



Using entrepreneurship theory to inform owner-managed SME engagement with novel energy data and management tools: An action research study

DAVID KENINGTON 

KATHRYN B. JANDA 

PAUL RUYSEVELT 

**Author affiliations can be found in the back matter of this article*



COLLECTION:
INDUSTRY

PEER-REVIEWED
PAPER



ABSTRACT

Peer-reviewed paper 9-238-26

SMEs use more than 13% of global energy, making them an important target to help achieve Net Zero. However, SMEs manage energy poorly and little is understood about how to influence them to improve energy management. Responding to this challenge, the UK Government delivered the Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC), funding the development of new smart energy management tools. This paper presents insights from an action research study exploring the question: How do owner-managed SMEs respond to the development and testing of new smart meter data-based energy management tools? The study involved working with a technology innovation business to design and test a prototype set of tools with three owner-managed SMEs. The findings showed that participants responded entrepreneurially to the tools and in-depth discussions, identifying new potential uses beyond those anticipated at the outset. The insights help to overcome SME engagement challenges by leveraging helpful entrepreneurial heuristics in intervention design.

CORRESPONDING AUTHOR:

David Kenington

Energy Institute, Bartlett School of Environment, Energy and Resources (BSEER), University College London, Central House, 14 Upper Woburn Place London WC1H 0NN London, UK

david.kenington.16@ucl.ac.uk

KEYWORDS:

SMEs; energy management; entrepreneurship; action research

TO CITE THIS ARTICLE:

Kenington, D, Janda, KB and Ruysevelt, P. 2026. Using entrepreneurship theory to inform owner-managed SME engagement with novel energy data and management tools: An action research study. *ecee Summer Study proceedings*, 1(1): 40, pp. 1–11. DOI: <https://doi.org/10.66506/essp.9-238-26>

INTRODUCTION

Small and medium-sized enterprises (SMEs) account for more than 13% of global energy demand (IEA 2015) and collectively represent over half of the energy demand from the industrial and commercial sectors in the UK (BEIS 2015). Despite this significance, SMEs are widely regarded as a 'hard to reach' sector: energy typically attracts limited attention in the context of wider business priorities, and management of it tends to be reactive rather than proactive (Janda et al 2014; Revell & Blackburn 2007; Trianni & Cagno 2012).

The UK Government's smart meter roll-out, covering more than two million non-domestic sites, the majority occupied by small and microbusinesses, presented a significant opportunity to improve SME energy management through new data-driven tools. In response, the Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC) funded the development of innovative smart meter data-based energy management tools between 2018 and 2020.

Despite growing policy interest in this area, a fundamental gap exists in the literature. SME energy management research has not connected closely with the broader field of SME business management and entrepreneurship research, which offers helpful frameworks for understanding how and why SMEs make decisions. This can help better understand how SMEs will respond to demand-side energy policy interventions, something that has been highlighted as a challenge (Revell & Blackburn 2007).

This paper addresses that gap directly. Drawing on an action research (AR) study conducted within the NDSEMIC programme, the paper offers the first analysis of SME energy management decisions through the lens of established entrepreneurship heuristics.

The paper makes three contributions. First, it is the first study to connect SME entrepreneurship research with SME energy management research, offering a novel conceptual lens. Second, it generates empirical insights about how owner-managed SMEs respond to new energy management tools, including unanticipated uses for smart meter and other operational data. Third, it derives practical implications for how energy management interventions should be designed and delivered to better engage this important sector.

LITERATURE REVIEW

SMEs AND ENERGY MANAGEMENT: A PERSISTENT ENGAGEMENT CHALLENGE

SMEs are a heterogeneous and hard-to-characterise sector (Hampton & Fawcett, 2017). While energy strategy and large businesses have been studied (Cooremans, 2011), SMEs have not received the same attention (Janda et al 2014). Energy typically represents a small proportion of their overall operating costs, and this, combined with limited time and management capacity, means that energy management is rarely a priority (Revell & Blackburn 2007; Fawcett & Hampton 2020). Existing research has identified a wide range of barriers, including lack of awareness, limited access to capital, insufficient information and advice, and the complexity of the supplier and metering landscape (Trianni & Cagno 2012; Lunt et al. 2014).

At the root of many of these barriers is what has been termed an 'attention deficit': energy simply does not warrant sufficient attention to motivate action within the context of other business priorities (Revell & Blackburn 2007). This means that even where financial savings could be realised, they are often insufficient on their own to drive engagement. The literature suggests that framing energy management in ways that connect with broader business goals, such as operational productivity or quality, may be a more promising approach (Kenington et al. 2020).

Smart meter data-based interventions have attracted growing interest as a mechanism for improving energy visibility in SMEs. However, existing evidence suggests that presenting raw consumption data is insufficient to generate meaningful engagement without clear relevance to business activities (Fischer 2008). This underscores the need for tools designed with a detailed understanding of how SME owner-managers think and make decisions.

ENTREPRENEURSHIP IN SMEs: CAUSATION, EFFECTUATION AND ABSENCE OF STRATEGY

SME business management research offers a range of theoretical constructs on how owner-managers make decisions. This paper focuses on Sarasvathy's (2001) foundational work,

which describes two contrasting decision-making logics. Causation is a goal-oriented approach in which a desired outcome is specified in advance and resources are deployed to achieve it. Effectuation, by contrast, is a means-based approach in which entrepreneurs work outwards from available resources, skills and networks to identify and exploit achievable goals. Rather than beginning with a fixed endpoint, effectual entrepreneurs ask ‘given what I have, what can I do?’ This mode of thinking tends to dominate in contexts of novelty and uncertainty, such as when developing new products or responding to new external opportunities.

Building on this, Hauser et al. (2020) introduced a third concept: Absence of Strategy. This describes situations in which neither Causation nor Effectuation is effectively deployed, manifesting as reactive, uncoordinated or neglected decision-making. This often occurs where activities lack sufficient priority or where the entrepreneur lacks the agency or resources to act.

Empirical studies show that SME owner-managers switch between heuristics depending on context (Smolka et al. 2018; Vershinina et al. 2017). Causation tends to dominate when managing established activities; Effectuation when exploring new opportunities; and Absence of Strategy when facing issues that fall below the threshold of meaningful attention. Crucially, these heuristics are sensitive to the specific decision context rather than being stable personality traits.

AN UNADDRESSED GAP: CONNECTING ENTREPRENEURSHIP AND ENERGY MANAGEMENT RESEARCH

Despite the richness of both the SME energy management literature and the SME entrepreneurship literature, these two fields have not previously been meaningfully connected. This is a significant gap. Cooremans (2011) previously explored the importance of strategic relevance of capital investments in energy efficiency, but this focused on large commercial organisations. If energy management decisions are shaped by the same entrepreneurial heuristics that govern many other SME decisions, then understanding those heuristics is likely to be helpful for designing effective interventions. The energy management implications of this are explored in the findings and discussion sections below.

METHODOLOGY

ACTION RESEARCH APPROACH AND RATIONALE

This study employed an action research (AR) methodology, situated within the Participatory Research Paradigm (PRP) as described by Heron & Reason (1997). AR was chosen because the research question required direct engagement with the social and operational contexts in which energy-related decisions are made, rather than observation from a distance. AR operates on a participative epistemology in which knowledge is built through active engagement with participants across iterative cycles of diagnosing, planning, acting and evaluating (Coghlan & Brannick 2014).

AR operates simultaneously at two levels: a contextual level, generating practical knowledge relevant to the study context; and a meta-level, contributing to broader academic and methodological understanding. This dual-level inquiry is reflected in the research question and objectives.

The primary research question guiding the study was: *How do owner-managed SMEs respond to the development and testing of new smart meter data-based energy management tools?*

This was supported by four research objectives, operating at two levels of inquiry. At the contextual level:

- RO1: To inform the design and deployment of prototype energy management tools.
- RO2: To improve understanding of how energy management can be improved to reduce energy demand.
- RO3: To inform understanding about what other benefits smart meter data-based energy management tools may deliver, or whether energy management might be better considered as a co-benefit of other, higher priority actions.

At the meta-level of inquiry:

- RO4: To contribute to understanding about applying an action research approach in this context, learning about its strengths and weaknesses and developing recommendations for future work.

AR proved especially valuable in the context of SME energy management because energy-related decisions are deeply embedded in daily operational routines that would be difficult to surface through conventional qualitative methods. The participative nature of AR gave participants agency in shaping the direction of the research, which proved important for both the quality of the findings and the sustained engagement of participants.

STUDY DESIGN AND CONTEXT

The study was conducted in two interlocking parts. In Part 1, the researcher worked directly with Hildebrand Technology Ltd, a technology firm that participated in NDSEMIC and developed a prototype smart meter data-based energy management tool called GlowPro. This part involved facilitated group discussions, semi-structured interviews with potential tool users (shopping centre managers, retailers, hospitality businesses, security contractors and energy consultants), and iterative reflection to inform the tool's design.

In Part 2, the researcher worked independently with three owner-managed SMEs over 18 months to test the GlowPro prototype and explore broader potential uses for smart meter and other operational data. The three businesses were: a small chain of cycle-shops (three premises in inner South London); a coffee-shop chain comprising two London sites and one site in South West England; and a coffee roastery in South West England. Together, the coffee businesses formed a group under a shared holding company structure.

Data collection in Part 2 comprised: in-depth initial interviews with owner-managers to understand business context; on-site visits to install GlowPro monitoring equipment and observe operational activities; semi-structured interviews to explore reactions to the GlowPro prototype; and follow-up interviews to explore potential broader uses for smart meter and other data. All participants were anonymised, with pseudonyms used throughout. Analysis drew on both inductive (grounded theory) and deductive ([Hauser et al. 2020](#) framework) approaches, supported by NVivo for coding.

Analysis proceeded in two related stages. The first was a 'within-cycle' analysis in which the researcher wrote summary notes after each interview,¹ site visit and group discussion and, where relevant, shared interim interpretations back with participants in subsequent cycles to test and refine them. This dialogic checking is intrinsic to action research and provided a continual cross-validation of emerging interpretations ([Reason 2006](#); [Reason & Torbert 2001](#)). The second stage was a retrospective analysis of the full dataset, including interview transcripts, field notes, observational records and supporting documents, coded in NVivo. Coding began inductively, following grounded-theory principles, to allow themes to emerge from the data itself. This inductive phase surfaced the relevance of entrepreneurial decision-making patterns and led to the identification of the Hauser et al. (2020) framework. A second, deductive process then re-coded the data using Causation, Effectuation and Absence of Strategy as analytic categories. Findings were derived where patterns were both consistent across participants and corroborated through participant feedback in subsequent inquiry cycles. The broad areas of unanticipated use reported in the findings, for example, emerged from this dual coding process and were confirmed in follow-up discussions with participants.

FINDINGS

PART 1: HILDEBRAND AND THE DEVELOPMENT OF GlowPro

Hildebrand's response to the NDSEMIC Competition illustrates Effectuation in practice. Rather than beginning with a fixed tool design derived from energy management goals, the team began with their available means: existing energy monitoring hardware, relationships with shopping centres and the hospitality sector, and expertise in smart meter data. From these, they explored what new and useful products they could create.

In doing so, they identified that the core barrier to SME energy management was the attention deficit problem. This represented a deliberate strategic departure from the Competition's explicit energy management goals, which the team judged to be necessary to produce something of genuine value to businesses.

Applying the Hauser et al. (2020) framework to these activities, Effectuation was the dominant mode throughout the tool development phase, with elements of Causation emerging as specific product features were developed and tested. Some Absence of Strategy was also observed, particularly in areas where the team encountered technical barriers or market complexities beyond their direct control, such as delays in the non-domestic smart meter roll-out.

PART 2: HOW OWNER-MANAGED SMEs RESPONDED TO GLOWPRO AND SMART METER DATA

Business context and entrepreneurial decision-making

Each of the three SMEs had been established and grown from scratch by their current owner-managers, and all exhibited strong entrepreneurial characteristics. Analysis of how each business had developed over time showed that Effectuation dominated in their formative period, as owners worked outwards from their available resources, networks and operational experience to grow the businesses. As the businesses matured and established their market niches, Causation became increasingly dominant, particularly in the management of existing operations, people and premises. This pattern aligns closely with existing empirical literature (Smolka et al. 2018; Vershinina et al. 2017).

Energy management, however, stood out as an area dominated by Absence of Strategy. Despite each business having experienced 'bill shock' from unexpected large energy bills, none had systems in place to manage energy proactively. Common issues included: billing problems arising from metering complications; different suppliers across multiple premises; and unhelpful supplier relationships. One of the cycle-shop premises had not paid any energy bills for nearly ten years due to an unresolved metering problem with their supplier. As one participant explained: 'It's not large enough to warrant trying to proactively sort out.'

Reactions to the GlowPro prototype

Reactions to the GlowPro prototype were varied, with one showing initial interest and the other two showing lukewarm responses. None of the participants chose to use the live system login provided to them between research visits. Key perceived limitations identified included: the tool's inability to connect to energy supplier billing systems; a lack of disaggregation of consumption data by appliance or zone; and the absence of integration with existing management systems already in use. As one participant (Oliver, cycle-shop owner-manager) noted: 'I can't think of a situation where I would rely on it too much. So I probably wouldn't pay for it, but if I had it, it would be interesting to go on, as it's data, isn't it?'

The cautious reception of the prototype in its current form was anticipated, and introductions to the tool were deliberately managed carefully for this reason. As a rudimentary prototype, GlowPro could not yet fulfil many of the applications participants might want – it lacked billing integration, appliance-level disaggregation, and connection to existing operational systems – so placing too much emphasis on it risked disengaging participants before the more valuable exploratory conversations could take place. The value of the prototype in the research therefore lay not in its immediate uptake, but in the discussions it prompted about what useful tools might look like, which directly informed the second inquiry cycle.

Unanticipated and entrepreneurial responses to smart meter data

The most helpful finding from Part 2 was the entrepreneurial quality of participant responses when invited to explore how smart meter and other data could be useful within their businesses. Rather than evaluating the data from an energy management perspective (which has been the focus of much energy management research to date), participants consistently drew on an Effectual logic, starting from their existing operational priorities and asking how the data could help them. This generated a range of unanticipated potential applications across four broad areas:

Staff and operational management. Participants identified that electricity consumption patterns could indicate staff arrival and departure times, equipment being switched on and off, and the opening and closing of premises. One participant suggested that making this data available to premises managers as a management support tool, rather than as an apparent surveillance mechanism, could be both empowering and practically useful.

Health, safety and management of the internal environment. Temperature data generated by the GlowPro system was identified as having potential for two specific applications. First, it could enable automated logging of fridge and cold room temperatures, currently recorded manually twice daily for Food Standards Agency compliance – a time-consuming Health and Safety task that was administratively burdensome and also prone to being forgotten. Two participants said they would pay for a subscription service to automate this. Second, internal temperature logging of the premises was also seen as useful to help manage the internal environment more effectively as it was possible to see trends and how they related to business activity levels and the weather.

Marketing and environmental credentials. The roastery's premises manager noted that wholesale clients were increasingly requesting evidence of environmental policies. Smart meter data that could help demonstrate energy efficiency or carbon credentials was seen as a potential marketing asset, particularly as sustainability expectations within supply chains tighten.

Energy management as integration and productivity. Rather than seeking a standalone energy management tool, participants consistently expressed a preference for integrating energy data into existing systems they already used – particularly point of sale (POS) and accounting systems (such as Sage or QuickBooks). This integration would enable energy data to be contextualised alongside operational data, facilitating the creation of productivity-oriented metrics (e.g. energy used per cup of coffee served, or per kilogram of roasted coffee) that would be far more meaningful than raw consumption figures.

Josephine (London coffee-shop owner-manager) identified two specific integration opportunities. First, integrating energy data into POS software such as SquareUp – already used by premises managers throughout each working day to manage sales, staff and operations – would enable energy-related alerts and advice to reach staff at the point they were most likely to act on them. Because POS systems are consulted constantly during the working day, embedding energy nudges within them may help overcome the energy management attention deficit in a way that a separate energy management system simply could not. Second, linking energy data to accountancy systems would allow it to be treated as a variable rather than a fixed cost, enabling analysis of how energy demand relates to output and performance over time.

The roastery premises manager (Mike) offered a complementary perspective, noting that integrating energy data into operational systems could also help communicate the relationship between production activity and resource use to staff and management. Where production targets were being pushed upward, being able to show the corresponding energy and operational demands could help justify resourcing decisions and improve internal planning. This points to a broader benefit of integration: not just making energy data more visible, but making it meaningful within the operational and financial language that SME owner-managers already use to manage their businesses.

Josephine's response went further than identifying the concept: she proactively explored how it might be realised, identifying that existing POS providers like SquareUp were already supplying hardware to hospitality businesses and were likely to be receptive to adding energy monitoring as a value-added service. She began to facilitate introductions to her contacts within that company with a view to exploring it as a commercial proposition. This response – moving rapidly from idea to potential commercial action – was itself a vivid illustration of Effectuation in practice, and underlines that SME owner-managers, when engaged on their own terms, can become active agents in developing solutions rather than passive recipients of intervention.

APPLYING THE HAUSER FRAMEWORK TO THE FINDINGS

Applying Hauser et al.'s (2020) framework to the Part 2 findings reveals a consistent and meaningful pattern. When SME owner-managers engaged with smart meter and other data, the dominant cognitive mode was Effectuation: they explored what could be done with the data, given their existing operational priorities and resources, rather than asking whether the data could help them reduce energy. This Effectual process led to the identification of a range of novel potential uses for the data, which were not anticipated at the outset of the research.

Notably, however, the ultimate goals that participants identified for smart meter and other data were predominantly Causal in character: they wanted to gain greater control over existing processes and operations, and to manage their businesses more tightly and predictably. The Effectual exploration of possibilities was, in this sense, in service of a Causal end goal: enabling better Causation in areas of existing operations where they felt they lacked adequate control or visibility.

Energy management, by contrast, remained firmly in the territory of Absence of Strategy throughout. Despite showing Effectual creativity in identifying novel uses for smart meter data, participants did not spontaneously identify energy demand reduction as a goal. Energy management was not actively pursued because it did not offer sufficient control or productivity benefits in the form participants could relate to.

DISCUSSION

ENERGY MANAGEMENT AS ABSENCE OF STRATEGY: INTERVENTION DESIGN IMPLICATIONS

The finding that energy management consistently falls within the Absence of Strategy heuristic is significant (although perhaps not surprising). This has important implications for intervention design.

Despite recent energy cost crises, for SMEs, energy bills typically represent a small proportion of operating costs for the kinds of SMEs studied here, and the cost savings from improved energy management are insufficient, in themselves, to motivate the sustained management attention that would be required (Revell & Blackburn 2007; O'Regan et al. 2005).

A more promising approach, suggested by this research, is to connect energy data with areas of the business where Causal decision-making already operates. The findings indicate that there appears to be genuine appetite for data tools that support those goals. If smart meter and other data can be made relevant to those existing priorities, energy management can emerge as a co-benefit rather than a primary goal.

LEVERAGING EFFECTUATION IN ENGAGEMENT AND INTERVENTION DESIGN

The Effectual quality of participants' responses when exploring smart meter and other data suggests that giving participants the agency to interpret data within their own operational contexts is a productive engagement strategy. This aligns with broader findings in the AR literature and with the participative approach taken in this study (Heron & Reason 1997; Bradbury & Reason 2008).

Both Hildebrand and the SME participants demonstrated that when given the opportunity to explore smart meter data from the perspective of their own operational contexts, they consistently identified novel and valuable use cases that energy management researchers and policymakers would not have anticipated. This has important implications for how future innovation competitions, research projects and other policy interventions are designed: rather than specifying the desired tool or outcome in detail, leaving room for entrepreneurial exploration may generate more useful and widely adopted solutions.

INTEGRATING SMART METER DATA INTO EXISTING SYSTEMS

A consistent theme across the findings was the preference for integrating smart meter and other data into existing management systems, rather than deploying a new proprietary energy management tool. Participants identified POS systems and accounting platforms as natural

integration points that they already used actively to manage their businesses. Integrating smart meter data into these systems would bring several benefits: it would make energy data visible alongside operational data; it would facilitate the creation of operational-level energy metrics meaningful to each business; and it would reduce the ‘attention cost’ of energy management by making it part of existing workflows.

This finding has significant policy implications. The evidence from this research suggests that targeting existing management systems providers, and encouraging them to integrate smart meter data into their platforms, may be a more effective route to improving SME energy management at scale. This represents a meaningful reframing of where innovation effort could helpfully be directed in future.

ENERGY PRODUCTIVITY AS A REFRAMING FOR POLICY AND PRACTICE

The findings also suggest a productive reframing for how energy management is communicated to SMEs. The dominant policy framings of energy efficiency and demand reduction are conceptually problematic for owner-managed SMEs who are primarily focused on growth and operational productivity. A framing around energy productivity – how efficiently (or perhaps better, *effectively*) energy is used in relation to operational outputs – aligns much more closely with how successful SME owner-managers think about their businesses.

Metrics such as energy used per cup of coffee served, or per kilogram of roasted coffee, are not only more meaningful to business owners but are also more likely to surface genuinely productive interventions – reducing energy waste in ways that also improve operational efficiency. Importantly, such an approach also offers a natural pathway toward engagement between energy policy and broader economic policy.

STUDY LIMITATIONS

These findings draw on in-depth engagement with three owner-managed SMEs across two related sectors, alongside collaborative work with one technology partner. The intent was depth rather than breadth, consistent with the participative and qualitative nature of action research, in which transferability rather than statistical generalisation is the appropriate test of value ([Heron & Reason 1997](#)). The small number of cases means the specific patterns identified, particularly the four areas of unanticipated use for smart meter and other data, should be treated as illustrative rather than exhaustive. The broader theoretical contribution, applying the Causation, Effectuation and Absence of Strategy framework to SME energy management, rests on a logic of analytic resonance with the wider SME entrepreneurship literature ([Sarasvathy, 2001](#); [Smolka et al., 2018](#); [Hauser et al., 2020](#)). Further empirical work across a wider range of sectors, business sizes and national contexts would help test how far the patterns observed here apply more generally.

CONCLUSIONS

This paper has presented findings from an action research study exploring how owner-managed SMEs respond to the development and testing of new smart meter data-based energy management tools. Three main conclusions emerge.

First, SME owner-managers respond to new energy management tools and data in an entrepreneurial manner, characterised primarily by Effectual decision-making. When given agency to explore how smart meter and other data could be useful within their own operational contexts, they generated a range of novel and operationally valuable uses for the data. Energy management, by contrast, persistently appeared as an area of Absence of Strategy, driven by the low priority and limited visibility of energy within the broader business context.

Second, the entrepreneurship framework ([Hauser et al. 2020](#)) offers a valuable conceptual lens for understanding SME energy management behaviour. This is the first study to bring this framework into dialogue with SME energy management research, and further empirical work to develop and test it in this context is warranted.

Third, the findings have clear implications for policy and practice. Interventions designed around cost savings alone are unlikely to overcome the attention deficit problem. More promising

approaches involve: connecting energy data with existing operational priorities where Causal decision-making already operates; integrating smart meter data into existing management systems rather than deploying standalone tools; giving SME owner-managers genuine agency in how data is explored and used; and reframing energy management around productivity rather than efficiency or demand reduction.

The study also demonstrates the value of action research as a methodology for energy management research. Working directly within the context of an innovation project, and building sustained participative relationships with SME owner-managers, generated insights that would not have been accessible through more conventional qualitative approaches. This suggests that AR has considerable potential as a method for future work in this under-researched field.

DATA ACCESSIBILITY STATEMENT

The data underlying this study consist of qualitative interview transcripts, field notes, on-site observational records and supporting documentary material gathered from a technology partner and three owner-managed SMEs. These data cannot be made publicly available because they contain commercially sensitive and personally identifiable information about a small number of participants and their businesses, for whom full anonymisation in the underlying records is not feasible given the depth and specificity of the qualitative material. Aggregated and anonymised excerpts are presented in the paper, and further information may be made available on reasonable request to the corresponding author, subject to ethical and confidentiality constraints.

NOTE

¹ Informed and supported by interview recordings and associated transcripts.

ADDITIONAL FILE

The additional file for this article can be found as follows:

- **Display session poster.** Poster relating to this article. DOI: <https://doi.org/10.66506/essp.9-238-26.s1>

ETHICS AND CONSENT

This research was approved by the UCL Bartlett School of Environment, Energy and Resources research ethics committee. All participants gave written informed consent to participate and were free to withdraw at any time. The research was registered with the UCL Data Protection Service (reference Z6364106/2019/01/06) and conducted in compliance with the UK Data Protection Act and General Data Protection Regulation (GDPR). Personal data and commercially sensitive material were stored securely on UCL servers. SME participants are reported under pseudonyms.

ACKNOWLEDGEMENTS

The authors are grateful to colleagues at Hildebrand Technology Ltd for their generous collaboration throughout this research. The authors also thank the three owner-managed SMEs who gave their time and openness to participate in the study.

FUNDING INFORMATION

This research was supported by the UK Engineering and Physical Sciences Research Council (EPSRC) through the Centre for Doctoral Training in Energy Demand (LoLo), grants EP/L01517X/1 and EP/H009612/1.

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

David Kenington was the lead author and this work presents a portion of work completed as part of his PhD Thesis. Kathryn B Janda acted as primary supervisor for the PhD and in this role provided substantial contributions to all elements of the conception, development and delivery of the paper. Paul Ruyssevelt acted as secondary supervisor and also provided substantial contributions to all elements of the conception, development and delivery of the paper.

ECCCC PAPER ID

9-238-26

AUTHOR AFFILIATIONS

David Kenington  orcid.org/0000-0003-3400-0693

Energy Institute, Bartlett School of Environment, Energy and Resources (BSEER), University College London, Central House, 14 Upper Woburn Place London WC1H 0NN London, UK

Kathryn B. Janda  orcid.org/0000-0002-2978-430X

Environmental Change Institute, School of Geography and the Environment, University of Oxford, South Parks Road, Oxford, OX1 3QY, UK; Minnesota Design Center, University of Minnesota, 1425 University Avenue SE Minneapolis, MN 55455, USA

Paul Ruyssevelt  orcid.org/0000-0002-4406-4458

Energy Institute, Bartlett School of Environment, Energy and Resources (BSEER), University College London, Central House, 14 Upper Woburn Place London WC1H 0NN London, UK

REFERENCES

- BEIS (Department for Business, Energy & Industrial Strategy).** 2015. *Building Energy Efficiency Survey (BEES): Overarching report*. Available: <https://www.gov.uk/government/collections/non-domestic-buildings-energy-use-project> [Accessed 28/7/2026].
- Bradbury, H and Reason, P.** 2008. 'Issues and choice points for improving the quality of action research'. In: Minkler, M and Wallerstein, N (eds.) *Community-based participatory research for health*. San Francisco: Jossey-Bass. pp. 225–242.
- Coghlan, D and Brannick, T.** 2014. *Doing action research in your own organisation*. 4th ed. London: Sage. DOI: <https://doi.org/10.4135/9781529682861>
- Cooremans, C.** 2011. 'Make it strategic! Financial investment logic is not enough'. *Energy Efficiency*, 4(4): 473–492. DOI: <https://doi.org/10.1007/s12053-011-9125-7>
- Fawcett, T and Hampton, S.** 2020. 'Why and how energy efficiency policy should address SMEs'. *Energy Policy*, 140: 111337. DOI: <https://doi.org/10.1016/j.enpol.2020.111337>
- Fischer, C.** 2008. 'Feedback on household electricity consumption: a tool for saving energy?'. *Energy Efficiency*, 1(1): 79–104. DOI: <https://doi.org/10.1007/s12053-008-9009-7>
- Hampton, S and Fawcett, T.** 2017. 'Challenges of designing and delivering effective SME energy policy'. *European Council for an Energy Efficient Economy*. <https://ora.ox.ac.uk/objects/uuid:1c373218-9abf-42ce-84d8-d7d2c056a5fb/files/m68f3067436047be2430659c77c5c0929> [Accessed 30-7-26].
- Hauser, A, Eggers, F and G ldenber , S.** 2020. 'Strategic decision-making in SMEs: effectuation, causation and the absence of strategy'. *Small Business Economics*, 54(3): 775–790. DOI: <https://doi.org/10.1007/s11187-019-00152-x>
- Heron, J and Reason, P.** 1997. 'A participatory inquiry paradigm'. *Qualitative Inquiry*, 3(3): 274–294. DOI: <https://doi.org/10.1177/107780049700300302>
- IEA (International Energy Agency).** 2015. *Accelerating energy efficiency in small and medium-sized enterprises*. Paris: IEA. <https://www.iea.org/reports/policy-pathway-accelerating-energy-efficiency-in-small-and-medium-sized-enterprises-2015> [Accessed 28/7/2026].
- Janda, K, Bottrill, C and Layberry, R.** 2014. 'Learning from the "data poor": energy management in understudied organizations'. *Journal of Property Investment & Finance*, 32, 424–442. DOI: <https://doi.org/10.1108/JPIF-03-2014-0018>
- Kenington, D, Chiu, LF, Janda, KB and Ruyssevelt, P.** 2020. 'Encouraging energy efficiency in United Kingdom independent retail? The case of the butcher, fishmonger and cycle-shop'. *Energy Research & Social Science*, 62: 101347. DOI: <https://doi.org/10.1016/j.erss.2019.101347>

- Lunt, P, Ball, P and Levers, A.** 2014. 'Barriers to industrial energy efficiency'. *International Journal of Energy Sector Management*, 8(3): 380–394. DOI: <https://doi.org/10.1108/IJESM-05-2013-0008>
- O'Regan, N, Sims, M and Ghobadian, A.** 2005. 'High performance: ownership and decision-making in SMEs'. *Management Decision*, 43, 382–396. DOI: <https://doi.org/10.1108/00251740510589760>
- Reason, P.** 2006. 'Choice and quality in action research practice'. *Journal of Management Inquiry*, 15(2): 187–203. DOI: <https://doi.org/10.1177/1056492606288074>
- Reason, P and Torbert, WR.** 2001. 'The action turn: toward a transformational social science'. *Concepts and Transformation*, 6(1): 1–37. DOI: <https://doi.org/10.1075/cat.6.1.02rea>
- Revell, A and Blackburn, R.** 2007. 'The business case for sustainability? An examination of small firms in the UK's construction and restaurant sectors'. *Business Strategy and the Environment*, 16(6): 404–420. DOI: <https://doi.org/10.1002/bse.499>
- Sarasvathy, SD.** 2001. 'Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency'. *Academy of Management Review*, 26(2): 243–263. DOI: <https://doi.org/10.5465/amr.2001.4378020>
- Smolka, KM, Verheul, I, Burmeister-Lamp, K and Heugens, PPMAR.** 2018. 'Get it together! Synergistic effects of causal and effectual decision-making logics on venture performance'. *Entrepreneurship Theory and Practice*, 42(4): 571–604. DOI: <https://doi.org/10.1177/1042258718783429>
- Trianni, A and Cagno, E.** 2012. 'Dealing with barriers to energy efficiency and SMEs: some empirical evidences'. *Energy*, 37(1): 494–504. DOI: <https://doi.org/10.1016/j.energy.2011.11.005>
- Vershinina, N, Barrett, R and Mchardy, P.** 2017. 'Logics and rationalisations underpinning entrepreneurial decision-making'. *Journal of small business and enterprise development*, 24, 158–175. DOI: <https://doi.org/10.1108/JSBED-06-2016-0092>

Kenington et al.
ecccc Summer Study
proceedings
DOI: 10.66506/essp.9-
238-26

TO CITE THIS ARTICLE:

Kenington, D, Janda, KB and Ruyssevelt, P. 2026. Using entrepreneurship theory to inform owner-managed SME engagement with novel energy data and management tools: An action research study. *ecccc Summer Study proceedings*, 1(1): 40, pp. 1–11. DOI: <https://doi.org/10.66506/essp.9-238-26>

Submitted: 18 March 2026

Accepted: 25 May 2026

Published: 10 August 2026

COPYRIGHT:

© 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <https://creativecommons.org/licenses/by/4.0/>.

ecccc Summer Study proceedings is a peer-reviewed open access journal published by European Council for an Energy Efficient Economy (ecccc).

