



Department for
Business, Energy
& Industrial Strategy

Non-Domestic Smart Energy Management Innovation Competition

Evaluation case study: GlowPro

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Executive summary

This report describes findings and lessons from the evaluation of the GlowPro energy management system, an energy management tool piloted by Hildebrand as part of the UK Government's Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC). The GlowPro system is a range of applications¹ which use live and non-live² energy data to help businesses identify operational and energy efficiency opportunities and, hence improve their operations, reduce costs and engage their staff. It was piloted across 75 businesses.

There is clear evidence from the evaluation that the GlowPro system has helped businesses track their energy use and wastage effectively and, in some cases, save on their energy bills. Evidence from across the pilot indicates that it has led to improved energy management practices, and the evaluation has a high level of confidence that GlowPro has contributed to energy savings in at least some sites.³

In total, out of 12 businesses consulted (through surveys and/or qualitative interviews), eight said they had implemented or planned to implement at least one energy efficiency measure as a result of GlowPro. Furthermore, two of these eight businesses reported that they had observed energy savings after making changes triggered by GlowPro.

The ability to visualise levels of energy consumption outside business hours was a key driver of change across the board. This was particularly the case for hospitality sites with energy-intensive equipment operating for long hours. For all hospitality sites, indoor temperature tracking against energy use also enabled managers to tackle energy waste and ensure customer comfort. The insights from the GlowPro system were particularly valuable to off-site managers as they allowed them to monitor on-site activity and to identify and tackle wastage.

The findings from this report suggest Hildebrand could take forward the following points as it progresses its commercial offer, which may also be relevant for other innovators:

- Consider ways to integrate equipment-level energy tracking and automated controls into the tool's offering. Particularly in the case of larger chain businesses: (i) tracking equipment-level energy consumption helps in mapping energy waste where there are multiple energy-intensive pieces of equipment, while; (ii) the ability to automate this equipment means managers do not need to rely on staff remembering / being trained to switch off equipment. Such automation may help managers who are wary of distracting staff with energy management obligations to ensure that energy consumption is reduced automatically.
- Continue to seek routes to provide users with access to live data and improve the offer by incorporating live alerts. Although the users interviewed felt they could usefully track energy use with non-live data via GlowPro, live data and alerts could facilitate different operational benefits for businesses making the offer more attractive overall.

¹ GlowPro is a single back-end solution with different front-end applications appropriate to the end user's needs.

² Live data in the context of this Competition describes energy consumption data at half hourly (or more detailed) granularity fed to the tool or platform on an on-going basis. Non-live data may provide the same level of granularity but is not updated on an ongoing basis, for example being uploaded to the tool or platform once a day (and in arrears).

³ This is the conclusion reached from applying the evaluation's strength of evidence framework (see Chapter three). This framework triangulated various quantitative and qualitative data sources to give a level of confidence that savings had been achieved in some pilot sites.

- Prioritise offering web-based access to the tool as part of the offer. The web-based platform was welcomed by managers and business owners, who are frequently in front of a computer, and some liked the possibility of exporting a spreadsheet with their data.

1 Introduction

This report describes the findings and lessons from the evaluation of 'GlowPro', an energy management system developed by Hildebrand as part of the UK Government's Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC). NDSEMIC (from here on referred to as 'the Competition') is an £8.8 million programme, funded by the Department for Business, Energy and Industrial Strategy (BEIS). It aims to maximise the potential for energy saving in three priority sectors (hospitality, retail and schools). To do this, it has developed energy management products and services that use smart meter data to help smaller organisations to manage their energy consumption better.

Nine projects were selected as part of the Competition to receive initial development funding. Seven of these passed through to the next 'feasibility and initial testing' stage. All seven project developers, including Hildebrand, also went through to the final stage of the Competition (from February 2019 to January 2020) during which the innovations were piloted with small businesses and schools in a real-world setting.

This report is part of a package of reports published as products of the Competition, which also includes six other pilot evaluations, an overall final evaluation report, insights for innovators, user impact case studies and an evaluation technical report. These are available on www.gov.uk.

Overview of GlowPro

The GlowPro system is a range of applications which use live and non-live energy data to help businesses identify operational and energy efficiency opportunities and hence improve their operations, reduce costs and engage their staff. The GlowPro system comprises a single backend solution with five different front-end applications suitable for small businesses (app and web browser based), each tailored to specific roles within a business.

From the energy efficiency point of view, GlowPro aims to help businesses reduce energy costs by providing them with live and historical energy data, hence enhancing their understanding of how their energy is used and where energy could be saved. Measures to save energy may either come in the form of improved processes and behaviours (e.g. turning equipment off when not in use) or investment-level measures (adoption of more efficient technologies).

From the operational efficiency point of view, GlowPro aims to help businesses manage their facilities and staff by providing live energy information that gives insights into wider business operations beyond energy use directly, such as a live notification of when a power cut occurs. It also aims to support operations by enhancing the working environment, for example monitoring of heating and room temperature.

Of the five GlowPro applications developed by Hildebrand, three – Reflect, Connect and Bright – were piloted as part of the Competition, and are the focus of this report. The other two applications – Assure and React – were tailored respectively to property managers (e.g. in commercial centres) and to shop-floor staff. However, they were de-prioritised due to the market not being as mature as that for the other applications. Reflect and Connect were piloted

by end users directly and also used by an energy advice company which partnered with Hildebrand. Screenshots of Reflect, Connect and Bright can be found in Annex 3.

Key features of the apps piloted

An outline of the three piloted applications and of how the energy advisor used Reflect and Connect to support their own customers is provided in Table 1 below. Although Hildebrand had also expected to integrate live alerts into the applications to help managers respond to operational issues in the business, this feature was not part of the applications piloted by participating sites because most did not have the relevant metering (SMETS) installed and Hildebrand deemed that alternatives would not be workable. Finally, during the pilot, energy data tracked through GlowPro referred to electricity data only (i.e. it did not include gas data).

Table 1: GlowPro applications description and expected benefits

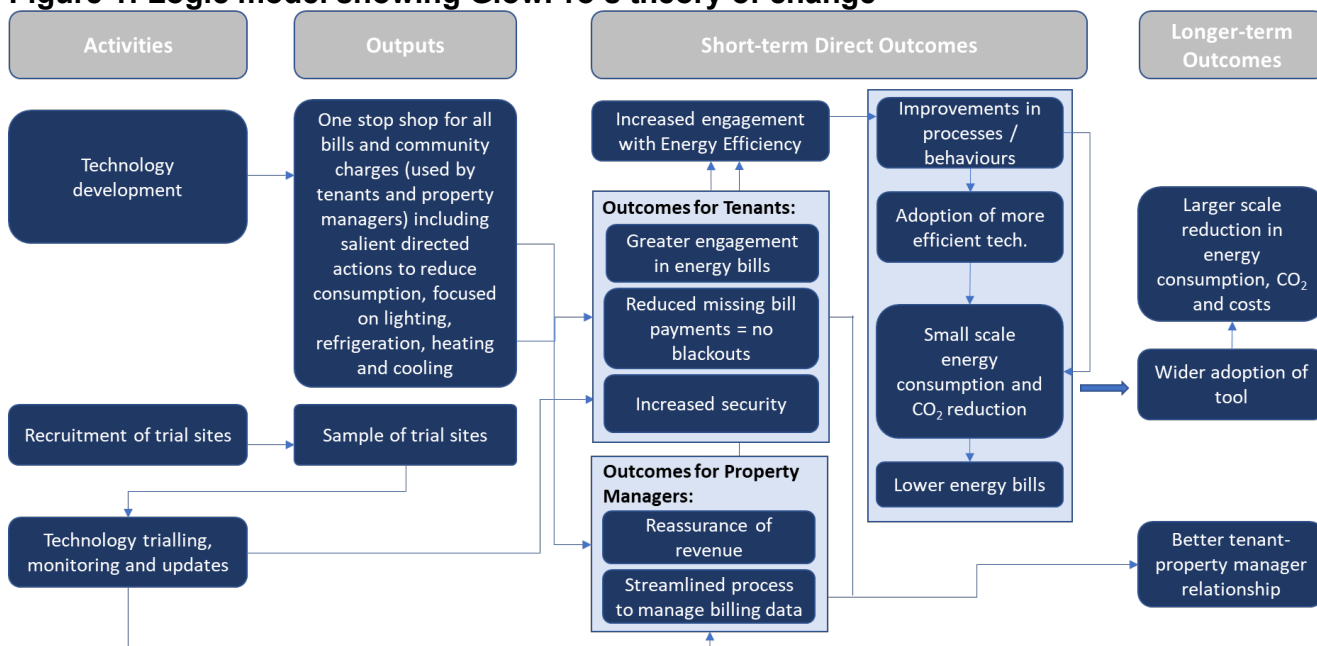
Application/ offer	Description of the application / offer piloted ⁴
Reflect	Web dashboard and application for business managers (owners, energy managers or area managers), focusing on planning and management activities to allow managers to oversee operations and energy consumption within one site or across many. It provides live and historical data on energy use on up to one-minute intervals, as well as energy costs and temperature.
Connect (mobile app)	Mobile application for business managers, used in conjunction with Reflect by some pilot sites, to support access to energy data at individual sites and across all sites within a portfolio. Provides the user with live and historical energy use on up to one-minute intervals, as well as energy cost data.
Bright (mobile app)	Application originally designed for domestic users, piloted by small businesses. It provides the user with live and historical energy use as well as energy cost data. Only the mobile version (not the web version) was available to users at the request of the energy supplier servicing them.
Energy advisor support	An energy advice company which partnered with Hildebrand for this pilot. The energy advisor used Reflect and Connect to access raw live energy consumption data which they used to deliver energy saving services. The end-user then received a regular PDF report with detailed energy consumption data and tips, as well as face-to-face energy saving advice.

⁴ These are descriptions of the applications piloted as part of the Competition. Additional features have been added to the latest versions of these apps.

The anticipated effect of GlowPro (its theory of change)

Figure 1 below presents the theory of change underpinning GlowPro's approach, and which guides this evaluation.⁵ It was developed by the evaluation team based on the GlowPro design and it describes: the activities that Hildebrand conducted to develop the tool, the direct outputs of these activities, and anticipated short-term and long-term results ('outcomes'). By the end of the project's close in January 2020, the project was expected to have met, or be contributing to, all of its proposed short-term outcomes, as well as showing evidence of the longer-term outcomes.

Figure 1: Logic model showing GlowPro's theory of change



How GlowPro was piloted

GlowPro was piloted from early 2019 to January 2020. Hildebrand recruited users to pilot GlowPro via one of three routes described below and recruited sites were assigned different applications according to what Hildebrand and partners deemed most useful to each customer pool:

- **Direct recruitment (*Reflect and Connect apps*).** Hildebrand contacted their existing network of suitable businesses in Spring 2019 to invite them to pilot *Reflect and Connect*;⁶ other sites were recruited through city council sustainability teams and universities. In total, 13 retail and hospitality businesses with 30 sites⁷ were engaged through this route. Most of them started piloting *Reflect* (and later, *Connect*) before Autumn 2019; with some joining afterwards, including one of the chain businesses

⁵ A theory of change describes how change is assumed to come about through an intervention. It describes the connections between interventions and outcomes – often called ‘causal pathways’ or results chains.

⁶ Hildebrand offered *Reflect* and *Connect* initially because they would typically first liaise with business/facility managers or business owners, who are the target users of these apps. Although Hildebrand aimed to also pilot *React* with shop-floor staff on those businesses, none of the managers or owners were keen on providing shop - floor staff with access to the tool, due to concerns over staff productivity. See Chapter two for more detail.

⁷ Among these 13 businesses, there are two chains, with 13 and 7 different sites each.

consulted in-depth as part of this study.⁸ As a result, some of the sites had a longer period of interaction with Reflect and Connect, while the late participants had only a few months' interaction before evaluation activities took place.

- **Energy advisor-recruited sites** (*energy report and advice*). To recruit more businesses to the pilot, Hildebrand leveraged their relationship with an energy advisor to include members of their network in the pilot. Mostly these were bars, pubs and restaurants. Using GlowPro, the energy advisor offered its members regular reports with insights on total energy consumption and detail around equipment or parts of the operation that consume the most energy. The energy advisor chose to partner with Hildebrand to access raw live energy consumption data from sites, which, in conjunction with insights from smart plug equipment,⁹ would feed into the regular energy reports provided to clients and ad-hoc face-to-face advice. In total, 42 businesses covering 70 sites were engaged through the energy advisor.¹⁰ Most of these sites had been piloting the GlowPro-supported energy advisor's services for at least five months before this evaluation was conducted.¹¹
- **Supplier sites** (*Bright app*). Hildebrand also sought partnerships with two different energy suppliers, offering the application free of charge to ~20 SMEs in the hospitality and retail sectors. Hildebrand chose to offer Bright to these users because this was the application that the suppliers preferred. These supplier sites joined the pilot after Autumn 2019 and had only a few months interaction with Bright before this evaluation was conducted.

This evaluation

The research for this evaluation was conducted by Ipsos MORI in conjunction with their consortium partner the Carbon Trust. Ipsos MORI designed the evaluation approach and designed and delivered all aspects of the methodology, except for the energy consumption analysis which was designed and conducted by the Carbon Trust, and quality assured by Technopolis.

The evaluation takes a theory and case-based approach which is described in Annex 1. The findings draw on insights from 12 businesses that piloted GlowPro, gathered throughout the Competition¹² through an online survey (12 respondents from 10 businesses), on-site visits to five sites and in-depth telephone interviews with four businesses not visited. This evaluation also utilises insights and data provided by Hildebrand throughout the Competition. It was not possible to run a trend analysis of energy consumption across all pilot sites due to data limitations and while in-depth analyses of energy use at seven sites across three businesses was carried out, similar issues meant this analysis could not make confident conclusions about impacts.

⁸ See Chapter two for more detail.

⁹ A smart plug is a small adapter that can be plugged into a standard wall socket and connected to a Wi-Fi network. Once connected, any appliance plugged into the adapter can be switched on and off via an internet-based app (e.g. via a mobile phone). The energy advisor installed smart plugs to automatically turn the equipment on and off at particular times of the day.

¹⁰ This included seven chain businesses which had 28 sites among them.

¹¹ 23 sites joined after Autumn 2019 and had experienced the tool for only a few months before this evaluation was conducted. These sites were not amongst the sites visited and interviewed for the evaluation.

¹² Baseline fieldwork was completed April-October 2019, and post-pilot research January-February 2020.

Sites for visits were selected based on purposive sampling by the evaluation team, who targeted a diverse coverage of sectors. Only pilot participants who had used the tool were selected for visits (as the visit necessarily involved tool use observation). Telephone interviews were conducted with other users who had logged into the tool a small number of times. Whilst attempts were made to reduce any bias in the sample, given that interview selection was dependent on users agreeing to participate in the research, the possibility that it may have been biased towards those having a positive experience of the tool cannot be completely excluded. Overall, the evidence considered covers 12¹³ of the 75 businesses registered to use GlowPro.

This report

The following chapters summarise the findings of the GlowPro evaluation in terms of: the extent to which businesses in the pilot engaged with GlowPro (Chapter two – How businesses used GlowPro), and the extent to which those engaged businesses experienced the intended effects of GlowPro (Chapter three – The results of the pilot of GlowPro). The final chapter summarises the findings of the evaluation (Chapter four – Conclusions and recommendations).

¹³ In total, 12 sites, corresponding to **10** businesses, participated in the survey. An additional **2** businesses (who had not responded to the survey) participated in interviews (N = **10** + **2** = **12 businesses participating in the evaluation**).

2 How businesses used GlowPro

This chapter discusses how GlowPro users engaged with the tool during the pilot in terms of the types of staff members using it, their frequency of access, and the features accessed. GlowPro was used mainly by business managers or owners. They engaged regularly with the app to check for atypical energy use or wastage.

Overall, users at the majority of the 12 businesses consulted as part of the evaluation (all except some of those recruited via the energy advisor) engaged regularly with the app: 10 users accessed it at least monthly, with some (6) accessing it more often. Two had access to live data, and another two also had access to temperature monitoring. None of the sites had access to live alerts of unusual energy usage.

The main drivers for users piloting GlowPro were to save money for their business and to become more sustainable (both referenced by eight out of 12 survey respondents). Businesses interviewed indicated that they were mainly interested in improving their tracking of energy usage, with **one business arguing that GlowPro offered added value to their energy supplier's offer of a smart meter.**

"We decided to take part in the [pilot] because that's one of the things I wanted to be able to do when we first got the smart meter was to do some sort of monitoring of the energy." – Retail business, Manager

GlowPro was used mainly by business owners or managers with decision-making powers. They were responsible for at least some aspects of the business energy management, including negotiating energy supply contracts, managing the operation of facilities and equipment (e.g. providing guidelines as to when and how staff should use key pieces of equipment) and managing energy costs.

There was little interest in sharing the tool or its tips with shop floor staff who managers considered should focus exclusively on service delivery.

"[The staff] wouldn't use it. [...] They're making money, they won't stand and look at that [the app, Reflect]. If they had time to look at that, I'd probably be making them redundant." – Hospitality business, Manager

Users accessed the apps regularly (at least monthly, but sometimes weekly or daily),¹⁴ for different purposes, including:

- **To increase their understanding of how energy is used within their business;**
- **To help them identify and tackle unusual energy consumption** (particularly useful for chain managers), and;

¹⁴ This is true among those who participated in the evaluation research. No data is available to determine how many of the other sites engaged with GlowPro and how often. In the case of the energy advisor sites, users would receive regular PDF reports, but it is not clear how far these were read and considered by the energy advisor customers. Insights from interviews with two energy advisor-recruited users indicate that engagement with the energy advisor advice mostly happened as part of ad-hoc visits by the energy advisor representative to the sites. According to a hospitality business manager: 'No one within the company used the app directly, rather it was held by an outside energy advisor who came in and informed them on what was going on based on the app'.

- **To help them identify opportunities to change their processes to save energy, and to identify inaccurate energy bills.**

Users mostly accessed the historical daily and weekly consumption dashboards. Hospitality businesses particularly found it helpful to compare consumption during weekends, when they are busier, to weekdays; or to compare holiday periods to other times of the year.

“The shop is closed on the Monday, and it’s closed on the Sunday, so I always check that the boiler has not been on at [unusual] times.” – Retail business, Manager (not usually on site)

Two of the businesses consulted for this evaluation also used GlowPro (Reflect app) to cross analyse temperature data with energy consumption. This **enabled users to identify periods when ambient heating or cooling equipment was using more or less energy than required**. These users were among the few which had a temperature monitor in place.

“To me, a really interesting thing to look at is the temperature in the different parts of the building. I want to make sure that [the customers] have not been having it too hot or too cold. We’ve got also a staffroom. If the staff start complaining in there, that’s often because the staffroom’s cold. [Reflect] tells me that it’s kind of normal throughout the entire day, and I’m happy with that.” – Hospitality business, Manager

The live energy use feature was available to only a few users,¹⁵ but none of them used it very often. The reasons why are not clear. By contrast, **some users without this feature (who could only see use from the previous day) said they would like to be able to view live energy use data. According to them, this data would have allowed them to promptly respond to issues affecting their facilities and to infer the energy demand of specific equipment:**

“[I would like the app to flag to me] spike usage [...]. So, [...] if we have a surge, or a blackout, we get to know about it in real-time.” – Hospitality business, Bar chain, Manager (not usually on site)

“It would allow us to say, ‘what’s that [particular piece of equipment] done to the energy usage compared with half an hour ago when [it was off]?’” – Retail business, Independent store, Manager (usually on site)

¹⁵ This feature is only available if the business has a certain type of meter (SMETS2) and was available up to minute-by-minute where the user had a Consumer Access Device (CAD) connected to Wi-Fi. For other users, the most recent data available was that of the previous day, and usually half hourly.

3 The results of the pilot of GlowPro

This chapter discusses the extent to which the expected results (outcomes) of GlowPro were achieved (as anticipated in its theory of change (see Chapter one)).

GlowPro was designed to help users track their operations, identify energy efficiency opportunities and take actions to reduce operational and energy costs. It was expected that the live and historical energy consumption insights would grant users a better understanding of how their operations use energy and allow them to pin-point where most savings could be achieved. In the long-term, success cases would be disseminated through word of mouth, helping GlowPro to achieve a wider customer base and facilitate larger-scale energy savings.

As detailed below, **GlowPro has helped some users become more aware of energy efficiency in the way they run their businesses, and in some cases, led managers to implement quick-win and no-/low-cost measures to save energy** (e.g. one business stopped leaving a water heater on overnight). Some of those users implementing measures in response to energy use data reported that this led to energy savings and cost savings.¹⁶

It is not clear if GlowPro has led users to invest in more efficient technologies to save energy. Small businesses tend to replace equipment or infrastructure only when needed (e.g. due to a fault in existing equipment) and it is possible that driving investment-level decisions would require additional types of support or more time than that available through the pilot.

Even though GlowPro's original design aimed to also help businesses manage operational inefficiencies, such as power cuts and suboptimal equipment use,¹⁷ this outcome was not observed at the sites participating in this evaluation. This result was somewhat expected, given that the features that would drive this were not included in the application version that users piloted. As a result, live data was only available to a few users and the function to alert users about unusual energy consumption was not integrated into the versions of GlowPro piloted by the sites interviewed as part of the evaluation (see Chapter one).

Immediate outcomes

How GlowPro drove increased awareness of energy efficiency

GlowPro supported an **improved understanding of energy use and engagement with energy efficiency across business managers and owners as compared to their previous means of monitoring usage** (typically through their monthly energy bills). As explained in Chapter two, understanding their out-of-hours energy usage and variations throughout the week was the most useful benefit of GlowPro,¹⁸ and it helped businesses monitor occasional wastage (e.g. equipment being left on overnight or staff turning heating up). In some cases,

¹⁶ As detailed in Annex 2, these savings could not be quantitatively verified, given the data gaps in the information obtained from these sites, mainly with regards to historical data against which pilot-period consumption could be compared.

¹⁷ E.g. turning ovens on at a specific time to ensure efficient customer service or turning heating/cooling equipment on at a specified time or setting to ensure customer comfort.

¹⁸ In total, eight in 12 survey respondents reported feeling more confident in knowing about their out-of-hours energy usage and the days of the week the business used the most energy.

GlowPro also helped users identify their most energy-intensive pieces of equipment and devise measures to reduce consumption.

“Before we used this, we had no idea when, how much [energy was used], apart from receiving the bills at the end of the month.” – Hospitality, Chain Organisation, Manager

“One of the things we did have a look at was the whole time when we were shut, what the electricity usage was. [...] we realised how high it had been when there was nobody here at all.” – Retail, Independent store, Manager

The insights from the GlowPro system were particularly valuable to managers who were not usually on-site, allowing them to monitor the activities on the shop floor and tackle wastage where it occurred.

Where users found GlowPro less useful, this was because they had problems accessing it or, in the case of a Bright user, were not happy with the (mobile phone) interface.¹⁹ This hints at the importance of giving the user the option to access the tool online: although no other Bright user consulted flagged the mobile interface as an issue, two users with access to both Reflect (web platform) and Connect (mobile platform) preferred being able to track usage on the web via Reflect.

Triggering changes in the way businesses use energy

Increased awareness and understanding of energy usage has, in some cases, led businesses to implement low/no-cost measures to reduce energy usage. The adoption of more efficient technologies, which typically require some level of investment (high upfront costs) has been less evident across the pilot sites, as explored in the next section.

GlowPro helped trigger more energy efficient processes or equipment operations in over half of the businesses consulted: **Eight of the 12 participating businesses consulted said that they implemented or planned to implement at least one energy efficiency measure as a result of GlowPro improving their understanding of their energy use.** Two further businesses had not implemented structured energy efficiency measures but argued that the information in GlowPro had made them more aware of (and able to tackle) energy waste on site. These were small business with no energy-intensive equipment other than heaters, and they felt that their options for making any further savings through process changes were limited. Of the two remaining businesses, one had been using a different energy management app, and another one did not report any changes through the survey.

The boxes overleaf provide an in-depth view into the profile of three of the eight interviewed businesses which reported substantial changes in their businesses. Another four businesses interviewed also reported positive experiences with GlowPro but had not yet implemented any changes (see above). The key learnings from these three businesses include:

- In independent businesses with a single piece of particularly high-consuming equipment, having sight of out-of-hours energy consumption can be sufficient to trigger operational changes towards more energy efficient practices, as illustrated by Business #1.
- In larger businesses, such as chain businesses, there are challenges in ensuring that shop floor staff follow energy saving procedures – such as turning heaters down on

¹⁹ As highlighted in Chapter one, only the mobile version of the app was available to users, at the request of the energy supplier servicing them.

warmer days and turning them off overnight. In those cases, catalysts for action seem to be: the ability to *automate* the operations of critical equipment and being aware of the total energy savings that can be achieved by targeted actions. This is illustrated in the Business #2 and Business #3 examples.

Business #1 – Dog Grooming Parlour | Changes implemented

Sector: Dog grooming | **Size:** 4-5 employees, 2 in-store; takes in 5-7 dogs every day for grooming | **Energy supply:** Electricity only | **App:** Bright

The owner of this small independent business was already committed to energy efficiency prior to engaging with Bright, having previously replaced the lighting in the shop with LED* light bulbs. Before engaging with Bright, the owner was already aware that the main source of energy consumption was the water heater – great volumes of hot water are needed to wash the dogs as part of the grooming services offered. However, engaging almost daily with Bright helped them gain a better understanding of the actual amount of energy the water heater was using and the associated costs. The out-of-hours and weekday versus weekend energy consumption features helped determine this, as the heater was the only equipment that would be left on when the business was not operating.

The owner started turning off the water heater whenever it was not in use and reported seeing savings in energy bills as a result, without negative impacts to the business' activities.

"I tend now to turn it on every other day [...] [before Bright] I would've probably had that water heater on, you know, all day, not thought about switching it off." – Owner

*Light-emitting diode

Business #2 – Chain of bars | Changes implemented

Sector: Cocktail bars | **Size:** 10 bars | **Energy supply:** Electricity | **App:** Energy advisor report

This chain business chose to participate in the pilot as part of a broader strategy to build an environmentally sustainable business model, with a vision of becoming a leader in their sector. Before engaging with GlowPro they already relied on an external sustainability consultant who supported them with sustainability more broadly, including sourcing ingredients and waste reduction. Piloting GlowPro through the energy advisor was therefore seen as an appropriate next step in their sustainability engagement.

The energy advisor used insights from the app, coupled with first-hand understanding of the business' operations, to identify the icemaker as the highest energy-consuming piece of equipment. The energy advisor then installed smart plugs that tracked equipment-level energy consumption to track specific usage and suggested programming the plugs to automatically turn the equipment on and off at particular times of the day. The measure was piloted in one site and has reportedly led to large savings in energy bills, with no detrimental effects to their outputs:

"It actually hasn't had any negative effect as such on our ability to sell drinks or anything like that [...] it has kept our drinks cold but also saved us energy at the same time." – Owner

The business owner now intends to roll out this measure across the other bars in their chain.²⁰

Business #3 – Chain of bars and pubs | Changes implemented

Sector: Bars, pubs and restaurants | **Size:** 7 pubs/bars | **Energy supply:** Not known | **App:** Reflect

The manager of this chain has been using Reflect to track out-of-hours energy consumption against temperature set-up across the chain's seven sites. Reflect helped to identify three sites that were keeping heating equipment on overnight. The sites were asked to turn the heating off in future, but the manager stressed that ensuring that staff implement the instruction is a key challenge. Therefore, they plan to implement an automated system to turn equipment on and off at specific times of the day.

"What we're looking at is trying to find a solution where that is automated and hopefully even connected back to the office so it can't be touched, the temperature will be set, there'll be a timer set. And I think that in itself, in two or three sites, will make a huge difference. And that's a direct result of using GlowPro." – Owner

More broadly, they are also considering adopting Reflect in a separate hospitality business managed by the same group, with twelve different sites.

The effects of GlowPro on the adoption of efficient practices and technologies

None of the businesses interviewed had invested in more efficient technologies as a result of using GlowPro. Budget restrictions seem to be the main barrier to the implementation of those technologies. Additionally, small businesses with no particularly energy-intensive equipment felt they had fewer options to save energy. For those sites, the high costs of potential measures and buildings' inefficient structure, coupled with the fact that often these businesses do not own their buildings, were the main barriers to implementing any measures.

"The building [is] not particularly well insulated, and it's not light either, so we can't benefit from the natural daylight during the summer months, because it doesn't have a way of getting in." – Retail, Independent store, Owner

Lack of information about what changes could be made to the building and equipment seemed also to have been a barrier, with four out of nine users feeling equally or less confident in knowing which changes they could make to their building and to their equipment in order to save energy, since engaging with GlowPro. Tailored energy savings tips within the tool could potentially help to direct users to consider specific forms of action that could help to improve the operational efficiency of equipment; this type of cue has been successful in

²⁰ A similar case was seen with the energy advisor of a pub chain piloting GlowPro, who advised them to amend their refrigeration processes, including turning off one refrigerator overnight. As with Business #2, the key trigger for action was seeing the equipment-specific consumption, tracked through a smart-plug. As such, it seems that GlowPro was a helpful tool for the energy advisor to map which customers had the best potential for savings, and hence offer enhanced equipment-level tracking and advice on operational changes needed to make savings. However, in these two cases, the additional support from the energy advisor (equipment-level monitoring and targeted advice) and the ability to automate the operations of the critical equipment seemed to have been a catalyst for action.

prompting behaviour change among users of other tools piloted as part of the Competition (where budget, building structure and ownership barriers weren't significant).

Potential of GlowPro to inform operational efficiency

As outlined previously, GlowPro aimed to help businesses improve their operations, with improved energy management being a consequential benefit. However, the live alert feature that would have supported this outcome was not part of the application version piloted by participating businesses, for reasons set out throughout this report. As a result, reduced bill shocks and support managing supply contracts and bills were the main operational improvements experienced by participating businesses. For instance, Business #1 manager (dog grooming parlour) does usually review tariffs every year and has said that Bright will probably be helpful in the next round of negotiation with energy suppliers because "[suppliers' rates per kWh] means a bit more to me than it did previously".

When prompted about the ways GlowPro had helped their business operations, businesses highlighted the energy management benefits over any operational benefits:

"Can cross reference billed usage to actual usage" – Hospitality, chain business, manager

"I can check on usage and budget for the bills" – Hospitality, independent business, manager

Chapter two indicated that businesses responding to the survey had been drawn to the tool mostly by energy saving (and consequential cost saving) opportunities, suggesting that at least for this group, operational efficiency was not a key driver of initial engagement. Furthermore, previous sections suggest that users broadly benefited from the energy efficiency insights from GlowPro. As such, **although the additional feature of live alerts may contribute to the user experience from the operational point of view, it might not be critical to trigger initial engagement and further awareness and behaviour change from sustained engagement.**

Medium-term outcomes: the effects of GlowPro on energy consumption and energy bills

Amongst those who actively used the tool, GlowPro allowed users to identify aspects of their business which were using the most electricity, helping them to make decisions around energy use. Based on an assessment of the available evidence, there is a **high level of confidence that GlowPro contributed to energy savings in at least some sites** (see Table 2 for the rating framework). This is based upon the following sources of evidence:

- **Self-reported behaviour change:** around two thirds of users consulted through the survey or through site visits / interviews reported changes in energy use behaviour and/or energy efficient measures that would be expected to lead to a reduction in energy use *and* they assigned these changes to use of the tool.
- **The perspectives of multiple users at a single site:** at one site, more than one user was consulted, and they converged in their opinion that the tool had led to behaviour change that would be expected to lead to a reduction in energy use.

- **Self-reported energy savings:** at two sites, the users consulted reported seeing savings in their energy bills.
- At a couple of sites, it was also possible to **test the assumptions underpinning the overall GlowPro theory of change** and this analysis suggested that the assumptions held true.
- Across most sites visited, the **potential for other factors to be driving any changes** (e.g. change in building/business operating hours or reduced building use) observed was investigated, but no evidence of this was identified.

Energy consumption data was available only for the intervention period (not for the pre-intervention period) and therefore it was not possible to verify whether the energy consumption patterns reported by users were triggered by the tool or not.

For each Competition tool, the evaluation assessed the extent to which the tool had contributed to energy savings at pilot sites, and the strength of the evidence supporting this. Eight 'types' of evidence were defined and scored for strength (see Table 3 in Annex 2). A higher score was given to evidence which was observed (e.g. energy consumption data) and triangulated (displaying a convergence in qualitative evidence and energy consumption data) or identified at a larger number of sites.

An overall score was derived to give an **average confidence rating in the evidence available: GlowPro scored 2.29, i.e. there is a 'high level of confidence that the tool has contributed to energy savings in at least some sites'**. The scores and associated confidence ratings are outlined in Table 2 below. Annex 2 provides more detail on how the score was derived.

Table 2: Energy savings confidence ratings (GlowPro rated 2.29 'high level')

0- 1	Low level of confidence that the tool has contributed to energy savings at any site*
1 – 1.99	Medium level of confidence that the tool has contributed to energy savings in at least some sites
2 – 2.99	High level of confidence that the tool has contributed to energy savings in at least some sites
3 to 4.5	Very high level of confidence that the tool has contributed to energy savings in at least some sites

** A low level of confidence does not preclude the tool from working in the future, if some adjustments / lessons learned are taken on board.*

Taking a case-based approach, the remainder of this section explores in further detail the factors which drove energy savings in the three businesses presented previously (at which behaviour change had been observed). In two cases (Businesses #1 and #2 below), participants reported seeing savings in their energy bills while Business #3 (see below and on page 11) did not know if savings had been achieved following advice to staff to turn off heating equipment.

Quantitative analysis of the energy consumption of these sites showed consumption patterns that aligned with the reported changes in behaviour in one of the sites (Business #1), while in the others, the data coverage was not sufficient to allow the impact on energy consumption to

be assessed. It was not possible to run a trend analysis of energy consumption across all pilot sites due to limitations in the data available.

Business #1 – Dog Grooming Parlour | Savings achieved

Sector: Dog grooming | **Size:** 4-5 employees, 2 in-store; takes in 5-7 dogs every day for grooming | **Energy supply:** Electricity only | **App:** Bright

Measure implementation and potential: According to the store owner, they started to turn off water heaters (a particularly high consuming piece of equipment in the business) when not in use. When turned on, water boilers are programmed to keep the water at a specific temperature set by the user, so they will consume energy (in this case, electricity) whenever the temperature falls below the programmed level. Therefore, turning it off overnight (either manually or automatically) tends to save energy as it avoids on and off cycles.

Energy savings reported by the owner: The owner believed that, if they had continued leaving the water heater on out-of-hours, their energy costs would have been much higher: *“if [the water heater] is on overnight a couple of days [...] you could potentially be doubling our bill for the month”* - Owner.

Energy data analysis: An analysis of the energy consumption data confirms that the measure was implemented, and the heater was turned off during out-of-hours, but the overall impact on energy consumption could not be fully verified due a lack of historic (pre-intervention) data.

Business #2 – Chain of bars | Changes implemented

Sector: Cocktail bars | **Size:** 10 bars | **Energy supply:** Not known | **App:** Energy advisor report

Measure implementation and potential: According to the owner, one of the sites changed times when icemakers were turned on and off. Icemakers spend energy when not in use because, even when the ice tray is full, they operate a small heater to keep the motor that turns the ice into the ice tray from freezing. Therefore, turning it off at given times (and on again in time to un-freeze the motor) can help save energy.

Energy savings reported by the owner: The owner reported having seen savings from the data shared by the energy advisor, which has encouraged them to roll out the measure across other sites within the chain.

Energy data analysis: It was not possible to assess the impact of this measure on energy consumption because energy data available did not cover the period when the measure was implemented.

Business #3 – Chain of bars and pubs | Changes implemented

Sector: Bars, pubs and restaurants | **Size:** 7 pubs/bars | **Energy supply:** Not known | **App:** Reflect

Measure implementation and potential. The owner requested three of the pub/bars to stop leaving the heating equipment on overnight but could not confirm with certainty that the sites had followed the instruction.

Energy savings reported by the owner: The owner did not know if the measure had already been implemented.

Energy data analysis: The analysis indicates that there is little evidence of these initiatives taking place in the three chain sites analysed. For two of the sites, the data period was relatively short with several gaps which limited the potential for identifying a trend in average daily consumption over the trial period. In the third site, energy consumption measured late in the pilot was 20% lower than consumption measured over a similar five-day period early in the pilot, however the relatively short analysis period, and lack of pre-pilot data means this finding cannot be assumed to be representative of the overall trend in energy use, or specific impact of GlowPro.

Longer-term outcomes

This section considers GlowPro's progress towards the longer-term impacts outlined in its theory of change. It was not expected that such outcomes would be realised in full by the end of the Competition. Therefore, the discussion that follows outlines evidence towards achieving these but also how likely it is that these outcomes may be met in future years.

In the long-term, GlowPro was expected to drive large-scale reductions in energy consumption, energy costs and CO2 emissions, as a result of wider adoption of the tool.²¹

As explained below, the sites reporting changes aim to maintain and expand on the achieved results, leading to further energy savings. Achieving large-scale savings will require that GlowPro reaches a much wider audience.

Sustaining and replicating process changes within engaged businesses

All three businesses where outcomes were noted intend to maintain the changes made in the near future. Furthermore, Business #2 (a chain of bars) was planning to replicate energy saving measures²² across their other sites, as detailed above, while Business #3 (also a chain of bars and pubs) intended to implement automatic controls on their heating equipment which could drive savings in the future. In turn, Business #1 thinks they will look into acquiring more efficient equipment to further energy and bill savings in the future.

²¹ As outlined in the theory of change, the Assure app was also expected to lead to better tenant-property manager relations, but this app was not piloted in this Competition.

²² Implementing controls in the time of operation of icemakers and fridges.

Progressing towards process changes within the business

Among those businesses which had not yet made changes to their energy usage, all of those interviewed would like to continue using the application and potentially progress towards improving their energy management practices. For instance, one business whose use of GlowPro has been limited would like to access it more in future to help them “*control and understand what’s causing what*” – i.e. pieces of equipment that are using energy unnecessarily.

Wider adoption of GlowPro

It was an assumption that as businesses experienced positive results from using GlowPro, they would spontaneously share their experiences with peers. As a result, more businesses would seek to engage with GlowPro or equivalent energy management tools and increase ‘advocacy’ towards energy efficiency.

The evidence collected through this evaluation is not sufficient to indicate whether word-of-mouth dissemination will be important for future uptake. A couple of businesses interviewed have shared their experiences with a few peers about GlowPro, and others feel that they are likely to recommend GlowPro in the future. However, this is unlikely to be sufficient to support dissemination at scale alone. As such marketing efforts from Hildebrand and partners may still be required. Some of the Competition pilot sites would lend themselves to successful case studies that Hildebrand can explore for marketing purposes.

4 Conclusions and recommendations

This report explored the extent to which Hildebrand's energy management system, GlowPro, was able to support businesses in reducing their energy consumption.

There is clear evidence from the evaluation that the GlowPro system can help businesses track their energy use and wastage more closely and potentially save on energy bills. Across the pilot, it has led to improved energy management practices and associated reductions in consumption and energy bills for some, although limitations in energy data make it difficult to reliably estimate the level of reduction achieved. Overall, the evaluation has a high level of confidence that the tool has contributed or will contribute to energy savings in at least some sites.

The ability to visualise levels of energy consumption out-of-hours was a key driver of change across the board, and it helped managers track and tackle energy wastage more closely, which was particularly valuable to managers who are not usually on site. For hospitality sites, indoor temperature tracking against energy use also enabled managers to tackle energy waste and ensure customer comfort.

In some cases, visualising out-of-hours consumption was sufficient to trigger action. This was particularly the case for those hospitality sites which had energy-intensive equipment on site operating for long hours, such as water heaters or ice makers. Some of the smaller businesses, including a retail business, tended to feel that there are not many savings that could be made in their operations.

In total, eight of the 12 participating businesses consulted said that they implemented or planned to implement at least one energy efficiency measure as a result of GlowPro improving their understanding of their energy use. Furthermore, two of the eight interviewed businesses reported having achieved energy savings following changes triggered by GlowPro.

GlowPro also seemed to work well as an add-on to the energy advisor offer (which included PDF reports with tips and face-to-face bespoke advice)²³ where it was used to help the energy advisor map those businesses across their portfolio which had the greatest potential for energy savings. This meant the energy advisor could then target these businesses for an enhanced offer that would include equipment-level tracking of energy use and bespoke advice on changes that could be made to operations.

The energy advisor enhanced offer also included the ability to automate the operation of critical equipment which enabled these businesses to overcome a key barrier of ensuring staff follow directions around equipment operations. Indeed, in the case of the sites piloting the energy advisor offer, the additional support from the energy advisor (equipment-level monitoring and targeted advice) and the ability to automate the operations of the critical equipment seemed to have been a catalyst for action.

It is not clear if GlowPro has led users to invest in more efficient technologies to save energy. Small businesses tend to replace equipment or infrastructure only when needed and it is possible that driving investment-level measures would require additional types of support.

²³ See the section "Key features of the applications piloted" for a longer description of the energy advisor offer.

The findings from this report suggest Hildebrand could take forwards the following points as it progresses its commercial offer, which may also be relevant for other innovators:

- Retain the dashboard and live monitoring features – these have been critical to the app's success.
- Prioritise offering web-based access to the tool as part of the offer. A web-based platform seems to be most welcome among managers and business owners, as most users have computer-based functions, and some like the possibility of exporting a spreadsheet with their data.
- Consider ways to integrate into the tool's offering equipment-level energy tracking and automated controls. Particularly in the case of larger chain businesses: (i) tracking equipment-level energy consumption helps in mapping energy waste where there are multiple energy-intensive pieces of equipment, while; (ii) the ability to automate this equipment means managers do not need to rely on staff remembering / being trained to switch off equipment. Such automation may help managers who are wary of distracting staff with energy management obligations to ensure that energy consumption is reduced automatically.
- Consider ways of providing access to the tool / the tool's reporting outputs alongside energy use advice. This might entail providing more tailored support as an 'add-on' feature of the tool or continuing to work with partners, such as the energy advisor, so that GlowPro forms part of a broader package or 'bundle' of services for the user.
- Continue to seek routes to provide users with access to live data and improve the offer by incorporating live alerts. The users interviewed, felt that GlowPro served well the purpose of tracking energy use even the data they had access to was non-live. However, ensuring users get access to live energy usage and introducing live alerts could allow GlowPro to drive operational benefits in businesses, making the offer more attractive.

Annex 1 Evaluation Methodology

The research for this evaluation was conducted by Ipsos MORI in conjunction with their consortium partner the Carbon Trust. Ipsos MORI designed the evaluation approach and designed and delivered all aspects of the methodology, except for the energy consumption analysis which was designed and conducted by the Carbon Trust. The evaluation was led by a dedicated evaluator who followed the implementation of the tool through its design phase (Phase 1), feasibility and initial testing (Phase 2) and roll-out and further testing (Phase 3).²⁴ The final evaluation report, and reports for the other six case studies, are available on www.gov.uk.

Evaluation approach

This evaluation aimed to assess the extent to which GlowPro generated anticipated outcomes and impacts, as well as the circumstances in which these were achieved. A case and theory-based approach was taken.

In line with the theory-based approach, the evaluation uses the GlowPro theory of change as its framework. The theory of change was developed in Autumn 2018 by Ipsos MORI in consultation with Hildebrand, through analysis of the GlowPro business proposal, points discussed at the Hildebrand inception meetings and through familiarisation interviews with the Hildebrand project lead and key consortium members. The extent to which anticipated change (i.e. 'outcomes' and 'impacts') took place as observed – and then evidence to demonstrate that GlowPro has contributed to this change – was assessed and is described in this report.

Sources of evidence and fieldwork activities

This evaluation was developed upon the following primary sources of evidence:

- **An online survey:** The survey²⁵ included between 20-30 questions²⁶ covering tool usage habits, attitudes to energy, energy management behaviours, actions taken following engagement with the tool and other questions to understand the context of the business and the user (such as the business size, user role). Two versions of the survey were administered, and their results were combined for analysis:
 - **Type A Survey:** conducted in two waves: before the pilot started (January to October 2019, depending on when the pilot began for that user) and at least three months after participants had been given access to the tool (January to February 2020). The Type A endline survey was sent to those pilot participants who had (i) completed the baseline survey, (ii) agreed to be re-contacted for

²⁴ The evaluation lead met regularly with the tool's design team, liaising with them on the evaluation plan, designed the evaluation's methodology, managed the team of data collectors and the development of this report.

²⁵ An example survey questionnaire used across NDSEMIC projects is included in the evaluation Technical Report, available on www.gov.uk.

²⁶ The exact questionnaire length for each respondent varied depending on the project and type of participant/organisation.

research, and (iii) not withdrawn from the pilot²⁷ since the baseline survey had been completed.

- **Type B Survey:** a single wave conducted post-pilot, administered to pilot participants who had not completed a baseline survey. As a baseline measurement was not available, participants were asked to self-report on any changes in attitudes or behaviours in relation to energy management over the course of the pilot, and whether GlowPro was a factor in these changes.

The total responses from both the Type A and Type B surveys was 12 (3 from Type A, 9 from Type B). A single survey was completed per site, including three sites from a single organisation. The profile of these 12 pilot sites is as follows:

- Recruitment channel - 7 Supplier sites | 4 Direct recruit sites | 1 Energy advisor site.
- Sector - 4 Retail | 8 Hospitality.
- Three were completed by business owners.
- Four were completed by business managers.
- One was completed by a business employee.
- Four survey respondents (users of Bright) were not asked about their position in the business, as this user group was given a shorter version of Survey B.

Six respondents (covering four businesses) also participated in observational site visits (see below).

- **Telephone interviews:** Undertaken with four users, these lasted 30-60 minutes and used a discussion guide tailored to GlowPro's features and intended outcomes. The guide included sections to understand how participants monitored energy use, and any impacts and benefits of GlowPro to them and their business.
- **On-site visits:** Conducted at four sites piloting GlowPro, they involved 30-60-minute interviews with the main tool user and, where possible, with other relevant staff responsible for site management or management of bills, to gauge a more complete picture about the tool's impact on the business. The interviews followed the same discussion guides as the telephone interviews and the visits also included observational elements to understand how users interacted with GlowPro.

The sample for qualitative research consisted of all pilot participants, excluding those who had either refused to be contacted for research or withdrawn from the pilot. A selection of pilot organisations was designed to ensure all three sectors were covered.

- **Energy consumption analysis:** Data on energy consumed during the intervention period – collected as part of the intervention (i.e. for use within the tool) – was analysed by the Carbon Trust. The aim was that historical energy data would also be collected and compared to intervention data to allow for a 'before and after-the-intervention' analysis to indicate tool effects. A more detailed analysis would also be completed on

²⁷ Approximately 16 organisations withdrew from the pilot after being on-boarded. Reasons for withdrawal included: technical issues with installing the required kit, connectivity issues that inhibited data transfer and requests from users to be withdrawn for various reasons (such as staff illness, businesses closing or limiting operations).

three organisations to triangulate findings on energy data with data obtained in the qualitative and quantitative research. However, as pre-pilot data was not available and there were gaps in the post-pilot data provided (the majority of sites were missing at least some data), it was not possible to run a trend analysis across the portfolio comparing pre- and post-pilot nor early versus late data. This was because there were significant gaps in the data across all pilot sites (barely any sites had complete data throughout the pilot period, and many had wide data gaps) which meant any analysis would bear a significant amount of uncertainty. Therefore, a more detailed analysis was attempted on seven sites across three of the pilot chain businesses, but multiple data gaps also meant that the analysis remained inconclusive: there was little evidence of impact, but this might be because of uncertainties around the data, especially around the pilot start date and, in one case, around the date when the measure was implemented.

- **Project documentation and correspondence:** As part of the Competition, Hildebrand (and the other Competition Partners) were expected to regularly update BEIS and the Ipsos MORI evaluation team on their delivery progress and learnings via milestone deliverables and project documentation. This was reviewed by Ipsos MORI and has supported the analysis in this report. Additionally, the evaluation team had regular bi-weekly updates with the Competition Partner to establish progress with the project and collate necessary information (e.g. recruitment challenges, partnership relationships etc.). Further documentation was made available to the Ipsos MORI evaluation team through Hildebrand's end-of-Competition report and in most cases provided useful supplementary information directly to the evaluation team.

Limitations of the methodology

These were as follows:

- Despite multiple reminders being sent by both Ipsos MORI and Hildebrand, and the offer of a financial incentive for completion, there was a low survey response rate from businesses, which limited the extent to which the tool's impact could be evaluated beyond the users interviewed. It also limited the ability to assess potential differences across the three versions of the application that were piloted within this competition, as not all of these were interviewed. Response rates for site visits and telephone interviews were better (with 80% of planned interviews / visits achieved).
- Despite attempts to do so, it was not possible to run a before-and-after analysis based on either the surveys or the qualitative interviews.²⁸ As a result, the evaluation relied on users' own assessment of how their attitudes and awareness of energy had evolved since engaging with GlowPro, which is more subjective than a before-and-after analysis would have been.
- Due to challenges in recruitment, some pilot participants only had access to GlowPro for 3-4 months before the evaluation fieldwork was completed. This relatively short timeframe limits the ability to determine trends in energy consumption, and to evaluate outcomes that may only be realised over a longer timeframe, such as the adoption of

²⁸ Challenges with recruitment meant that Hildebrand had to be mindful of not overwhelming interested participants with evaluation participation requests – e.g. they were not able to chase for survey responses. Therefore, response rates to the "before" Type A survey were relatively low, and attrition led to even lower response rates to the follow up.

more efficient technologies, which requires a significant investment from the business that may not be immediately available and a longer time period to implement.

- A key limitation of the energy consumption analysis is the lack of historical and pilot-period data for businesses, from which year on year comparisons can be made to determine the impact of GlowPro.

Annex 2 Assessment of GlowPro's contribution to energy savings

Assessing the energy saving potential of smart energy management tools was central to the evaluation, however, in the context of the Competition it was not possible to collect a single definitive estimate of impacts and there were a range of challenges in using and interpreting energy consumption data for pilot sites. In recognition of the circumstances involved (limited access to historical data, small sample sizes, no control groups), a mixed-methods approach to evaluating energy savings was taken.

This approach drew on a range of evidence (outlined in Annex 1) to create a summary indicator of the evaluation's confidence that the tools had contributed to energy savings for pilot sites (by comparing the findings of energy consumption analysis, self-reported savings, and evidence of behaviour change from qualitative interviews). An analytical framework that considered both the strength of evidence, and its robustness, was used to produce the indicator (see Table 3 overleaf). The methodology for this described in more detail in the Final Evaluation Technical Report published alongside this evaluation.

On the basis of these assumptions and the evidence available, an analytical 'strength of evidence' framework was developed which, when applied, generated a confidence rating in the evidence of energy savings for each pilot. This confidence rating was illustrated in Table 2 in Chapter three and is recopied at the end of Table 3.

Table 2: GlowPro contribution to energy savings - evidence strength assessment.

Evidence 'type'	Description of evidence type	Numerical rating of evidence type
Energy Consumption evidence		
Observed energy consumption reductions – (across all pilot sites, when comparing data over time and against pre-intervention data).	Insufficient data for full pilot trend analysis to be conducted, meaning this evidence group does not count towards overall rating.	N/A ²⁹
Observed energy consumption reductions that align with user-reported evidence of changes in energy use behaviour. Suggests potential that tool use has contributed to energy savings.	Conducted for seven sites across three businesses comparing data from the first half of the pilot to the second half, assuming that effects might be more observable in the second time period (historical data wasn't available). At only one of the sites was there a reduction in use, both at peak and off-peak times, but the quality of data made it impossible to confidently state whether this was due to the tool or other factors such as weather. At one of the other sites, it was possible to match observed shifts in consumption at different time-points against reported behaviour, but without the historical energy use data, it was not possible to verify whether the behaviour had resulted from use of the tool (or whether the user had been using energy in this way pre-intervention).	2 ³⁰
User reported evidence		
Self-reported energy savings (e.g. user can point to cost reductions in bills) that the user assigns to use of the tool.	Two sites visited were able to actually point to savings made in their energy bills.	2 ³¹

²⁹ This group of evidence could be rated as either “not evident” (0), evident but only with red quality rating (1), evident with an amber quality rating (3) or evident with a green quality rating (4.5).

³⁰ This group of evidence could be rated as either “not evident” (0), evident but only with red quality rating (2), evident with an amber quality rating (4) or evident with a green quality rating (6).

³¹ This group of evidence could be rated as either “not evident” (0), evident at 1-2 sites (2), evident at more than 1-2 sites (4) or evident at most sites consulted (6).

Evidence 'type'	Description of evidence type	Numerical rating of evidence type
Multiple users at one site converge in reporting behaviour change, inferred to lead to energy savings, that users assign to use of the tool.	At one site, more than one user was consulted, and these users converged in reporting behavioural changes which they assigned to use of the tool.	2 ³²
One user reports behaviour change, inferred to lead to energy savings, that users assign to use of the tool.	Around two thirds of users consulted through the survey or through site visits / interviews reported behaviour change, inferred to lead to energy savings, which they assigned to use of the tool.	4 ³³
Behaviour change reported via survey assigned to use of tool.	Most survey respondents (eight out of 12) reported changes to the ways they were using energy which they assigned to the tool and which can be inferred to lead to energy savings.	3 ³⁴
Theory-based evidence		
Evidence of the assumptions considered necessary for change to occur (as per the theory of change) occur as anticipated. This suggests all of the necessary conditions for energy savings are available.	At two of the sites visited, it was also possible to test the assumptions underpinning the overall GlowPro theory of change. In these cases, no evidence was identified to suggest that other factors would prevent energy savings from being achieved (assuming that behaviour change was sustained).	1 ³⁵
No evidence of alternative theories of change for observed, reported or	Across most sites visited, the potential for other factors to be driving any changes (e.g. change in building/business operating hours or reduced building use) observed was	2 ³⁶

³² This group of evidence could be rated as either "not evident" (0), evident at 1-2 sites (2), evident at more than 1-2 sites (4) or evident at most sites consulted (6).

³³ This group of evidence could be rated as either "not evident" (0), evident at 1-2 sites (2), evident at more than 1-2 sites (4) or evident at most sites consulted (6).

³⁴ This group of evidence could be rated as either "not evident" (0), evident at 1-2 sites (1), evident at more than 1-2 sites (2) or evident at most sites consulted (3).

³⁵ This group of evidence could be rated as either "not evident" (0), evident at 1-2 sites (1), evident at more than 1-2 sites (2) or evident at most sites consulted (3).

³⁶ This group of evidence could be rated as either "not evident" (0), evident at 1-2 sites (1), evident at more than 1-2 sites (2) or evident at most sites consulted (3).

Evidence 'type'	Description of evidence type	Numerical rating of evidence type
hypothesised energy savings.	investigated, but no evidence of this was identified.	
Overall score (max. of 33) ³⁷		16
Averaged score (max of 4.5) ³⁸		2.29
RAG rating		High

Table 2 (repeated): Energy savings confidence ratings (GlowPro rated 2.29)

0- 1	Low level of confidence that the tool has contributed to energy savings at any site*
1 – 1.99	Medium level of confidence that the tool has contributed to energy savings in at least some sites
2 – 2.99	High level of confidence that the tool has contributed to energy savings in at least some sites
3 to 4.5	Very high level of confidence that the tool has contributed to energy savings in at least some sites

* A low level of confidence does not preclude the tool from working in the future, if some adjustments / lessons learned are taken on board.

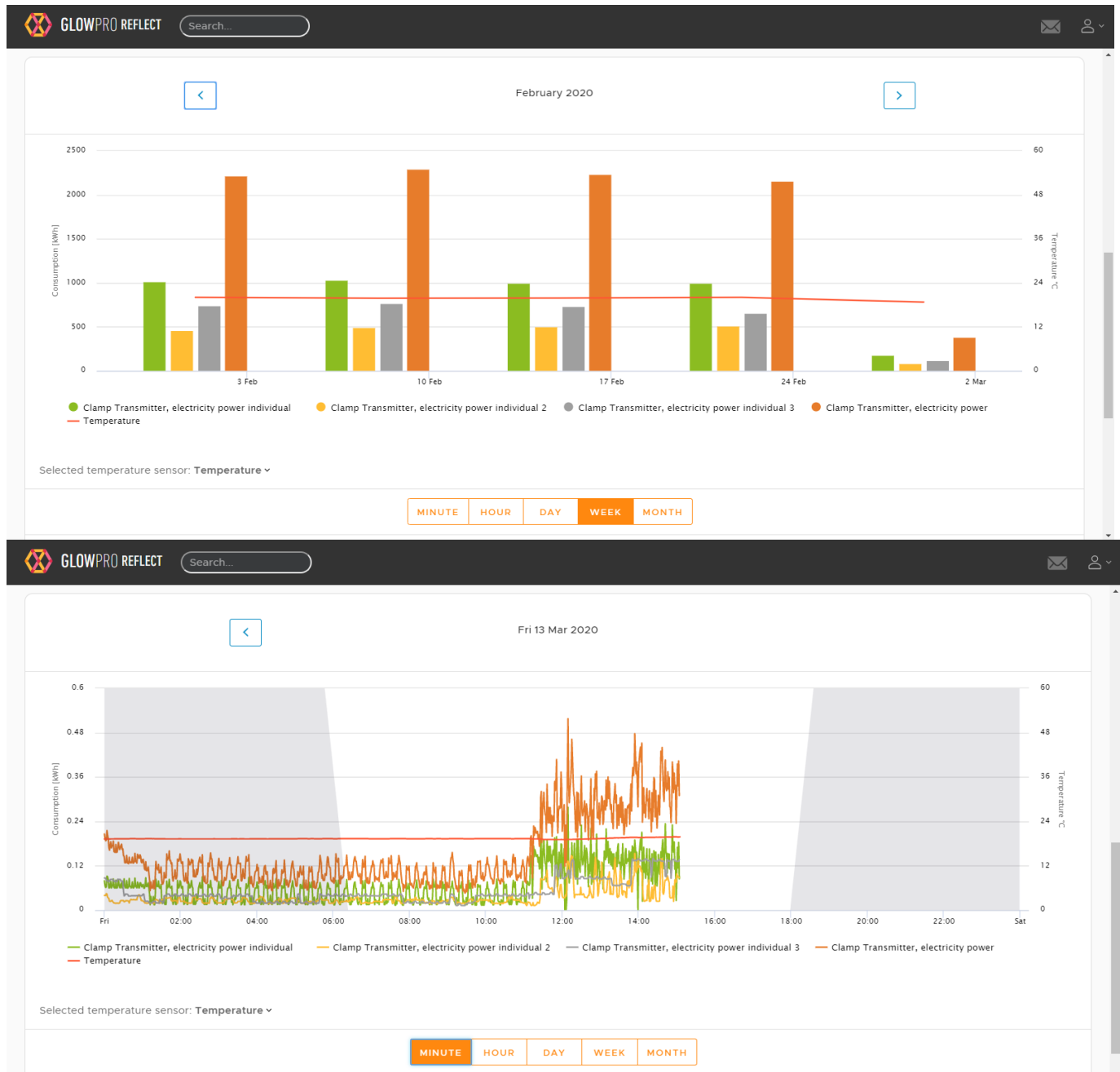
³⁷The maximum overall score differs for some Competition projects as some of the evidence types are not available for some project evaluations.

³⁸ This is calculated by dividing the maximum possible overall score by the number of evidence types considered (8 in this case) and rounding to the nearest 0.5 decimal.

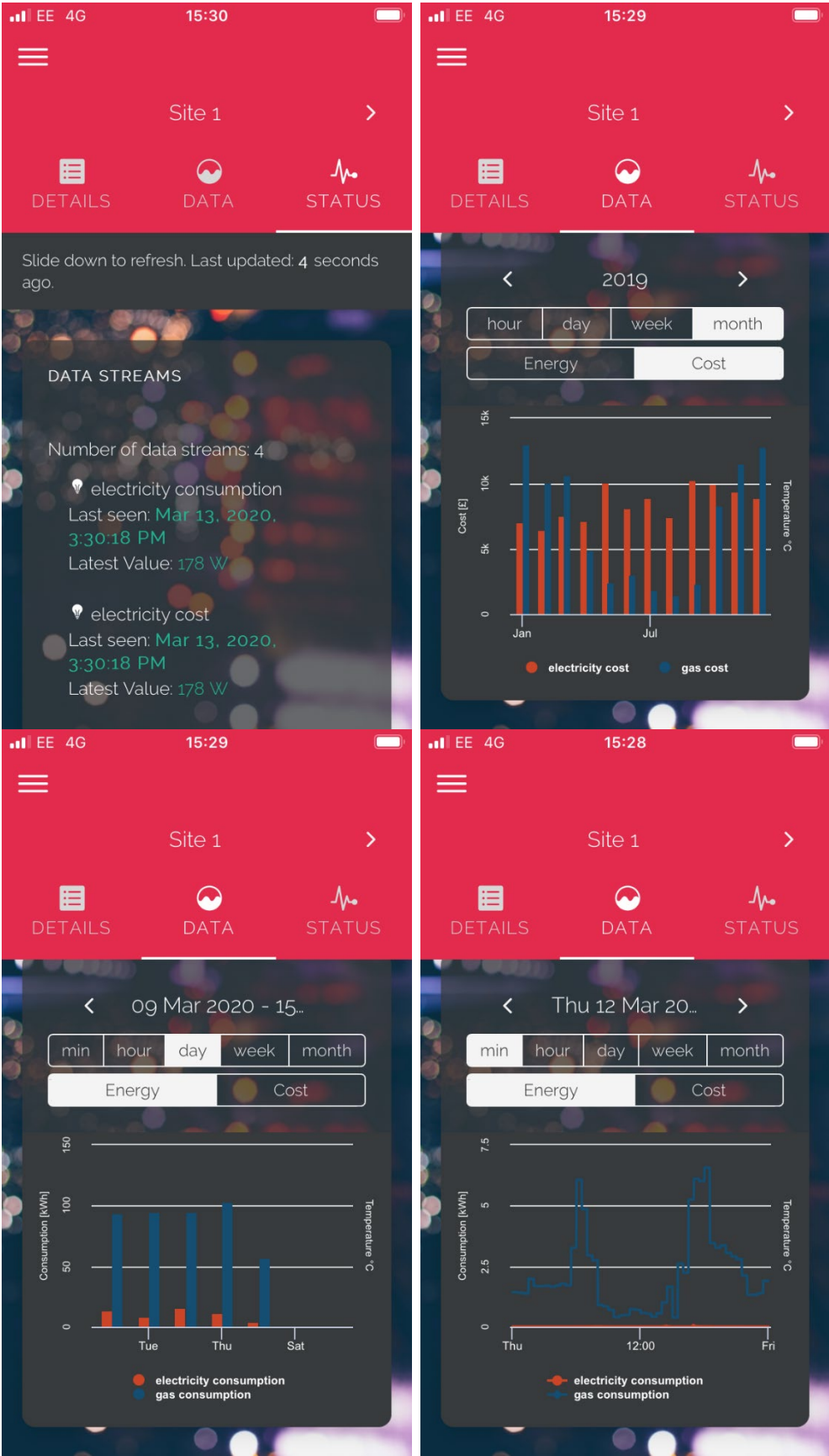
Annex 3 GlowPro screenshots

This annex provides screenshots of the three different versions of the GlowPro application which were piloted by the businesses interviewed as part of this evaluation, namely, Reflect, Connect and Bright.

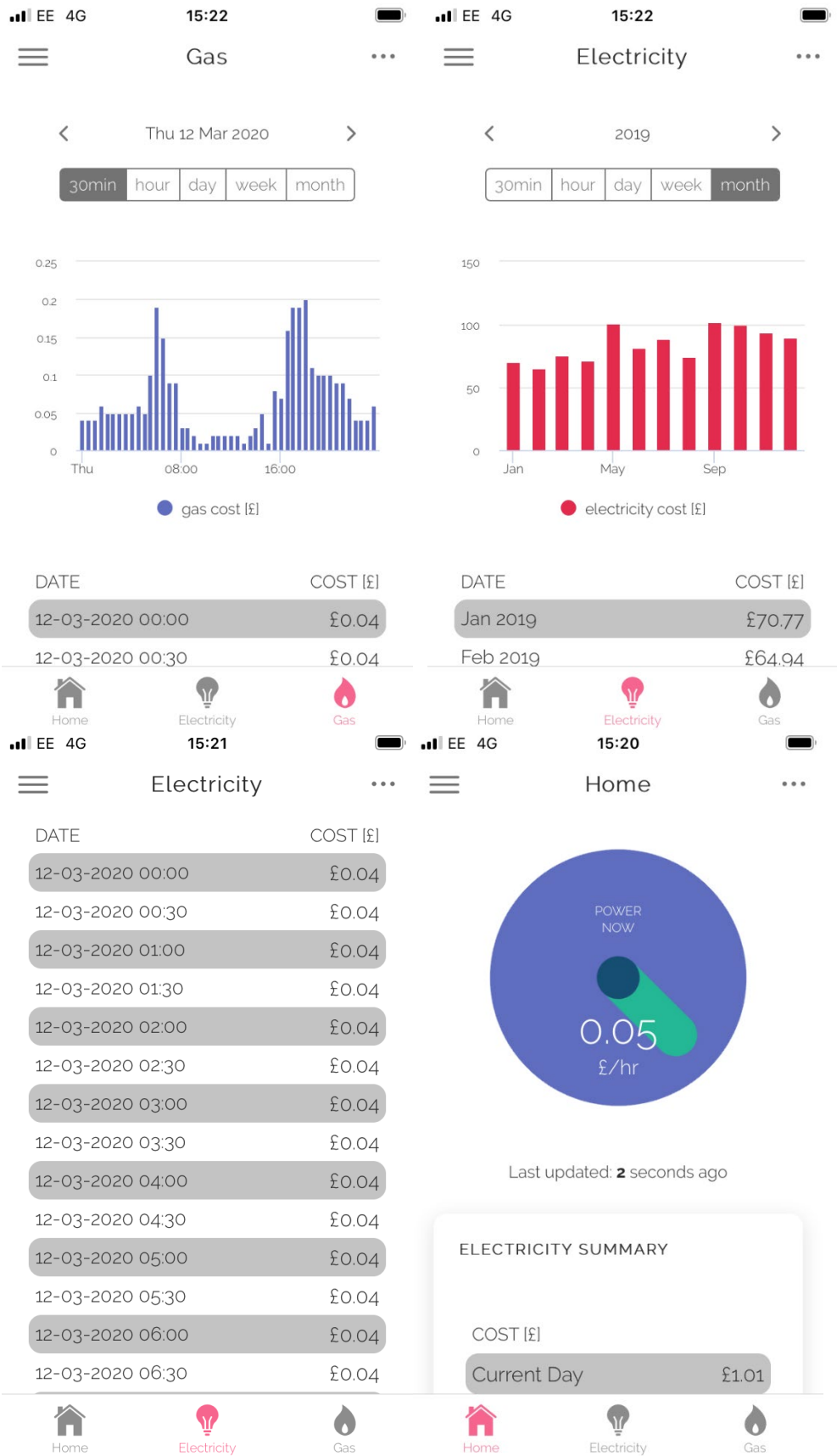
Reflect



Connect



Bright



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