Improving the Customer Journey: Catalyst

Project lead:

EDF

Partners:

Daikin Airconditioning UK Ltd, SPEN, University of Sheffield

Contact:

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Funding:

£395,221

What were the objectives of the project?

The project aimed to make the heat pump installation journey quicker and simpler for customers and installers. It aimed to:

- **Provide a better, more integrated customer journey for heat pump adoption** by developing a user-friendly app that supports customers from initial interest to installation and aftercare.
- **Ensure customer satisfaction and optimal heat pump performance** by providing post-installation support using remote monitoring and control of installed heat pumps**.**

What activities were funded?:

The Catalyst project activities included:

- Collaborating with a UI design agency to create a user-friendly app that navigates homeowners through the heat pump installation journey, including a customer-led pre-survey assessment and remote survey.
- Software development and integration of 3rd party features that digitalise and/or automate heat pump development activities.
- Working with Daikin to establish a live heat pump data pipeline to facilitate system optimisation, automated flexible operation for smart tariffs and other customer after-care benefits, such as remote monitoring and diagnostics.

What did the project achieve?:

The project has created an app to support customers in progressing their heat pump journey from initial enquiry through to installation and aftercare, using technology and automation to empower customers to drive the process at their desired pace. Due to challenges around establishing heat pump digital connectivity, the project was unable to test heat pump monitoring, flexibility potential or the Catalyst

aftercare package. The project expects that the Catalyst app can reduce EDF's heat pump installer subsidiary EDF Heat Pumps' (formerly CB Heating) average lead time of initial enquiry to the completion of installation from 12 to an estimated 10 weeks. In part, this is due to an expected reduction of installer home visits (a survey of Daikin installers indicated a current average of 1.3 visits per install), notably by reducing the need for occasional second or third home visits. This equates to an average installer saving of £60 per customer due to a reduction in time demand and overhead costs (which could then be passed to customers). The app is expected to reduce the duration of home visits to almost 1½ hours – down from around 3¼ hours for Daikin and 2½ hours for EDF Heat Pumps. Combining direct survey cost savings with other efficiencies resulting from the use of Catalyst, the project expects that cost savings for customers could be around £200-400 per customer, excluding the potential savings from automated operation in conjunction with a smart tariff.

Project objective 1: Provide a better, more integrated customer journey for heat pump adoption by developing a user-friendly app that supports customers from initial interest to installation and beyond.

Why is this important?:

The customer journey for heat pump adoption can often be disjointed, complex and time-consuming, requiring customers to navigate much of the process themselves using various sources of information. These inefficiencies increase the likelihood of customers ending the process prematurely (EDF and Daikin estimate an indicative drop-out rate of 72% between lead generation and home visits executed) and require more time and support from heat pump professionals, leading to increased costs.

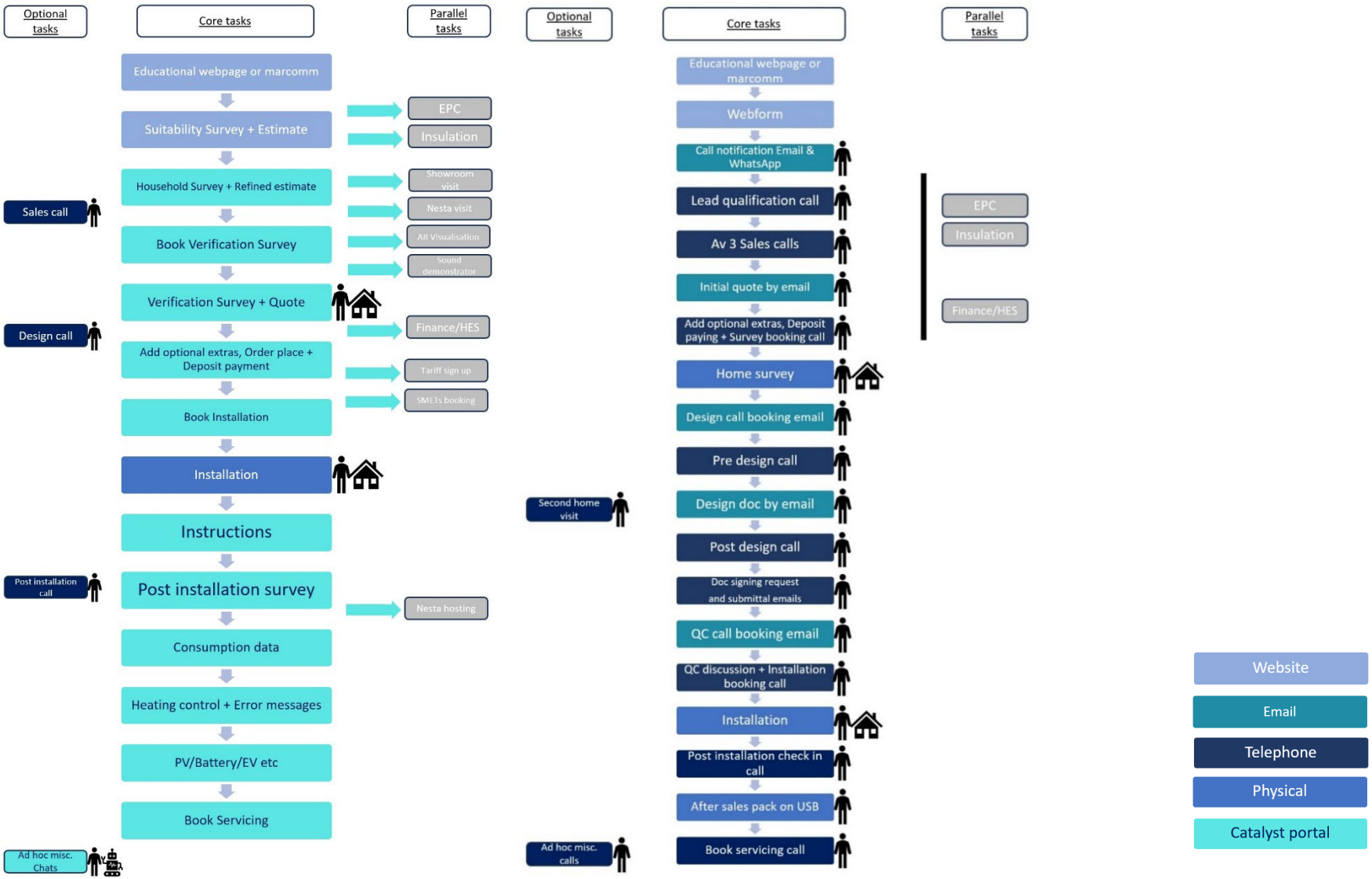
What activities were funded?:

Software and user-interface development was carried out to create the Catalyst app. App development included integration with external or existing applications, and the digitalisation and/or automation of historically time-intensive and manual processes. These included:

- Establishing an API interface with the EPC register to populate property information based on a given address.
- Developing a dynamic heat loss model to estimate a building's heat loss and appropriately size a heat pump.
- Integrating Heatly's[1] room dimensioning tool to provide rapid and accurate room and radiator sizing.
- Automating the notification of the DNO/ENA of a new heat pump installation, and post-installation MCS registration.
- Calculating final costs after the verification survey (verified by back-office staff).
- Ensuring sound levels meet the requirements and standards with a sound level estimator.

The app's designs and features were user-tested by representative customers and installers, with subsequent feedback used to iterate and refine the product.

[1] Heatly is a software solution that uses technologies - such as 2D/3D modelling, augmented reality, and virtual reality - to expedite the survey, design, installation and commissioning of heat pump systems. Heatly was granted funding under the Heat Pump Ready Stream 2 programme to develop the software solution.



Above: *Typical customer journey before Catalyst (left) and after Catalyst (right). Image courtesy of EDF.*

What were the project findings and did the project achieve this objective?:

Catalyst achieved its objective of creating an app to support customers from initial interest to installation and subsequent aftercare. The app centralises and guides the customer through the heat pump sales, survey, installation and aftercare processes at their own pace. All the information regarding a customer's installation is captured within the app, which can be shared with app-accredited installers. Wait times are reduced by limiting dependence upon installer availability, only requiring a final installer verification survey at the end of the survey process. Its findings were as follows:

The duration of the heat pump adoption customer journey can be reduced to 10 weeks. The average lead time from enquiry to installation for EDF's heat pump installer subsidiary, EDF Heat Pumps, was 12 weeks at the time of the project. The project assessed the composition of that 3-month journey and deemed that a two-week reduction is achievable using Catalyst. This reduction is facilitated by:

- A reduction in the number of companies or organisations that a customer communicates with, from 1-2 (plus 7 optional ones that customers often have to navigate to themselves) to 1 (plus 4 optional, with which the customer shall receive clear guidance). These companies and organisations include the heat pump installation company, ECO provider/insulation company, EPC company, bank and energy supplier, for example.
- A reduction in the number of customer communication channels with those companies/organisations from 5-6 to 2-4.
- A reduction in the quantity of customer emails and phone calls, saving 2½-5 hours.
- Easy access to clearer educational material for customers.

Improvements to the workload of professionals (e.g. heat pump installers) facilitate this reduction by:

- A lower quantity (from 4 to 0-2) and duration (from 2½ hours to 0-2 hours) of phone calls per customer.
- Increased capacity to deal with 30% more leads per head due to prior self-elimination of poor-quality leads.
- Reduction in design engineer effort by between 4 and 10 hours (including phone calls and desk work).
- A far lower quantity of short phone calls and email activities for administrative staff, resulting in a time saving of 2-3½ hours per customer

Based on benchmark installer rates, the project estimates that these app-related efficiency improvements could save around £200-400 per customer.

Some customers do not want to undertake the high-level survey process independently of an installer. Catalyst set out to explore whether eliminating pre-installation home visits was possible. The project quickly established that, both from a customer confidence perspective and a business trust perspective, it was highly unlikely to be a viable option. For customers, a heat pump installation is a significant investment decision and requires reassurance through verification of their survey inputs by a trusted third party. Businesses would also have to accept significant risk to create the system specification, purchase the required parts, and begin the installation based on customer-provided answers and database-extracted data without a visit to the home to verify those data.

Some customers were hesitant about undertaking any aspect of home surveying themselves, even if was followed by an in-person verification survey. These customers either preferred the reassurance of the process being handled by a knowledgeable professional, particularly due to the significant expense of a heat pump installation, or didn't have a sufficient level of knowledge, such as knowing where their fusebox/consumer unit is. While this indicates that customer demand for installers' already limited time will be greater than anticipated at project inception, the project expects this to be a time-limited problem as installer availability improves and the complexities of different installations are better understood and addressed.

Innovative solutions may have to undergo validation before being adopted as mainstream. The University of Sheffield developed a housing stock modelling workflow to estimate a household's heat loss and appropriately size a heat pump. The model uses a dynamic simulation program, allowing for variable external factors such as solar gain, external temperature, and ground temperature to be considered. This was viewed as more accurate than the steady-state methodologies currently used across the industry. However, it requires further technical endorsement (e.g. from the Chartered Institution of Building Services Engineers, CIBSE) before it can be recognised in industry standards and widely deployed. To do so, the project team aims to develop a technical memorandum on dynamic heat loss simulations for households. With validation outstanding, the project also implemented industry-compliant steady-state modelling into the tool.

Project objective 2: Ensure customer satisfaction and optimal heat pump performance by providing post-installation support using remote monitoring and control of installed heat pumps

Why is this important?

Post-installation monitoring is key to ensuring customer satisfaction through optimal heat system performance. It indicates when maintenance is required and aids with fault management and troubleshooting of the heating system. It can also indicate where a customer's current heating profile (i.e. their preferred settings and patterns for controlling their heating system, including temperature preferences, timing and usage habits) is sub-optimal for heat pump operation. The optimal operational profile of a heat pump differs from how many people currently choose to heat their homes using a gas boiler; transferring a traditional gas boiler heating schedule to a heat pump can lead to higher bills and/or decreased user comfort. Monitoring can identify customers who need support in understanding this difference, and subsequent prompts can be issued to encourage behaviour change.

What activities were funded?

- An aftercare interface, customer satisfaction survey and repair booking were implemented in the app.
- An analysis of operational heat pump data from Energy Systems Catapult's 'Electrification of Heat' UK demonstration project to gain insight into the typical load profile of heat pumps, their potential to be dispatched more flexibly to reduce running costs in response to smart tariffs, and the interaction of flexible operation with thermal comfort.

What were the project findings and did the project achieve this objective?

The Catalyst app can draw upon heat pump monitoring data, but the project didn't get a chance to test it on a live heat pump.

Heat pump manufacturers must be ready to offer installers and aftercare providers the ability to connect to their devices remotely. Heat pump data connectivity is key for all heat pump manufacturers, but some are more advanced than others in delivering this capability. While lots of work on heat pump monitoring has been completed by Daikin Europe, its UK subsidiary – Daikin UK – operates independently and has made less progress on heat pump data connectivity. Consequently, Daikin UK[2] needed support from Daikin Europe to understand what the Catalyst project was trying to achieve and to find a process to share heat pump data with third-party organisations for post-installation monitoring. The project believes that establishing a standardised approach to heat pump data connectivity would greatly benefit customers, installers, energy suppliers, Home Energy Management Systems providers and DNOs, especially for potential flexibility events. However, the project estimates that the industry is approximately 18 months away from making heat pump data connectivity standard, although technological advancements are being made rapidly.

[2] Daikin UK was a project partner for the Catalyst project; all testing was planned on Daikin hardware products.

The project also encountered issues with testing the Daikin API. While the project was able to design the API interface using the pre-production environment, it became clear that to be able to test the API, they would also need access to an internet-connected Daikin heat pump as an additional requirement. Daikin found several heat pumps within UK training centres, but they were either not capable of remote access due to outdated LAN adapters or firmware or, if they were capable, the heat pump units themselves were training units used every day and regularly turned on and off, preventing any suitable testing. Another access point needed to be defined to test the API and allow integration in the app, delaying the full build of the remote monitoring features. Daikin has since developed a new API access process, which removes most of the limitations of the pre-production environment. Overall, although Daikin agreed that the project's objectives were feasible, they were far more challenging to achieve within the project's timescales than was initially suggested. EDF regards the aftercare package as vital, making it a key objective to be completed after project closure. Whilst all of the project's APIs have been created, integration with Daikin has not yet been completed.

Digital connectivity and inclusion are required to recognise the full benefits of heat pumps. An internet connection is required to realise the smart capabilities of modern-day heat pumps, including remote scheduling, monitoring, remote diagnostics, and heating profile optimisation. The added functionality can improve the heat pump's performance by reducing operating costs and enhancing user comfort. However, Daikin has found that only 5-6% of its current installs in the UK are able to use smart functionalities as most heat pumps are not connected to the internet during installation. During the Catalyst project, the number of completed monitoring installations was much lower than planned. Just 15-20% of sensors installed in social housing properties were connected and produced data. Several challenges contributed to this outcome, including difficulties in gaining access to properties, the absence of home Wi-Fi or broadband connections, residents not owning a smartphone (which prevented the installation and use of necessary apps), residents' suspicion of the purpose of the monitoring equipment, and installers' reluctance to spend additional time connecting the monitoring equipment in addition to the heat pump installation. This has important implications for the sector:

- **Where possible, installers should connect heat pumps to the internet as standard.** They should ensure that heat pumps are connected to WiFi or an internet-of-things (IoT) service as standard during installation. Currently, only some installers communicate the benefits of heat pump connectivity to customers, whilst some are unaware that this requires an additional step during installation. The Catalyst project has recommended making heat pump connectivity a mandatory part of certification whenever a data connection is viable, and that installers should undertake training to understand how to connect a heat pump to the internet and why it is important.
- **The benefits of internet-connected heat pumps should be clearly communicated and understood.** The UK's digital development strategy highlights many existing social and economic divides that risk being amplified by uneven access to, and ability to make effective use of, digital tools and technology[3]. This applies to heat pumps, where the benefits of internet-connected heat pumps (including lower bills and enhanced comfort) are likely to provide the most benefit to groups that historically have had lower rates of digital access and inclusion, including the elderly and low-income urban communities.

[3] Digital development strategy 2024 to 2030 - GOV.UK

- To prevent disparity in access, the benefits of internet-connected heat pumps should be clearly communicated to customers so they can make an informed decision. Additional time should be taken for groups with historically lower levels of digital inclusion. The project team is also involved in the Greater Manchester 5G SMART Decarbonisation Network project, which will connect hundreds of existing air source heat pumps across Greater Manchester's social housing settings using 5G technology, removing the requirement for residents to have a WiFi connection to be able to benefit from heat pump data connectivity.

Flexible operation of heat pumps can achieve cost reductions without sacrificing user comfort. For a selected case study from the Energy Systems Catapult's (ESC) 'Electrification of Heat' demonstration project, modelling demand flexibility to achieve cost minimisation was shown to reduce the total cost of electricity by up to 4.7%. This is similar to the savings achieved by thermostat turn-down but without sacrificing thermal comfort. The project found that high levels of pre-heating were not a prerequisite, with modelled scenarios demonstrating that preheating to 22°C or 24°C achieves relatively little over and above 20°C in terms of cost reduction. When aggregated across multiple heat pump systems, even a modest reduction in house temperature of 0.5°C can substantially impact electricity demand for a short time. Further research and empirical data are required to validate the modelling and understand the potential impact of a 'rebound' peak immediately following a flexibility event.

Summary:

The Catalyst app provides a **more streamlined and integrated customer journey for heat pump adoption** by developing a user-friendly app that supports customers from initial interest to installation and beyond. The project expects that use of the Catalyst app will reduce the average lead time of EDF's heat pump installer subsidiary, EDF Heat Pumps, from 12 weeks to an estimated 10 weeks. The project also found that, despite the level of support provided to customers via the Catalyst app, it is challenging to produce a solution that meets the needs of all customers, as some fundamentally do not want to undertake the survey process independently of an installer.

Catalyst aimed to **ensure customer satisfaction and optimal heat pump performance** by providing post-installation support using remote monitoring and control of installed heat pumps**.** However, the project experienced challenges in enabling the required heat pump connectivity. It believes the industry is 18 months away from standardising heat pump data connectivity and that policy is required to ensure that all installed heat pumps are 'smart' to ensure future-proofing. The project suggests that a common standardised approach to heat pump data connectivity could be created so that all heat pump manufacturers are ready to offer installers and aftercare providers the ability to connect to their devices remotely. The project also recommends that connecting heat pumps to the internet (where a data connection is viable) becomes a mandatory step in certification for heat pump installers. The benefits of internet-connected heat pumps should be clearly communicated to customers so that they can make an informed decision – particularly for those groups that historically have had lower rates of digital access and inclusion, such as the elderly and low-income urban communities.

What impact could this have on accelerating the heat pump rollout?:

The long and complex nature of the existing heat pump installation process results in a high customer drop-out rate; EDF and Daikin estimate an indicative drop-out rate of 72% between lead generation and home visits executed. When fully launched, Catalyst could increase the number of customers

completing their heat pump adoption customer journey and reduce the time taken from initial interest to installation. It could also improve the quality of customer leads for installers, reducing the amount of time spent on visits and calls with customers, including those who do not proceed with a heat pump installation, ensuring that their time is used more efficiently and productively. Post-installation monitoring should also ensure that every customer's heat pump is performing optimally, improving customer satisfaction and, therefore, the reputation of the efficacy of heat pumps.

What next?

The next steps are to:

- Commercialise Catalyst and soft launch the tool with a small number of test customers to identify areas for improvement and which demographics are most willing and able to use Catalyst.
- Enable EDF Heat Pumps (EDF's heat pump installer subsidiary, formerly CB Heating) to integrate the Catalyst tool into their operations.
- Integrate an assessment of running costs with new smart tariffs to help lower running costs and include new functionality, including remote diagnostics.

Where to find out more

Visit www.edfenergy.com/heating/electric/air-source-heat-pump

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