



EnergyMeasures

Tailored measures supporting energy vulnerable households

D3.3 Case Study: energy company vulnerable household support pilot programme (interim report)

 <http://www.energymeasures.eu>

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About EnergyMeasures

EnergyMeasures is working to address energy poverty in seven European countries, namely: Belgium, Bulgaria, Ireland, Netherlands, North Macedonia, Poland, and the United Kingdom. The project comprises two complementary and synergistic strands of work.

The first strand involves working with energy poor households to improve their energy efficiency through a combination of low-cost measures, and changes in energy-related behaviours and practices. Recruited householders will be provided with low-cost energy measures and empowered to change their energy-related behaviours and practices through an approach that takes account of existing housing conditions and is reflective of their lived experience.

The second strand comprises working with municipalities, energy authorities, housing associations and other relevant actors to assess how current multi-level institutional contexts affect efforts to alleviate energy vulnerability in the participating countries. This knowledge will be used to develop and support the implementation of policy and practice measures which will address structural issues that combine to trap households in energy poverty.

Through this work the project contributes to reducing participants' vulnerability to energy poverty, while at the same time cutting household energy consumption and associated GHG emissions.

For more information see <http://www.energymeasures.eu>

Executive summary

This report provides an initial report on the energy company vulnerable household support pilot programme undertaken within the EnergyMeasures project.

Glossary

C&R	Care and Repair
CRU	Commission for Regulation of Utilities
CSR	Corporate Social Responsibility
EAI	Electricity Association of Ireland
EED	Energy Efficiency Directive EU/2023/1791
EEOS	Energy Efficiency Obligation Scheme
NGO	Non-governmental organisation
OP	Obligated Party
SDCP	South Dublin County Partnership
SEAI	Sustainable Energy Authority of Ireland
UCC	University College Cork

1 Introduction & Background

A household is considered to be energy poor when it is ‘... not able to adequately heat or provide other required energy services in their homes at affordable cost’ (Pye *et al.*, 2015). While always a significant issue in many countries (albeit not always acknowledged)¹, the level of energy poverty in Europe has worsened in recent years arising in part from the knock-on impacts of the Covid-19 pandemic but in particular, from the energy crisis precipitated by the Russian invasion of Ukraine² – with both the quantum of energy poor households and the intensity of energy poverty they suffer increasing.

The inability of energy poor household to afford the energy needed for to service their basic needs mean they face an unenviable dilemma. They are forced to choose between spending an overly high portion of their income on energy for heating, lighting, cooling, cooking, and other uses, or going without so they can pay for other essentials. In effect, this means that many in energy poverty face ‘a cold (or overly hot) and uncomfortable home and reduced living standards’ (Dunphy *et al.*, 2023, p. 17). The consequences can have significant impacts on the physical health and mental wellbeing of the energy poor (Thomson *et al.*, 2016)

While one’s level of income can be considered an important factor in being energy poor, it is by no means the defining factor. Not all those who are income poor are also energy poor, and conversely not all those in energy poverty are necessarily in what might be termed income poverty (Palmer *et al.*, 2008). Energy poverty arises from several intersecting factors, including low household incomes, high energy prices, specific energy needs, and reliance on inefficient buildings and appliances (Bouzarovski, 2014). Consequently, unlike so-called income poverty, energy poverty cannot be addressed through income support alone³, rather it requires a more holistic response including addressing building energy efficiency and to an extent influencing the householders’ energy consumption behaviours.⁴

EnergyMeasures is a Horizon 2020 funded project which is working to address energy poverty in seven European countries, namely: Belgium, Bulgaria, Ireland, Netherlands, North Macedonia, Poland, and UK. The work is divided into two strands, the first of which is household support initiative. Here, energy poor households are engaged to understand how the way in which they use energy, and how this is influenced by both their physical surroundings and the patterns of their daily life. Leveraging this knowledge, appropriate low-cost energy measures are provided, and tailored behaviour change plans devised for the householders. Complementary to this engagement, the project is also working with municipalities and other relevant actors to assess institutional contexts affect efforts to alleviate energy vulnerability, and to develop and support measures which will address structural issues that combine to trap households in energy poverty.

The second of these strands of work contained a task which aimed to develop a staff volunteer programme, which would help and support energy poor households with small maintenance and other odd jobs. The rationale for the task was to recruit from the large number of relevant trades (electricians, plumbers,

¹ Bouzarovski (2014, p. 276) notes, that until the last decade or so, Ireland and the UK ‘...were the only two EU states where the material existence and political voice of the ‘fuel poor’ were widely recognized in public debates, policies, and research.’

² Notwithstanding relative moderation in late 2023, energy prices are still a great deal higher than the pre-war situation.

³ Although of course insufficient income is a significant factor in energy poverty.

⁴ However, we acknowledge that many of the householders suffering from energy poverty may not have substantial scope for reducing energy-related behaviour change due to existing self-rationing.

carpenters, etc.) working in UCC and other comparable sized organisations. This planned ‘Care and Repair’ team would comprise of UCC staff who would have specifically volunteered for this role. It was intended that they be Garda vetted⁵ and would work in pairs under the supervision of UCC project leads. In many ways the envisaged programme was to be similar to other schemes found in Ireland e.g., initiatives run by the South Dublin County Partnership⁶ and Age Action⁷, with the difference being its target beneficiaries⁸.

The Covid-19 pandemic posed a significant impediment to starting the staff volunteer programme, with substantial legal restrictions on movements and social mixing during 2021 and into quarter one 2022 making it simply not possible to commence such a programme, or even to do the preparatory engagement needed to plan such a programme. Even after the relaxation of the social and movement restrictions in early 2022 there remained substantial impediment to organising and launching a volunteer programme as originally planned. Health and safety obligations and duty of care concerns made it difficult to progress the initiative with the level of safeguarding necessary for prospective staff volunteers and householder clients alike. Moreover, the experience of the long ‘lock-down’ and the continuing precautionary public health messaging meant that many householders remained reluctant to let visitors into their house for most of that year. It became apparent that realising the prospective volunteering initiative (in any meaningful way) was becoming less and less likely as the project progressed – not least because of ever reducing time available. With this in mind and cognisant of the availability of Care & Repair schemes for a majority of the participating householders in Cork, a decision was taken in 2023, in consultation with the project officer, to reimagine and redefine the task as one focused on collaboration with energy companies to enable them reach out to and support energy poor households. This task involves working with energy company(ies) to devise a support programme for energy poor households, which will complement and supplement the small scale energy efficiency and conservation measures provided through the EnergyMeasures project.

This report comprises an interim report on such activities, giving an overview of the envisaged assistance programme, reporting on what has been achieved to date, and indicating (if so much as possible) what will be done over the remaining life of the initiative. A update full report on this task will be prepared in Feb-2024. There are three sections in this brief report, this first section offers an introduction and provide background to the report, outlining the original plan for the task and explaining the pivot to a task collaborating with energy company(ies). The second comprises a brief review of the process of engaging with the energy companies and working with them to devise prospective programme. It also provides an overview of the programme launched by one of the companies during 2023. The third section provides an overview of the implementation of the programme to date along with a brief discussion of the outcomes and a prospective look at the remainder of the task. At this stage, the names and identifying information relating to, the energy company(ies) and other stakeholders will not be included in this report. Such details will be included in the final case study report forthcoming in Feb-2024.

⁵ This refers to vetting by An Garda Síochána (the Irish National Police Force), a statutory process to check whether someone has a criminal record, or if there is any specified reason why they might pose a threat to vulnerable people.

⁶ Tús Care & Repair aimed at the elderly or those with an illness or disability in South Dublin. <https://sdcpartnership.ie/care-repair/>

⁷ Care & Repair service, for older people in Cork, Dublin and Galway. <https://www.ageaction.ie/how-we-can-help/care-and-repair>

⁸ Although over half of those recruited to EnergyMeasures in Cork are elderly, and as such they are eligible for support from the Age Action C&R scheme.

2 Energy company support programmes

Following the amendment mentioned in the previous section, the description for the reimagined task concerning energy company support programmes for the energy poor reads as follows:

‘This task involves working with at energy company/(ies) to devise a support programme for energy poor households, which will complement and supplement the small-scale measures provided though EnergyMeasures. The programme will build on the household identification and recruitment in WP2 to select a cohort of households for additional support including e.g., remote heating control systems, hot water control systems, insulation, boiler replacements. The small number of person-months allocated for this task relate to the management and administration of the proposed initiative. The actual engagement with the households will take place in the context of WP2, while the envisaged supports will be provided by the participating energy company/(ies). While this is a real and tangible action in its own right (with an initial target of 150 households), the creation and realisation of this programme is of immense value both as a demonstration case study, and as a legacy energy company led programme. Accordingly, by the end of the initiative, it is planned to: (i) have placed the pilot programme on a strong footing for continued operation under the leadership of the participating energy company/(ies); and have (ii) produced a documented case study to encourage other organisations to undertake similar initiatives. This type of programme is an example of a practice innovation (for both public and private organisations), which could be promulgated through appropriate policy supports.’

2.1 Motivation

Arena (2019, p. 83 citing Scott, 1995) posits that ‘organizations must be considered legitimate by the surrounding world to survive on the long run.’ That truism particularly holds for utilities, the entities, such as energy companies that manage public goods and in so doing have strong relationships with members of the general public. No organisation of course exists in a vacuum. Companies’ activities are influenced and shaped by the multiple institutional logics⁹ of their stakeholders and the wider context in which they operate. This is no less true for regulated public utilities such as energy companies, which must balance the expectations and demands of multiple stakeholders such as investors, governments, regulators, business partners, communities, customers, employees, etc. (Arena *et al.*, 2018). It should be noted that ‘(t)he logics bring concurrent pressures as companies must simultaneously address these multiple logics and reconcile contrasting ones, bringing to the forefront the role of companies in evaluating and choosing whose expectations to prioritize and how to answer them’ (Arena *et al.*, 2019, p. 84). It is the combination and the interaction of these multiple stakeholders’ expectations that motivates energy utilities to engage in public good programmes.

The Irish government’s Energy Efficiency Obligation Scheme¹⁰ (EEOS) obliges large energy distributors & suppliers to support energy efficiency projects in homes, businesses, and communities. Under the EEOS, distributors and those that sell more than 400GWh of energy per year to final customers – known as Obligated Parties (OPs) – are given specific annual targets based on their market share within the energy industry. The

⁹ The idea that major societal institutions (e.g., state, market, communities, families, democracy, religion) each have ‘a central logic that constrains both the the means and ends of individual and organizational behaviour’ Arena *et al.*, (2018, p.346)

¹⁰ Contributing to meeting (albeit predating) the requirement of Article 7 of the Energy Efficiency Directive (EED) for countries to countries to achieve a certain amount of energy savings.

OPs can achieve these targets by financially supporting energy efficiency upgrades. For every unit of energy saved, OPs 'earn' Energy credits towards their annual goal. Although the support offered through this programme would contribute to meeting the energy companies' EEO targets, so too would support for energy efficiency upgrades in other households, businesses or communities¹¹, which might be more easily realised. Thus, while offering supports for energy poor households can earn energy companies' EEO credit, that on its own is likely an insufficient motive to establish such an effort-intensive programme. But coupled with interaction of various institutional logics (including *e.g.*, societal expectations¹², shareholder concerns, socially aware employees), it has the potential to be an inducement.

2.2 Engaging the sector

From early in the project, the Irish EnergyMeasures partners were reaching out to relevant sectoral actors to communicate the aims and objectives of the project and disseminate its activities and outputs. This included a number of presentations facilitated by the Commission for Regulation of Utilities (CRU). The first comprised a most productive meeting with 23 consumer stakeholders, the second held in conjunction with the Electricity Association of Ireland (EAI) was attended by 14 different energy suppliers. Following these initial meetings there were a range of further engagements with other relevant groups including *e.g.*, Government Departments, the Sustainable Energy Authority of Ireland (SEAI), local authorities, housing associations, NGOs, community groups, *etc.* These engagements with the energy companies was in many respects a direct pitch for them to support (and ideally build upon) the EnergyMeasures household engagements, that with the various other socio-political stakeholders¹³ could be characterised as working to share the external context as discussed in the previous section.

Following the very successful and well-received CRU/EAI meeting with the 14 energy companies, 10 of the companies responded positively to our proposal to support their vulnerable customers and engaged with us in different ways towards realising this objective. There have been several meetings with these energy suppliers exploring not only ways in which they could facilitate or ideally support the reaching out to energy poor households but also the prospective ways in which they might leverage and build upon the EnergyMeasures activities¹⁴. These discussions continue with varying intensity and at different stages with different energy suppliers.

To date, two energy suppliers have committed to developing initiatives to support householders suffering from energy poverty and to implement these in conjunction with – and with the support of – the Irish project partners. The first of these initiatives commenced in mid-2023 and involves the provision of additional (what might be termed medium scale) measures for householders. This programme is outlined in more detail in the following section and a brief update on progress is included in Section 3. The second energy supplier is working with us to develop and realise two initiatives, one involving the analysis of householder energy consumption data to recommend optimum tariffs, the other involving the provision of larger energy conservation & energy

¹¹ EEO supports energy efficiency improvements for homeowners, businesses, local authorities and approved housing bodies. In addition to building improvements this could also include improvement of business processes, fleets and infrastructure.

¹² Manifested in socio-political discourse and perhaps in regulatory guidance.

¹³ Albeit in many of these engagements the primary focus was to reach energy poor households.

¹⁴ The programmes developed with the energy companies will continue beyond the end of the project and in this respect representative a legacy of EnergyMeasures.

efficiency measures to energy poor households at no cost. Full details on each these initiatives, the supports provided and the outcomes achieved will be presented in the update version of this report, an additional output of this report forthcoming in Feb-2024.

2.3 Overview of Initial initiative

The first initiative arising from the engagement with the energy companies had a soft launch in the first quarter of 2023. At this point an outline of the offering is being provide in this interim report, full details will be provide in the forthcoming full case study report due to Feb-2024. The initiative involves the provision of smart controllers for heating and water; survey for, and installation of attic and cavity insulation where appropriate; and where necessary replacement of old gas boilers for a limited number of cases. These measures are described below.

1. Smart Heating Controller

Installation of smart remote digital heating controllers (value of c. €399) – compatible with most heating systems – was offered to householders to replace their traditional physical controllers along with wirelessly connection thermostats. The heating controller controls up to three heating zones, depending on the configuration of the heating system (one of which can be water heating).



Figure 1: Smart heating controller – wall mounted hub (left & centre) smartphone app (right)

The smart remote heating controllers were installed in participating households free of charge. A wall mounted hub (see left & centre in Figure 1 above) replace the conventional switches offering more precise control over the heating system more with an user-friendly interface with seven day planning and booster controls. The heating can also be controlled through an smartphone app (see right in Figure 1), web portal and a SMS service (for homes in more isolated areas and those who are less tech savvy) offering remote access to the same controls – ideal *e.g.*, checking the temperature and perhaps boosting heating in advance of the family arriving home on an cold day (this service is also very useful for households with more vulnerable members, where other family members can for example monitor household temperature when they are away). In most homes, the conventional physical time clock controls are set perhaps once a season, with manual intervention as weather conditions change. This leads to significant inefficiencies due to lack of control and often results in waste *e.g.*, when the physical boost to the system during a cold spell is not switched back in time. By offering more control over their heating systems, these smart controllers help householders save on energy heating

and using only when needed. In energy company trials, these controls have been shown to save up to 20% of heating costs.

2. Smart Immersion controller

Installation of smart digital remote hot water immersion controllers (value of c. €399) was offered to householders to replace the conventional switches. The system comprised a temperature probe which was fitted to an existing tank along with the new controller. This system also made the householder compatible with the EnergyCloud initiative.

In Ireland almost all houses are fitted with immersion water heaters¹⁵ separate from the water heating from their primary energy source (e.g., natural gas or oil). For some this is a supplementary system, used perhaps during summer months when the heating is not used, when the boiler breaks down, or (as may be the case for many energy poor households at different times of the year) when their oil tank is empty – for others it is used as their primary hot water supply. This system comprises insulated hot water cylinders with an integrated element (think of an electric kettle) designed to heat water.

The existing binary on/off switches which were so likely to be left on for long periods¹⁶, were replaced by the wall mounted smart immersion controller shown in Figure 2 below (left). For the first time householders can now see how much usable hot water is available – eliminating the ‘just in case’ heating that would have been common. Hot water heating can be set on a seven-day timer, allowing for schedules according to weekly activities, it can also be ‘boosted’ for a set amount of time. The ability to schedule the immersion means that households with time-of-use tariffs can save by timing their water heating for when rates are cheaper.



Figure 2: Smart immersion controller wall mounted (left) smartphone (centre & right)

These new easy to use controls are supplemented by a smartphone app (as shown in Figure 2 above (the central image shows a status with no hot water available, while the image on the right shows an in progress ‘boost’ to c. 33% hot water capacity)). This means that users can now not only check how much hot water is available but they can do so remotely e.g., coming home after playing sports and setting a boost for hot water

¹⁵ The refrain ‘did you turn the immersion off?’ is such a common cultural trope in Ireland that it is often used by comedians.

¹⁶ EnergyCloud <https://energycloud.org/home/> is a social enterprise supported by Irish energy utilities and the wind energy industry. It diverts surplus energy from renewable energy generators, which otherwise would be wasted, to provide free water top-ups in vulnerable Irish homes.

if required. This offers a huge improvement in levels of control for homeowners, meaning they save energy and money by only heating when it is needed.

3. Insulation

Poor thermal insulation is a significant contributor to energy poverty. Many of the households engaged by EnergyMeasures project have little (and occasionally even no) insulation in their homes. This means the heat is simply escaping resulting in significant costs while still not heating the home adequately. This part of the initiative involves surveying the participating households to check their suitability for installation of attic, cavity, and/or external wall insulation as shown in Figure 3 below.



Figure 3: Installation of attic insulation (left), cavity insulation (right), and external wall insulation

Attic insulation is generally the most cost effective energy efficiency upgrade that can be made to a house. The most common approach is so-called ‘cold roof’ insulation involves the laying of insulation (e.g., floor rolls or insulation floor boards) to the floor of the attic trapping the heat in the main part of the house. This means that the attic itself is effectively outside of the thermal envelope of the house. This is suitable if the attic is not used or only used for the storage of non-perishable items. The alternative approach is to fit insulation above the rafters making the area a habitable space. The attic insulation survey involves checking *e.g.*, size of the area; depth of existing insulation; adequacy of ventilation; size of hatch; presence of dampness; pipework and cold water tanks be insulated; *etc.*

Cavity wall insulation involves the injection of insulation (*e.g.*, Expanded Polystyrene bonded bead) into the space found between inner and outer walls in cavity wall constructions forming an insulating mass. This still allows the wall cavity to breathe and as this type of insulation does not absorb moisture it will not transfer across the cavity to the inner wall. The pre-insulation survey involves checking *e.g.*, type & condition of structure; size of area; width of the cavity; services through cavity; presence of debris; presence of damp; adequacy of ventilation; access considerations; *etc.*

External wall Insulation involves (as the name suggests) affixing suitable insulation (*e.g.*, expanded polystyrene extruded polystyrene, or polyisocyanurate) to the outside wall of a dwelling. The pre-insulation survey involves checking factors such as type of structure; condition of walls; size of area; services (*e.g.*, meters); drainpipe and other fixtures; windows and sills; ventilation requirements; access considerations; *etc.* It will usually also require some remediate work to resolve any problems with the exterior walls. Fixtures such as lights and satellite dishes are removed before commencing. The external wall insulation system is then fixed in place adhesively and/or mechanically fixed, and a fibre mesh and base coat is applied to increase strength. A render finish is then applied on top of the insulation and fixtures are refitted.

Once households are deemed physically suitable for attic cavity wall, external wall Insulation, the insulation upgrade will happen free of charge in a subsequent phase of the project. The installer will liaise with the householders to apply for and draw down any available grant funding. This will serve to conserve the budget and thereby enable the initiative to assist more households. The provision of this installation will provide householders with more comfortable and energy efficient homes while saving money on their heating bills.

4. Gas Boiler upgrade

The final part of this initiative involves the replacement of a limited number of gas boilers. As of 2019, approximately 80% of Irish homes relied on a gas or oil boiler for heating. Although ideally householders would move away from fossil fuel consumption for some this is simply not possible at present and in the interim they are in need of a boiler replacement. Modern boilers typically operate at 90% efficiency or higher, compared with 55%–70% for older boilers depending on a number of factors. Householders with boilers older than say, 15



Figure 4: Gas boiler installation

years (not to mention those with faulty boilers) would benefit substantially from a boiler replacement which would reduce the amount of heat loss and save money. The initiative is assessing the gas boilers of participating households. If they are deemed suitable for upgrade this will be organised in a subsequent phase of the initiative.

3 Summary & final comments

The Irish EnergyMeasures partners (UCC and Energy Action/PNEC) have engaged (and continue to engage) with Irish energy utilities (and other sectoral actors) to encourage them to deliver initiatives to support energy poor households. Arising from this engagement, they have worked with two companies in the planning and design of specific initiatives building on the experience of EnergyMeasures, and particularly in the identification of energy poor (see Dunphy, Lennon & Velasco-Herrejón, 2023).

One of these companies has launched its initiative in early 2023, which is outlined in Section 2, the second company's initiatives are rolling out in late 2023/early 2024. The initial results of the first initiative are quite promising are shown below:

- 87 smart heating controllers installed, 70 queued – representing triggered investment of c. €62.5K.
- 35 smart immersion controllers installed, 101 queued – representing triggered investment of c. €54.3K.
- 135 households surveyed for insulation, awaiting grant progression & installation, 68 queued.
- Additionally, several leads have been identified of households potentially in need of gas boiler replacements. This work will be progress in in early 2023.

Over the remaining life of the EnergyMeasures project (and indeed post-project) we will continue to work with the energy companies on the delivery of these initiatives. Full details of the works will be provided in D3.4, a forthcoming project report (due Feb-2023).

4 References

- Arena, M., Azzone, G., & Mapelli, F. (2019). Corporate Social Responsibility strategies in the utilities sector: A comparative study. *Sustainable Production and Consumption*, 18, 83–95.
<https://doi.org/10.1016/j.spc.2018.12.006>
- Baden, D., Harwood, I. A., & Woodward, D. G. (2011). The effects of procurement policies on “downstream” corporate social responsibility activity: Content-analytic insights into the views and actions of SME owner-managers. *International Small Business Journal*, 29(3), 259–277.
<https://doi.org/10.1177/0266242610375770>
- Boardman, B. (2010) *Fixing Fuel Poverty: Challenges and Solutions*. London: Earthscan.
- Bouzarovski, S. (2014) ‘Energy Poverty in the European Union: landscapes of vulnerability’, *WIREs Energy and Environment*, 3, pp. 276–289. <https://doi.org/10.1002/wene.89>
- Dunphy, N.P., Lennon, B., & Velasco-Herrejón, P. (2023) 'Identifying energy poor households in the Global North' In: P. Velasco-Herrejón, B. Lennon, & N. P. Dunphy (Eds). *Living with Energy Poverty: Perspectives from the Global North and South*. London & New York: Routledge.
- Palmer, G., Macinnes, T., & Kenqay, P. (2008) *Cold and Poor : An analysis of the link between fuel poverty and low income*. London: New Policy Institute.
- Pye, S., Baffert, C., Brajković, J., Grgurev I., De Miglio, R., & Deane P. (2015) *Energy poverty and vulnerable consumers in the energy sector across the EU : analysis of policies and measures*. A research output of the INSIGHT_E FP7 project. Available from <https://bit.ly/3tBT0Bg>
- Scott, W. R. (1995). *Institution and Governance*. Thousand Oaks: Sage Publications, Inc.
- Thomson, H., Snell, C. and Liddell, C. (2016) ‘Fuel Poverty in the European Union: a concept in need of definition?’, *People; Place and Policy*, 10(1), pp. 5–24. <https://doi.org/10.3351/ppp.0010.0001.0002>