indoor Unit Info', 'Design', 'Set Temperature', and 'Price'. The main panel is titled 'Product' and contains the following fields:

Product	
Product Type	VRF
System Type	3-pipe (Heat Recovery)
Model Type	KXZR standard
Model Name	FDC400KXZRE2
Quantity	1

Next, users need to specify the Design Condition and Indoor Unit Information:

- Connection Ratio: This is the capacity ratio between indoor and outdoor units in %.
- Pipe Losses: This represents the capacity correction, which varies with the system pipe length. The default value is 10%. Users should estimate the Pipe Losses for each system. For smaller systems, this factor can be reduced, while for larger systems, it can be increased.
- Indoor Unit Quantity: This is the total quantity of indoor units in a System.
- Average Indoor Power Input: This is the average power input per indoor unit. It is recommended to use the Reference file to calculate the total power input and then divide it by the number of indoor units.

Edit System: System 1

The screenshot shows the 'Edit System: System 1' interface with the 'Design Condition' and 'Indoor Unit Info' panels. The sidebar is the same as in the previous screenshot, with 'Design Condition' highlighted in red.

The 'Design Condition' panel contains two sliders:

- Connection Ratio:** A slider ranging from 0 to 100%, currently set at 100%.
- Pipe Losses:** A slider ranging from 0 to 30, currently set at 10%.

The 'Indoor Unit Info' panel contains two input fields:

- Indoor Unit Quantity:** A text input field with the value '0'.
- Average Indoor Power Input:** A text input field with the value '0' followed by 'W' and a red 'Reference' label.

The next step is for the user to configure the load curves for both cooling and heating modes.

On the X-axis, users will find the Ambient Temperature corresponding to the previously selected location. Each cursor can be dragged and dropped to specify the maximum operating temperature in heating (max 15°C) and the minimum operating temperature in cooling. Note that the two curves cannot cross.

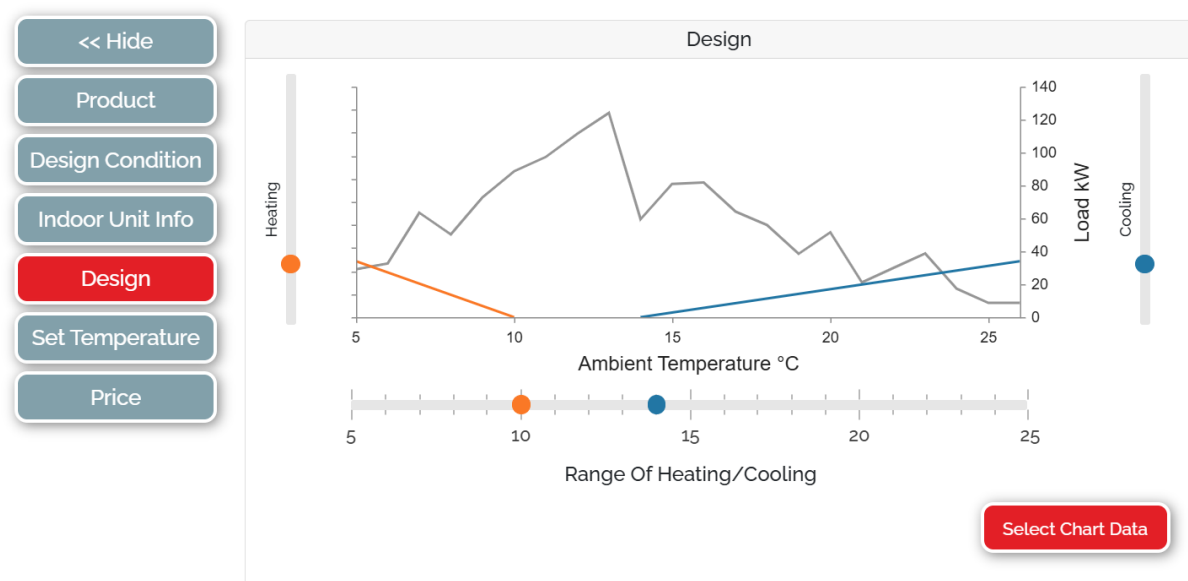
On the two Y-axis (left and right), users can specify the maximum required capacity at:

- Minimum ambient temperature in heating and,
- Maximum ambient temperature in cooling.

There is a maximum limit for each mode that users cannot exceed, and this limit is calculated based on the selected outdoor unit and location.

Tip: user can click on slide bar button and use keyboard arrows to precisely change values and it is also possible to display more data on the graph by clicking the button “Select Chart Data”.

Edit System: System 1



In the last 2 steps, users need to select the temperature setpoints and the type of temperature control. It is possible to choose between:

- Dual Setpoint: users can select 2 different temperature setpoints based on whether the building is In Use or Not In Use
- System Off: users can select a temperature setpoint when the building is In Use only. The system will be considered as stopped if the building is Not In Use and values will disappear.

(Please refer to 4.5)

Finally in the last section, users can specify Initial Cost (upfront cost) and Annual Maintenance Cost (yearly) related to the system. If specified, these values will be used for ROI.

Do not forget to click on Save when all the parameters have been configured.

Edit System: System 1

<< Hide
Product
Design Condition
Indoor Unit Info
Design
Set Temperature
Price

Set Temperature

Behaviour When Not in Use
☒ Dual Setpoint
☐ System Off

Heating In Use
16 27
20°C

Heating Not In Use
10 27
16°C

Cooling In Use
16 35
24°C

Cooling Not In Use
16 35
28°C

Prices

Initial Cost
0 £

Annual Maintenance Cost
0 £/year

Once System parameters are saved, the System box should be updated as follows:



## 5 Results and Comparison

### 5.1 System Results

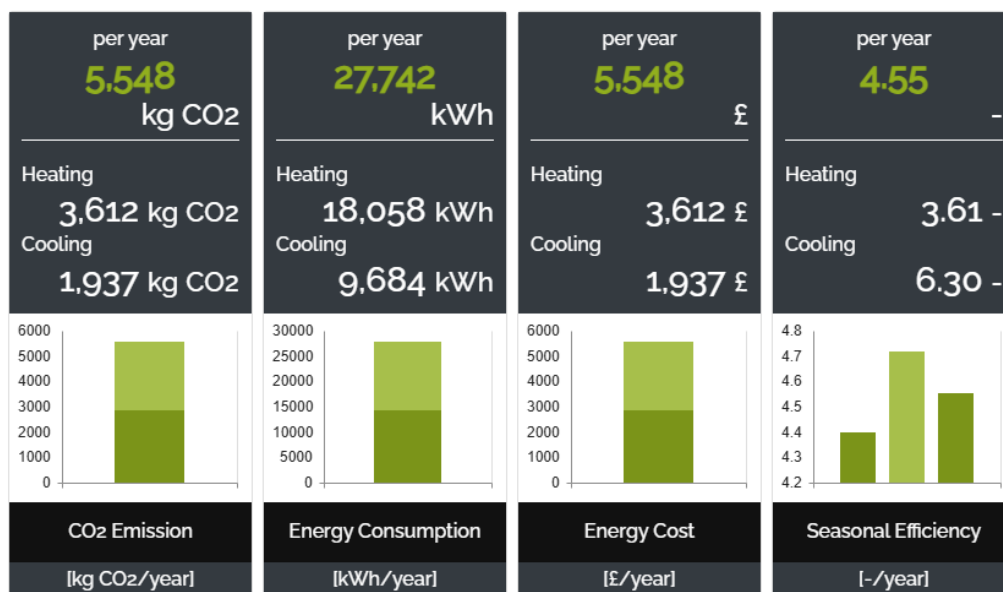
Next to the system, there is an icon to View Results. By clicking on it, the following results will be shown for each mode and combined.

- Annual CO<sub>2</sub> emission in kg CO<sub>2</sub>
- Annual Energy Consumption in kWh
- Annual Energy Cost in £
- Annual Seasonal Efficiency

If more than one System is configured, each of them will be displayed on the same graph using a different colour.

#### Solution 1 Results

✕



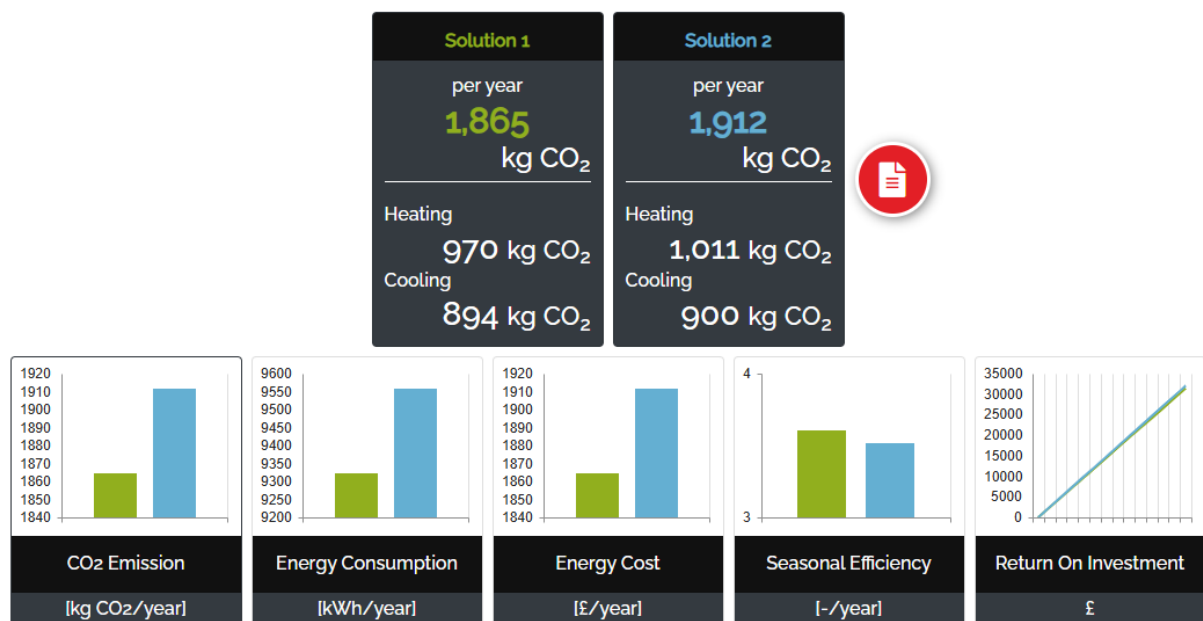
Close

## 5.2 Compare Solutions

Regardless the number of Solutions, users can Compare Solution Results by clicking on the icon next to the Solution boxes. The parameters and screen below will be shown:

- Annual CO<sub>2</sub> emission in kg CO<sub>2</sub>
- Annual Energy Consumption in kWh
- Annual Energy Cost in £
- Annual Seasonal Efficiency
- Return On Investment in £

### Comparison



## 5.3 Generate report

On this last screen, user can also generate report which will be opened in a new tab. The report will summarise the project details as well as each Solutions and Systems and will highlights key results.

It can be printed out and/or saved as a PDF.

## 6 Managing Projects

There are a few options to efficiently manage projects in E-Seasonal from the main dashboard and/or from the top right icons on any screens.

New Project: see 4

Open Existing Project: a window will pop up to open any existing E-Seasonal file (.ees)

Save: it will save the current project (Downloads folder by default) using the current project name

Save as: window will pop to enter a File Name and then the file is saved (Downloads folder by default)

## 7 Settings and Preferences

Settings can be accessed from the main dashboard on the top right corner. From there, the following can be changed:

Location: Country, language, and currency.

Electricity: Below are the default values for Annual Standing Charge, Co2 Emission Factor (kWh to CO2 conversion), High and Low Tariff. On the calendar it is possible to manually toggle tariffs between High and Low.

### Preferences

Electricity																								
Annual Standing Charge	550.0000										£/year													
Co2 Emission Factor	0.2000																							
High Tariff Price	0.2000										£													
Low Tariff Price	0.1000										£													
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sun	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Mon	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Tue	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Wed	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Thu	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Fri	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High
Sat	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High