seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Consumers' ability to operate heat pumps and their controls

Insights from a survey and online experiment

SEAI Behavioural Economics Unit

Behavioural insights for policy: primary research

Rialtas na hÉireann
Government of Ireland

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September 2022

Sustainable Energy Authority of Ireland

SEAI is Ireland's national energy authority investing in, and delivering, appropriate, effective and sustainable solutions to help Ireland's transition to a clean energy future. We work with the public, businesses, communities and the Government to achieve this, through expertise, funding, educational programmes, policy advice, research and the development of new technologies.

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Acknowledgments

This paper summarises the main findings of a report produced by Indecon Economic Consultants and London Economics for SEAI's Behavioural Economics Unit. We thank all members of the research team for their input into the project. The original detailed report is available on request from hannah.julienne@seai.ie.

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Executive summary

Background

Widespread heat pump deployment is integral to achieving the decarbonisation of Ireland's residential heating sector, as set out in the Climate Action Plan. However, realising the full potential of heat pumps in reducing carbon emissions relies not only on their adoption but also on correct operation once installed.

Consequently, the Sustainable Energy Authority of Ireland's (SEAI) Behavioural Economics Unit commissioned Indecon Economic Consultants to conduct primary research to investigate the following questions:

1) How well do consumers understand how to operate heat pumps and their controls?
2) Can consumers' ability to operate heat pumps and heat pump controls be improved through an intervention?
3) What features of heat pumps make them easier or harder to use?

Methodology

The primary research instrument used in this study was an online experiment in which participants had to complete tasks on interactive replicas of heat pump control panels and respond to questions about efficient heat pump operation. Preliminary desk research and surveys of heat pump owners, installers and manufacturers informed and complemented this experiment.

Main findings

1) Consumers face difficulties in understanding and operating heat pumps:

- While most heat pump owners surveyed (74%) agreed they have a strong understanding of how their system operates, installers and manufacturers did not share this opinion, with only 40% and 14% respectively in agreement.
- Common user mistakes identified by installers and manufacturers include setting the internal room temperature or hot water temperature too high and turning the heat pump on and off multiple times a day, rather than letting it run continuously.
- There was some disagreement amongst installers as to how heat pumps should be operated when no one is at home – 63% thought continuous operation should be maintained but others thought there should be intermittent operation or that the heat pump should be switched off completely.
- A quarter of survey respondents disagreed that their system's controls and displays are easy to use and, and just 60% agreed that they received clear instructions on how to operate their heat pump.
- Installers and manufacturers identified setting schedules and adjusting heat curve settings as among the more difficult tasks to achieve using heat pump controls.
- In the online experiment, performance was good on simple tasks involving setting the room temperature (86-93%), but poorer on complex tasks that involved setting schedules or a heat curve (23-53%).

2) Simplified instructions and energy saving tips can improve consumers' ability to operate heat pumps:

- Providing simplified instructions as a 'quick start guide' to the online experiment participants improved performance on heat pump controls tasks by 11% on average, compared with providing them with the standard manual only.
- The quick start guide was particularly effective at improving performance on more complex tasks but may have hindered performance on the easiest task (setting the room temperature).
- The quick start guide also improved the perceived usability of the controls, and improved performance on comprehension questions related to energy efficient operation of heat pumps by 16%.

3) Control panel user interface design is an important factor in consumers' ability to operate heat pumps:

- Of the survey respondents that thought their system's controls are difficult to use, 60% attributed this to the user interface being too complex, rather than poor understanding of the system.
- Experiment participants found it easier to perform tasks on the replica controls of a heat pump model that required setting a heat curve, rather than the controls of a different model that required setting a heating schedule. This highlights the importance of the usability of the control panel itself, as the concept of a schedule is arguably more familiar than that of a heat curve.

Recommendations

Heat pump manufacturers

- Design heat pump controls and user interfaces with the consumer in mind and carry out thorough user testing as part of the process.
- Consider developing accessible quick start guides for more complex settings that heat pump owners may need to adjust.
- Test the efficiency of heat pumps under different occupancy scenarios and create clear operation guidance based on the results.

Heat pump installers

- Take time during installation to teach consumers how to use heat pump controls.

Policymakers

- Engage with installers to enable them to play their part in instructing consumers.
- Develop simple evidence-based guidance on efficient heat pump operation aimed at heat pump owners and take steps to make sure they are aware of it.
- Support field research into the efficiency of heat pumps under different occupancy scenarios to grow the evidence base.

1. Introduction

This report summarises the main findings of a piece of primary research about homeowners' ability to operate heat pump controls, which was conducted by Indecon Economic Consultants for the Sustainable Energy Authority of Ireland's (SEAI) Behavioural Economics Unit in 2021. It aims to provide an accessible overview of the main results of the study and make recommendations based on these for a range of relevant stakeholders.

1.1 Background

A notable component of Ireland's Climate Action Plan is the decarbonisation of the residential heating sector through the promotion of heat pump technology, with a target of 680,000 heat pumps to be installed in residential buildings by 2030.[1] The widespread deployment of heat pumps was also identified as key to achieving net-zero by 2050 in the heating sector in SEAI's recently published National Heat Study.[2]

However, realising the full potential of heat pumps in reducing carbon emissions relies not only on their adoption but also on correct operation once installed, as identified in a policy paper produced by SEAI's Behavioural Economics Unit.[3] Moreover, consumers' experience of using heat pumps may have knock-on effects on future adoption of the technology – would-be adopters are likely to be highly influenced by the experience of others, whether positive or negative.

Consequently, heat pump owners themselves play an important role in achieving emissions savings from heat pumps through their ability to understand and use the technology.

1.2. Aims of the research

The study comprised desk research, surveys, and an online experiment to investigate several research questions, which may be summarised as:

1) How well do consumers understand how to operate heat pumps and their controls?
2) Can consumers' ability to operate heat pumps and heat pump controls be improved through an intervention?
3) What features of heat pumps make them easier or harder to use?

[1] https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/
[2] https://www.seai.ie/publications/Net-Zero-by-2050.pdf
[3] https://www.seai.ie/publications/Heat-Pump-Adoption.-Maximising-Savings..pdf

2. Methodology

The primary research instrument used in this study was an online experiment in which participants had to complete tasks on interactive replicas of heat pump control panels and respond to questions about efficient heat pump operation. Preliminary desk research and surveys of heat pump owners, installers, and manufacturers informed and complemented the experiment. Further detail is provided below.

2.1. Review of previous research

The first phase of the project involved an informal review of existing literature on user behaviour and satisfaction relating to heat pumps and their controls. The focus was primarily on studies relating to domestic heat pump adoption and use in the UK and Ireland, involving surveys and interviews with heat pump owners and would-be adopters.

2.2. Surveys

The second phase of the project was a survey of Irish heat pump owners, installers and manufacturers in summer 2021.

Heat pump owners (n=1,097)

Indecon sent letter and email invitations to partake in an online survey to a sample of 13,241 heat pump owners identified through SEAI's database of grant recipients. Of these, 703 respondents completed the survey after receiving a letter, and 394 after receiving an email.

The survey collected information on homeowners' satisfaction, understanding and difficulties encountered when operating heat pumps and their controls.

Heat pump installers (n=31)

Indecon issued survey invitations to 400 SEAI-registered heat pump installers. Of these, 31 completed the online survey. Respondents gave their views on consumer usage of heat pumps, common mistakes and instructions given to homeowners regarding maximising efficiency.

Heat pump manufacturers (n=7)

Indecon issued 30 survey invitations to heat pump manufacturers, of which seven responded. The questions were similar to those in the installer survey, with additional questions regarding default settings and recommended operation.

2.3. Online experiment

The final phase of the project was an online experiment, designed by Indecon in association with London Economics and SEAI's Behavioural Economics Unit.[4] YouGov coded and hosted the experiment online.

Participants (n=2,043)

A nationally representative sample (gender, age, region) was used for the experiment. Performance was incentivised through awarding YouGov points for correctly completed tasks and questions.

[4] The experiment was pre-registered in line with best practice. The pre-registration can be found at https://doi.org/10.17605/OSF.IO/8C7KD

Experiment outline

Participants proceeded through the experiment as follows:

1) Introduction to the experiment and heat pump model
2) Three operational tasks using interactive heat pump control panel
3) Questions on perceived usability of heat pump model[5]
4) Comprehension questions about efficient heat pump operation (see Appendix)
5) Sociodemographic questions

Participants had access to the heat pump manual (in PDF form) throughout the experiment.

Experimental manipulations

The experiment design employed two experimental manipulations, each with two conditions (see *Figure 2.1*):

- Heat pump model used (Model 1 vs. Model 2)
- Provision of simplified instructions as a 'quick start guide' (Baseline vs. Treatment)

Heat pump model

Participants were randomly assigned to see the controls of one of two common heat pump models, identified by Indecon as being the most common models sold in Ireland (referred to here as 'Model 1' and 'Model 2').

Model 1 represented one type of heat pump model for which users typically set a heating schedule to control the heat pump. Model 2 represented an alternative type of heat pump for which users typically set a 'heat curve' – an instruction regarding the heating system supply temperature as a function of the outdoor temperature.

Quick start guide

All participants had access to the relevant heat pump manual while completing the experiment. In addition to this, half of the participants were randomly selected to also receive a simplified quick start guide. We refer to these participants as the 'Treatment' group, and those who received the manual only as the 'Baseline' group.

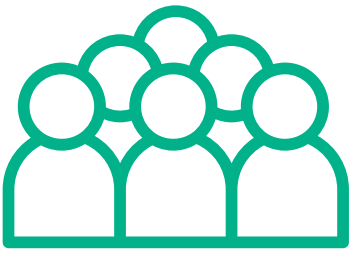
The quick start guide included:

- A labelled diagram of the control panel
- Step-by-step instructions for five commonly used heat pump settings
- Links to instructional videos for each of these settings
- Energy saving tips

The quick start guides for both heat pump models are in the Appendix.

[5] The 'System Usability Scale', see https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html

Consumers' ability to operate heat pumps and their controls



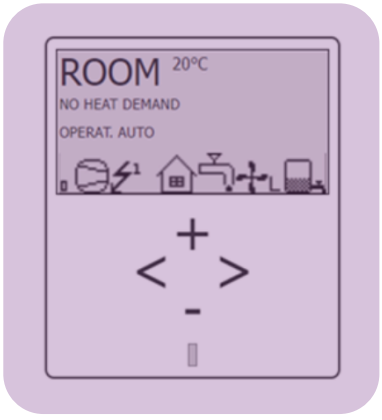
n = 2,043

Model 1

n = 1,013

Model 2

n = 1,030



Manual only

Baseline
n = 512

Manual + Quick Start Guide

Treatment
n = 501

Manual only

Baseline
n = 518

Manual + Quick Start Guide

Treatment
n = 512

Figure 2.1. Online experiment design depicting the different experimental conditions participants were randomly assigned to, with sample size for each before any exclusion criteria were applied.

3. Main findings

The main results relating to the research questions set out in Section 1.2 are described below. For the online experiment, we excluded data from participants who failed an attention check or who did not engage at all with any of the three tasks using the interactive controls. The final sample comprised 1,971 participants. More detailed results and analyses are available in the original Indecon report.[6]

3.1. Consumers face difficulties in understanding and operating heat pumps

Evidence from the literature review, surveys and from the online experiment suggests that consumers have difficulties understanding how heat pumps work and operating their controls.

Understanding of heat pump operation

Almost three-quarters of respondents to the consumer survey agreed they had a strong understanding of how their system operates (*Figure 3.1*). However, installers and manufacturers were not of the same opinion, with only 40% and 14%, respectively, agreeing that consumers have a strong understanding of how the heat pump works. The most common user mistakes identified by installers and manufacturers were setting the internal room temperature or hot water temperature too high and turning the heat pump on and off multiple times a day, rather than letting it run continuously.

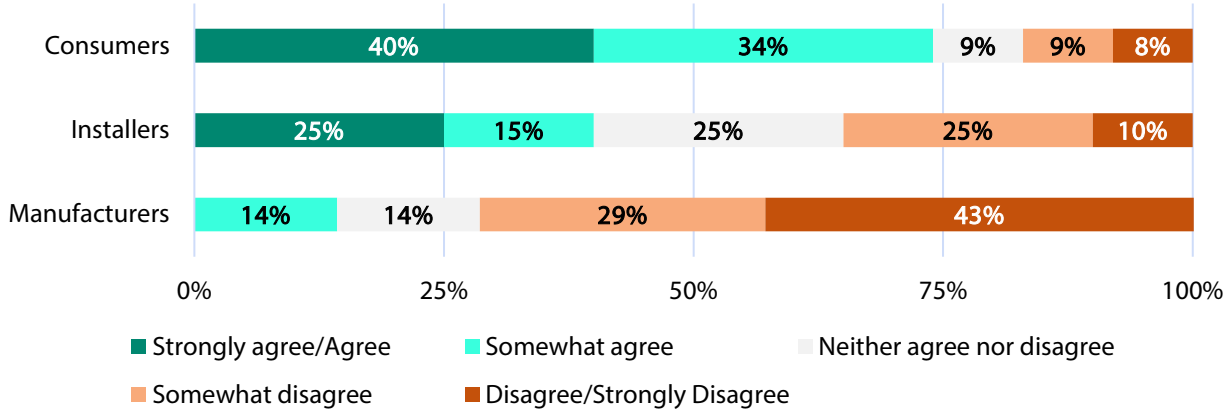


Figure 3.1. Heat pump owners' responses to the statement "I have a strong understanding of how the heat pump operates" vs. installers' and manufacturers' responses to the statement "Consumers have a strong understanding of how the heat pump operates"

We also saw poor understanding of heat pumps in the online experiment (albeit in a sample of consumers who did not necessarily have a heat pump themselves). At baseline, just 42% of participants understood that heat pumps operate differently to oil and gas boilers and take longer to produce high temperatures. Of the 130 experiment participants who said they had a heat pump installed in their home, 41% said they did not know how it worked. Overall, heat pump owners did not display better comprehension of efficient heat pump operation than those who did not own a heat pump.[7]

These results are also broadly in line with findings from the literature, including those of one study which interviewed six heat pump adopters, who all said they did not fully understand how the technology worked, with some citing their age as a factor in this.[8]

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[6] Note that there may be slight discrepancies in results from the original report due to the adoption of the aforementioned exclusion criteria.
[7] Note that heat pump ownership was self-reported in this case and therefore it is possible that some participants who did not understand what a heat pump is may have erroneously said they had one installed in their home.
[8] Owen, A, Mitchell, G & Unsworth, R (2013) 'Reducing carbon, tackling fuel poverty: adoption and performance of air source heat pumps in East Yorkshire', *Local Environment*, vol.18(7), pp. 817-833. Available at: https://doi.org/10.1080/13549839.2012.732050 [accessed 20 Nov 2022]

Note, however, that there were some discrepancies among survey responses from installers regarding instructions given to homeowners about efficient heat pump operation. There was broad agreement that homeowners should let heat pump systems run continuously when someone is at home, but disagreement where no one is at home – 63% thought continuous operation should be maintained but 26% thought there should be intermittent operation and 5% thought the heat pump should be switched off completely. Comments from manufacturers and installers generally indicated a split between those who thought homeowners should not touch their heat pump system once installed, and those who thought homeowners should learn how to perform some basic functions.

Ability to use heat pump controls

As well as poor understanding of how heat pumps work in general, consumers also encounter difficulties using heat pump control panels. A quarter of survey respondents disagreed that their system's controls and displays were easy to use, and only 60% agreed to some extent that they received clear instructions on how to operate their heat pump on initial contact.

Installers felt that some tasks such as setting heating temperatures were easy for users (approximately three-quarters rating it as at least 'Somewhat easy'), but that other tasks were more difficult, such as setting schedules (32%) or adjusting heat curve settings (21%). Results from the manufacturer survey were broadly in agreement with this, with five out of seven manufacturers identifying hard-to-understand controls as an issue for consumers.

These observations from installers and manufacturers are reflected in objective performance in the online experiment on tasks using the interactive replica heat pump controls. While baseline performance was generally good on a simple task asking participants to set the room temperature (93% or 86% depending on heat pump model), performance on more complex tasks involving schedules or heat curve settings was much poorer (between 23% and 53%) (see white bars in *Figure 3.2*).

3.2. Simplified instructions and energy saving tips can improve consumers' ability to operate heat pumps

Providing online experiment participants with simplified instructions as a quick start guide improved performance on heat pump controls tasks by about 11% on average, compared with providing them with the standard manual only (an average of 1.7 vs. 1.1 correctly completed tasks out of 3). The guide was particularly beneficial for performing more complex tasks, but actually hindered performance on the simplest task for Model 1 – setting the room temperature (see *Figure 3.2*).

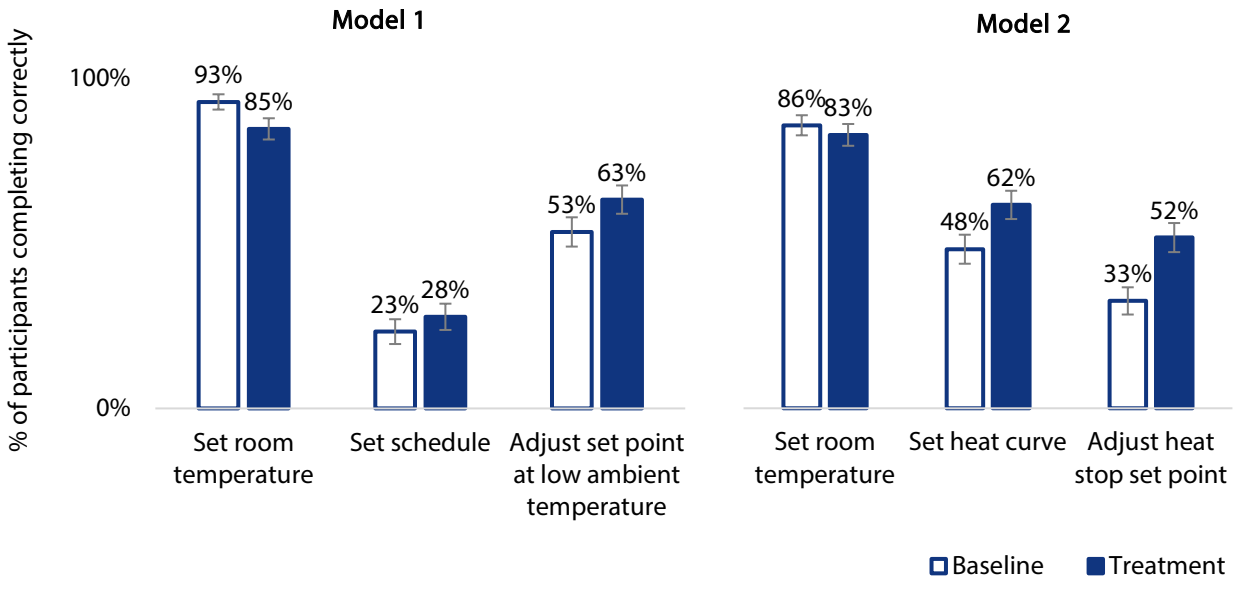


Figure 1.2. Performance on online experiment tasks using interactive replicas of heat pump controls for participants in Baseline (manual only) and Treatment (manual + quick start guide) conditions. Error bars denote 95% confidence intervals

The quick start guide also improved the perceived usability of the controls (as measured using the System Usability Scale), and improved performance on five comprehension questions related to energy efficient operation of heat pumps by about 16% (see *Figure 3.3*). The comprehension questions used are in the Appendix.

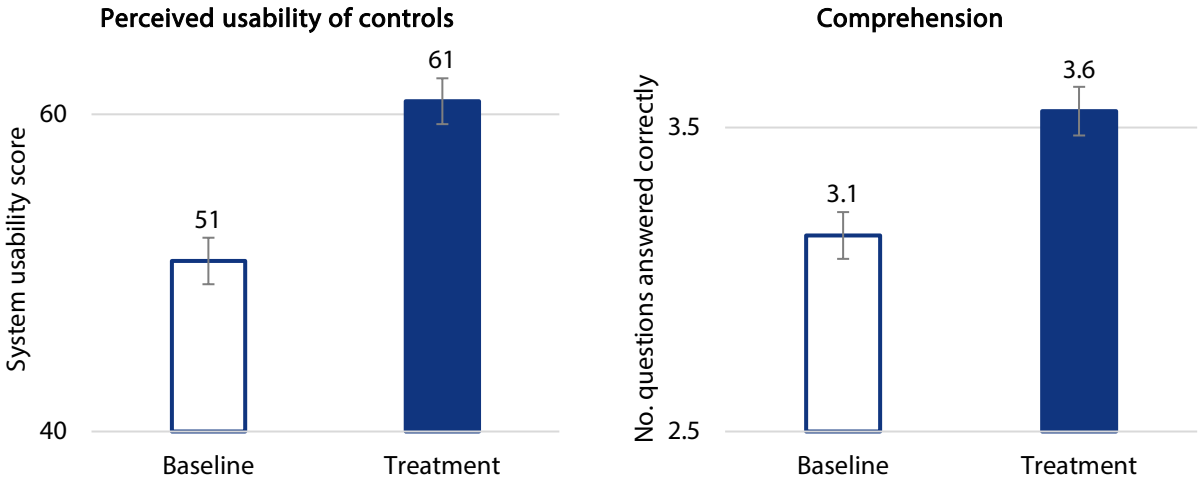


Figure 3.3. Effect of the quick start guide on (a) participants' perception of the usability of the replica heat pump controls (max score 100) and (b) participants' performance on comprehension questions related to efficient heat pump operation (out of five). Error bars denote 95% confidence intervals. Y-axis is scaled to approximately one standard deviation

3.3. Control panel user interface design is an important factor in consumers' ability to operate heat pumps

As mentioned previously, approximately one-quarter of survey respondents disagreed that their system's controls and displays were easy to use. Of this group, approximately 60% attributed their difficulty in using the controls to the user interface being too complex, while just over 30% attributed it to not understanding the system more generally.

The importance of user-friendly controls can also be seen in the difference in performance on tasks using the two different heat pump replica controls – particularly the performance difference in setting a heating schedule for Model 1 and setting the heat curve for Model 2, which may be thought of as somewhat equivalent tasks (see *Figure 3.2*). Although the concept of a heating schedule is arguably easier to understand than that of a heat curve, participants in fact found it harder to correctly set a schedule than to adjust heat curve settings, even when they had the help of the quick start guide.

4. Discussion

4.1. The importance of heat pump control panel design

This study highlighted the importance of the user interface as a factor in consumers' ability to operate heat pumps, perhaps over and above their general understanding of how heat pumps operate.

Recommendations

- *For manufacturers*: Design heat pump controls and user interfaces with the consumer in mind and carry out thorough user testing as part of the process.

4.2. The benefit of improving instructions

This study showed that providing consumers with simplified instructions can improve their ability to operate heat pumps, particularly for more complex tasks such as setting schedules or adjusting the heat curve. We used a quick start guide due to the constraints of running an online experiment, but instructions may take other forms, such as a demonstration from the installer.

Recommendations

- *For manufacturers*: Consider developing accessible quick start guides for more complex settings that heat pump owners may need to adjust.
- *For installers*: Take time during installation to teach consumers how to use heat pump controls.
- *For policymakers*: Engage with installers to enable them to play their part in instructing consumers.
- *For policymakers*: Develop simple evidence-based guidance on efficient heat pump operation aimed at heat pump owners and take steps to make sure they are aware of it.

4.3. Disagreement over optimal operation

During this study, a recurring issue was a level of disagreement over the optimal way to operate heat pumps to maximise efficiency. Although there appears to be broad agreement that heat pumps work best when left to run continuously, there was disagreement over what to do if no one is at home (such as during holidays).

Recommendations

- *For manufacturers*: Test the efficiency of heat pumps under different occupancy scenarios and create clear operation guidance based on the results.
- *For policymakers:* Support field research into the efficiency of heat pumps under different occupancy scenarios to grow the evidence base.

4.4. Study limitations

This study has several limitations to acknowledge when interpreting the results:

- The survey sample was self-selected – Indecon sent invitations to a large sample of heat pump owners but responses were received from only a small proportion of these. It is possible that these responses may be slightly biased towards consumers who are particularly enthusiastic about heat pumps or had an issue with theirs, as opposed to those who are more indifferent.
- The online experiment used a nationally representative sample that were not necessarily heat pump owners, although this should not be considered too much of a limitation given the aim of increasing the number of new households adopting heat pumps.
- Although performance in the online experiment was incentivised through the awarding of points for correct answers, this is a different type of incentive than real-life motivations around energy saving. It is possible that individuals would put in more or less effort into these tasks in real life.

5. Conclusion

The results of this research project provide up-to-date evidence regarding consumers' ability to operate heat pumps and their controls in an Irish context. The results clearly indicate current and would-be heat pump owners have a poor understanding of how best to operate heat pump systems, and perhaps even disagreement among experts. There is also evidence that the user interface of heat pump controls is a key factor in consumers' ability to operate these controls.

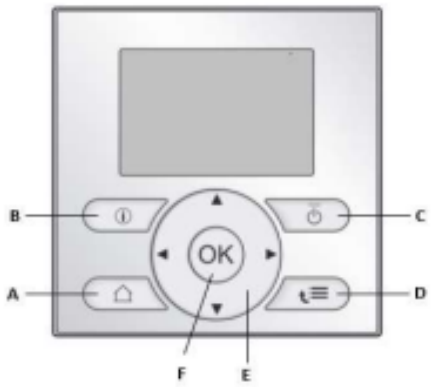
The ability of consumers to operate heat pumps correctly is key to fully realising the potential energy savings associated with deployment of the technology, but also (and perhaps more importantly) to ensuring consumers advertise their positive experience to speed up widespread adoption. The recommendations made in this report should go some way towards achieving these goals.

Appendix

Quick start guides

Model 1

Heat Pump Control Quick Start Guide



A) Home button (switches between home pages or brings you back to home page from menus)

B) Malfunction information button (displays information about any malfunctions)

C) ON/OFF button (turns on or off heating/hot water modes)

D) Menu button (opens the menu options)

E) Navigational keypad (△, ▽, ▷, ◁ - used to move through menus and change values)

F) OK button (confirms a selection or selects an option in a menu)

Energy Saving Tips (€)

- Do not set the room temperature any higher than needed. Setting a higher temperature will **not** make the room heat up any faster.
- Setting a heating schedule is the most energy and cost-efficient way of controlling the temperature. Avoid changing the temperature too often or using the boost function. Change the schedules as the seasons change.
- The heat pump warms your home slowly over time. Avoid turning it on and off, even if there is no one in the house (e.g. during the day). Instead, let it run continuously.

Changing the Room Temperature

1. Press any button to turn on the controls.
2. The home screen should display the current room temperature.
3. Press △ or ▽ on the keypad to increase or decrease the temperature shown on the home screen.
4. Press OK.

Instructional Video

Turning on and changing the Hot Water Tank Temperature

1. Press any button to turn on the controls.
2. Press ⌂ to reach the domestic hot water page ("LWT Main" should appear on the screen).
3. Press ⏻ to turn on the hot water settings. The current hot water temperature should be shown
4. Press △ or ▽ on the keypad to increase or decrease the desired temperature.
5. Press OK.

Instructional Video

Changing the Room Temperature Preset Values

(There are two values used in setting a heating schedule, Eco (cooler, less energy intensive) and Comfort (warmer, more energy intensive). Change these values using the below steps.)

1. Press any button to turn on the controls.
2. Press ☰.
3. Press ▽ until you reach the 'user settings' option and press ▷ to select.
4. Use ▽ until you reach the 'preset values' option and press the ▷ to select.
5. Press ▷ to select the 'room temperature' option.
6. Use △ or ▽ to move between the 'Comfort' or the 'Eco' option and press ▷ to select.
7. Press △ or ▽ to increase or decrease the desired temperature.
8. Press OK.
9. To change the temperature of the other preset value repeat steps 5, 6 and 7, pressing ▷ to select the other preset option with.

Instructional Video

Setting Weather Dependent Set Point for Heating

(Used to adjust the temperature of the water in system based on outside temperature)

1. Press any button to turn on the controls.
2. Press ☰.
3. Use ▽ until you reach the 'user settings' option and press the ▷ to select.
4. Use ▽ until you reach the 'set weather dependent' option and press the ▷ to select.
5. Press ▷ to select 'main' and then press ▷ again to select 'set point at low ambient temperature'
6. Press △ or ▽ on the keypad to increase or decrease the temperature.
7. Press OK.
8. If you wish to also change the 'set point at high ambient temperature' first press ▽ and then ▷ to select 'set point at high ambient temperature'.
9. Press △ or ▽ on the keypad to increase or decrease the temperature.
10. Press OK.

Instructional Video

Setting a Heating Schedule

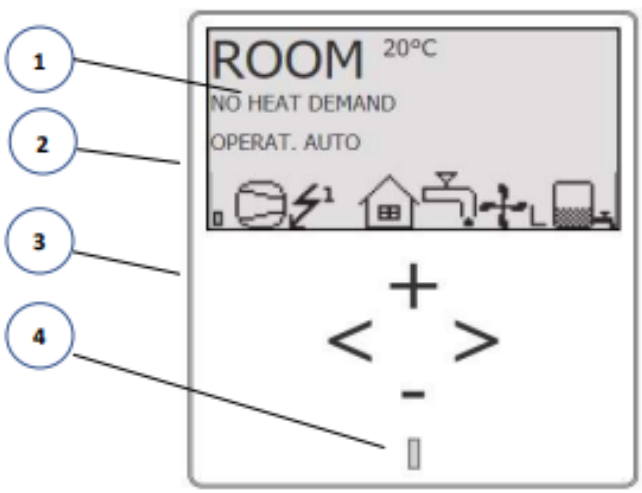
(To select the temperature for different times of day and for different days of the week.)

1. Press any button to turn on the controls.
2. Press ☰.
3. Use ▽ until you reach the 'user settings' option and press ▷ to select.
4. Use ▽ until you reach the 'set schedules' option and press ▷ to select.
5. Press ▷ to select the 'room temperature' option.
6. There is room for three potential schedules to be set. To change the first one click OK on 'User Defined 1'.
7. Select the day to set a schedule for using △ or ▽, then press ▷
8. Use the arrow buttons to set times of day for the schedule, and select 'eco' (cooler, less energy intensive) or 'comfort' (warmer, more energy intensive), repeating for each line as needed. Use △ or ▽ to change values and ▷ and ◁ to move between values.
9. Use ☰ to return and select a different day, or press OK and select 'copy day' to choose other days to copy the schedule, using the arrows to move between "Yes" and "No" for each day, then press OK.
10. Press OK again and then select 'Save schedule' and click OK.

Instructional Video

Model 2

Heat Pump Control Quick Start Guide



1. **Start Screen**
2. **Display**
3. **Keypad**
4. **Indicator**

Energy Savings Tips (€)

- **Do not set the room temperature any higher than needed. Setting a higher temperature will not make the room heat up any faster.**
- **Adjusting the heat curve is the most energy and cost-efficient way of controlling the temperature. Avoid changing the temperature too often or using the auxiliary heater. Change the heat curve as the seasons change.**
- **The heat pump warms your home slowly over time. Avoid turning it on and off, even if there is no one in the house (e.g. during the day). Instead, let it run continuously.**

Changing the Room Temperature

1. The home screen should display the current room temperature.
2. Use '+' or '–' to change the temperature, then press '<' to exit.

Instructional Video

Setting the Heat Stop

(This function stops all production of heat when the outdoor temperature reaches a certain point)

1. Press '>' to reach the information menu.
2. Press '–' until you reach 'heat curve' and press '>' to select.
3. Press '–' until you reach 'Heat Stop' and press '>' to select.
4. Use '+' and '–' to change the 'Heat Stop' temperature.

Instructional Video

Setting the Heat Curve

(The heat curve tells the system how much heat to produce depending on what the outside temperature is)

1. Press '>' to reach the information menu.
2. Press '–' until you reach 'heat curve' and press '>' to select.
3. Press '>' to select the 'curve' option. The heat curve will then be displayed on the screen.
4. Use '+' and '–' to increase or decrease the curve value. The curve value sets the heating system's supply temperature when the outdoor temperature is 0°C.

Instructional Video

Setting Operating Modes

1. Press '>' to reach the information menu.
2. Press '>' again to reach the operating menu.
3. Use '+' and '–' to scroll through the various operating modes.
4. Press '>' to select the desired operating mode. The operating mode in use is shown by an asterisk (*) displayed next to it.

Instructional Video

Adjusting/Breaking the Heat Curve

(This function adjusts the heat curve at three outdoor temperatures (-5,0 and +5°C) if the indoor temperature is not comfortable)

1. Press '>' once to go to the information menu.
2. Press '–' until you reach 'heat curve' and press '>' to select.
3. Press '–' until you reach 'Curve -5' and press '>' to select.
4. Use '+' and '–' to adjust the curve value. The value can be increased or decreased 5°C.
5. The process can be repeated for 'Curve 0' and 'Curve 5'.

Instructional Video

Comprehension questions about efficient heat pump operation

Question	Answers
If you want to maximise the efficiency of your heat pump (reduce the amount of energy it uses to keep your house comfortably warm) and minimise your energy bills, which of the following options would be the most effective way to do this?	• Use both the heat pump and the booster together regularly to heat the home • Use the heat pump to heat the home and use the booster to regularly heat the water in the home • Use the heat pump's booster function every day to heat the home and hot water • **Use the heat pump on its own to heat the home and avoid using the booster as much as possible**
Please choose the correct answer from the following options. "It is more energy efficient (uses less energy to keep your house comfortably warm) to…"	• Turn your heat pump off when you leave the house for 4-5 hours and turn it back on when you return • **Allow your heat pump to run continuously, including when you leave the house for 4-5 hours**
Which of the following options would be the best to maximise the efficiency of your heat pump (reduce the amount of energy it uses to keep your house comfortably warm) and minimise your energy bills?	• Increase the temperature by one degree Celsius every week between October and November, and turn the temperature down by one degree Celsius every week between March and April • Adjust the room temperature manually on a day-to-day basis • **Set a heating schedule/heat curve* to determine when the heat pump provides heat** • Turn the heat pump off and on at the switch on a daily basis
Please choose the correct answer from the following options that best describes how a heat pump works.	• A heat pump works similarly to an oil/gas boiler and can quickly produce high temperatures • **A heat pump does not work like an oil/gas boiler and takes longer to produce high temperatures**
True or False, setting the room temperature higher on the heat pump controls will increase the speed at which your heat pump heats the room?	• True • **False**

Note: * Depending on whether the participant was in Model 1 or Model 2 condition

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