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Moving homes and energy poverty: residents' concerns, capabilities and responses

RESEARCH

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ABSTRACT

In the study of energy poverty and vulnerability, limited attention has been paid to the social differentiation and unequal capacities to act. This study examined housing mobility as part of energy action space, asking how the possibility, or impossibility, of moving home shapes energy vulnerability. In-depth interviews (n = 29) conducted during 2024 and 2025 with Finnish residents of detached houses investigated how moving home is discussed after the rapid rise in energy prices in 2022. Some households experience a lock-in beyond their control and inability to move, resulting in aggravated concern for the energy costs and living conditions in their house. Whilst moving home might be a form of effective energy action, it is difficult due to financial constraints, health, housing market conditions or emotional attachment. Moving home also requires capacities of anticipation and timely action. Housing immobility forms a layer of vulnerability that coexists with other forms of vulnerability. The findings challenge the assumption that owner-occupants of detached houses do not experience energy poverty due to their asset ownership.

POLICY RELEVANCE

Energy policy instruments that focus narrowly on prices or on energy efficiency risk overlooking how energy vulnerability is produced through housing trajectories and immobility. Particularly in contexts where home ownership is widespread, policies need to consider the barriers of moving homes and relocating. Public authorities need to consider how housing development, renovation support and mobility options shape the energy action space. Policy should support not only energy retrofits but also feasible housing alternatives and options that allow households to move before their vulnerability becomes entrenched. In more general terms, recognising that people may move home because of high energy costs and poor energy efficiency can help to support market developments towards energy retrofits, not only in the stock of owner-occupied detached houses but also in the rental market, in which property owners need to retrofit to keep their assets attractive.

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1. INTRODUCTION

Energy poverty is most often approached with quantitative indicators such as the share of heating costs in overall expenditure (Tirado Herrero 2017). However, there is an increasing effort to also understand energy poverty as a multi-dimensional, lived experience (Hihetah *et al.* 2024) and a set of coping practices in everyday life. It then appears as a condition in which households are unable to secure adequate energy services due to a combination of limited financial resources, high energy prices and the restricted ability to influence their living conditions (*e.g.* Walker 2015; Day *et al.* 2016). Closely related, energy vulnerability refers to the *risk of exposure* to such conditions of inadequacy, revealing how, for example, structural and situational factors shape households' capacity to cope with energy-related pressures over time (*e.g.* Middlemiss & Gillard 2015).

Previous research has examined household responses to energy vulnerability primarily through individual actions and adjustments within the home, often framed through the nexus of meeting basic needs such as eating, heating and sleeping (Anderson *et al.* 2012; Brunner *et al.* 2012; Stojilovska *et al.* 2021). Alongside such emergence of the qualitative study of energy poverty and vulnerability, Walker (2015) nevertheless claims that insufficient attention has been paid to the social differentiation and unequal capacities to act. Subsequently, there has been increasing attention to vulnerability as socially differentiated and rooted in broader inequalities (Kajoskoski *et al.* 2025).

Capability-based approaches to energy poverty have foregrounded questions of the consequences of energy poverty, *i.e.* what individuals are able to do and be, given their access to energy services and resources and their circumstances (Day *et al.* 2016; Pellicer-Sifres *et al.* 2021). From a capabilities perspective, energy vulnerability concerns whether and how energy systems shape people's choices of living arrangements, social ties and locations (Jenkins *et al.* 2016). Vulnerability not only stems from high costs or inefficient buildings and the consequences thereof, but also importantly from limited or constrained possibilities for mitigating action. Such scope for energy-related action relates to energy use, availability and expenditure, and also to broader issues such as personal health, social relations, housing markets and employment. While related work on carbon and climate capabilities has expanded the scope of analysis towards individuals' capability to understand and act on energy-related issues, it has largely focused on capacities exercised within existing domestic settings (Bal *et al.* 2025), leaving questions of mobility and changing living arrangements less explored (Hampton & Whitmarsh 2024).

The focus of this paper is on the obstacles and ability to affect one's living conditions as a central-yet-underexplored dimension of energy vulnerability. The concept of *energy action space* is introduced and used to capture the scope of agency households have to influence their domestic energy conditions and thereby mitigate vulnerability. The concept of *lock-in* refers to situations a situation where residents are:

> locked into a certain type of energy consumption due to reasons beyond their control.
> (Stojilovska *et al.* 2021: 2)

Adding to the capabilities approach, the concept of energy action space directs attention towards action on energy-related issues.

Housing mobility is examined as a critical but unevenly accessible and feasible dimension of the energy action space. Mobility is increasingly positioned as a transformative response to environmental change, while remaining unevenly accessible and politically contested (Blythe *et al.* 2018). Moving home has been shown to be a disruptive event that reconfigures routines, technologies and material arrangements, with significant implications for domestic energy use (Rinkinen & Jalas 2017; Curtis & Grilli 2021). Settling into a new dwelling involves learning its affordances and constraints, such as heating systems, insulation and spatial layout, and aligning these with household competences, routines and financial means. Moving often coincides with other life changes, including changes in income, health or household composition, making it a revealing moment for examining how energy action space evolves in relation to vulnerability (Toivonen & Rinkinen 2025). Residential mobility is embedded in wider housing trajectories and life-course processes (Coulter *et al.* 2016). Energy vulnerability may therefore reflect not only present circumstances but also previous housing decisions, life-course transitions and changing

housing-market conditions that shape households' opportunities for action. Yet it remains poorly understood how the possibility of moving, or being unable to move, shapes energy vulnerability. This study addresses energy vulnerability in Finland by examining moving home as a situation where energy-related concerns, capacities and opportunities became particularly visible. The analysis draws from 29 interviews with owner-occupants mostly living in detached houses, selected from a large survey (n = 4771) of Finnish detached-house residents. The interviews were conducted in the period 2024–25 in the aftermath of the 2022–23 energy crisis, when energy prices increased rapidly following Russia's invasion of Ukraine, and energy concerns became salient in everyday life (Laakso *et al.* 2024; Matschoss *et al.* 2025).

2. HOUSEHOLD ENERGY ACTION AND VULNERABILITY

Households have long been recognised as active participants in shaping energy use. Rather than being passive recipients of energy services, people continually adjust how they live in response to shifting social, material, economic and infrastructural conditions. Monitoring consumption, learning the functioning and limitations of heating and cooling systems, and negotiating comfort within available resources all form part of this ongoing work. Through such adjustments, the home and its energy arrangements are actively maintained and reproduced, as residents draw on their skills, knowledge and support networks to secure an adequate level of energy services (Jalas & Rinkinen 2016; Matschoss *et al.* 2025; Moore *et al.* 2017).

Research on energy action has documented a wide range of actions and strategies. At the one end of the spectrum, highly skilled and technologically oriented citizens develop new energy solutions and adapt technology for local needs and develop their own capabilities and share knowledge in peer-to-peer networks (Hyysalo *et al.* 2013; Heiskanen *et al.* 2015a). However, such users are a rare breed. Most households sustain an adequate level of energy services through bricolage, resourcefulness and incremental adaptations. These include periodic maintenance, small retrofits, social support from neighbours or relatives, and informal learning within communities (*e.g.* Madsen 2018; Rinkinen *et al.* 2024). Such responses draw on heterogeneous resources beyond finances, including bodily capacity (Wallenborn & Wilhite 2014), local communities (Heiskanen *et al.* 2015b), support networks and knowledge accumulated through lived experience (Kajoskoski 2024). Moreover, efforts to cope with extremely hot outdoor temperatures imply similar patterns, but also new spatial configurations of using the indoor space and proximate outdoor spaces (Berger *et al.* 2022). Households thus learn to align routines with the affordances of buildings and technologies, adapting actions to maintain comfort under constrained conditions (Madsen 2018; López *et al.* 2025).

Household energy action is often also practical, embodied and identity-forming. Jalas & Rinkinen (2016) show how demanding heating arrangements can become feasible through the alignment of ingrained daily rhythms with infrastructural requirements, such as the timing of burning of solid wood or the management of intermittent systems. People also regulate their social interaction (Day & Hitchings 2011; Jalas & Rinkinen 2016) and adjust comfort expectations (Chappells 2010; Berger *et al.* 2022; Matschoss *et al.* 2025), and hence 'live' their heating systems and cooling arrangements. Through such material and social embedding of heating and cooling practices, what might be regarded as cumbersome, inconvenient or even unhealthy can indeed become a comforting basis for everyday life and normalised as an identify-giving struggle (Berger *et al.* 2022). However, negative emotions of shame and strain also accompany fuel poverty and the struggle of coping (Longhurst & Hargreaves 2019).

To bring these perspectives together, the concept of energy action space is employed: the space spans from everyday practices and spatial–temporal arrangements to human bodies, cognitive capacities and to technological and housing-related elements. Energy action space thus both collects together underlying constituents of energy action and capacities as well the outcomes of unfolding energy practices: it aims to capture how households adjust routines, mobilise social support, engage with technologies and, at its outer limits, reconfigure their living arrangements through relocation. It is further suggested here that the action space is deployed and practiced through activities that pursue a match with existing cultural and social categories and can be read as competent and effective measures within such realms.

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Within this framework, residential mobility represents a high-impact form of energy action, where households may seek homes and engage in spatial arrangements that better align with their needs and aspirations. Moving home entails reconfiguring a wide range of energy-related arrangements and can substantially reshape energy vulnerability. Relocation has been shown to occur at moments of wider life transition, when routines are unsettled, resources reassessed and expectations about the future negotiated (Rinkinen & Jalas 2017). At the same time, uneven spatial development and the emergence of 'energy peripheries' reveal how access to adequate and affordable energy is structured by housing markets and regional inequalities (Golubchikov & O'Sullivan 2020), shaping both the need and the possibilities for moving. Energy vulnerability can become concentrated in particular socio-spatial contexts, 'downstream energy peripheries' (Atkins *et al.* 2025). From this perspective, the uneven consequences of energy transitions are not experienced only in places marginalised from energy infrastructures, but also in housing markets and housing stocks where economic disadvantage, housing conditions, and limited opportunities for action intersect and reinforce one another.

Moreover, moving home is constrained by considerable real costs relating to mortgage, transaction-related taxes, agent fees and surveys costs, as well as the liabilities of owners for hidden flaws in the building structure. Beyond these direct costs, the possibility of moving is shaped by wider social, familial and biographical circumstances, meaning that relocation is an outcome of interrelated life-course, place-based and relational considerations (Coulter *et al.* 2016). Moving home thus constitutes one of the outer limits of the energy action space: a potentially powerful means to reduce vulnerability through a better-suited, more energy-efficient dwelling. Yet it demands substantial foresight and resources, and is structurally constrained, and thus remains least available to those most in need of change. Energy vulnerability, then, can arise through intersecting vulnerabilities (Simcock *et al.* 2021): those most burdened by energy costs are also those most immobilised, locked into dwellings that no longer support affordable or healthy living.

3. DATA AND METHOD

Qualitative research methods are employed to explore how moving home couples with concerns over energy services or experiences of vulnerability. The data stem from a set of 29 thematic interviews with Finnish owner-occupants mostly living in detached houses (23 out of 29), who were recruited among respondents (n = 4771) of an online survey that mapped experiences of Finnish citizens, considering their practical responses to the energy crisis in 2022.

The methodology and questionnaire questions (also translated into English) are available in open access (Numminen *et al.* 2024a). The number of invited people was 133, all of whom had stated in the survey that they were impacted by the energy crisis. Invitation criteria included the following: (1) they had agreed to be invited to an interview; (2) they had submitted their contact information; and (3) they had indicated having moved or having planned to move home due to high energy prices. The survey had two checkbox-type questions that allowed identifying respondents' moving activities and plans. The first survey question was: Have you done any of the following due to high energy costs? Those who had ticked 'Having moved' (11 invitees) and/or 'Having planned to move' (100 invitees) were invited to attend. The second question was: How have your household's energy costs changed in the last two years? Those who had ticked 'Yes, I have moved home' (22 invitees) were invited to attend. However, among the movers caught through their response to the second question, only those who had responded either 'Yes, regularly' or 'Yes, sometimes' to another question: Do you consider your household's energy costs to be a significant financial burden, taking into account your household income?, were invited to attend. In this way, the aim was to include households who struggle with energy *and* have moved or planned to move.

The invitations were sent in December 2024, and a reminder in January 2025. Finally, 29 people accepted the invitation for an interview. They were interviewed between December 2024 and March 2025 by three authors of this paper, each interviewing about 10 households. Interviews lasted from 30 to 60 minutes; they were held via videoconferencing. For the interview, see Appendices 1 and 2 in the supplemental data online. Interviews were recorded, transcribed and anonymised, and coded using a qualitative content analysis method. Before coding, 18 codes

were chosen to guide coding, based on the preliminary observations on the interviews by the interviewers. In the coding process, new codes were added when the initial codes did not cover passages in the transcripts. Beside the 18 initial codes, 14 extra codes were created.

3.1 INTERVIEWEE BACKGROUND AND CONTEXT

Background information on the study participants is presented in Table 1. The age of the participants varied between 25 and 84 years, and asked with 10-year categories. Two genders (men and women) were evenly represented in the data. Over half the interviewees either had a

ID	AGE (YEARS)	GENDER	HEATING SYSTEMS[a]	YEAR MOVED	BUILDING TYPE: PREVIOUS; CURRENT	INCOME LEVEL[b]
r01	55–64	Female	Electricity, wood stove, ASHP	2021	Detached; detached	Middle income
r02	65–74	Male	District heat	2022	Detached; apartment block	Low income
r03	55–64	Male	District heat, ASHP	2024	Detached; terraced	Middle income
r04	45–54	Female	Electricity, ASHP, two wood stoves	2023	Detached; detached	Middle income
r05	35–44	Male	Electricity, wood stove, ASHP, solar panel	2020	Terraced; detached	Middle income
r06	35–44	Female and male	Electricity, ASHP, solar panels, wood stove	2021	Semi-detached; detached	Sufficient
r07	75–84	Female	GSHP, ASHP, fireplace	2020	Apartment flat; detached	Constrained
r08	35–44	Male	Electricity, two ASHPs, wood stove	2021	Semi-detached; detached	Middle income
r09	65–74	Female	WAHP, solar panels, ASHP, wood stove	2021	Detached; detached	Middle income
r10	45–54	Male	Electricity, wood stove, ASHPs	2021	Terraced; detached	High income
r11	65–74	Male	District heat	2022	Detached; low-rise apartment block	Sufficient
r12	55–64	Male	EAHP, floor heating, ASHP, solar PV	2021	Apartment flat; semi-detached	Middle income
r13	n.a.	Female	Electricity, wood stove, ASHP	2020	Apartment flat; detached	Middle income
r14	35–44	Male	Electricity, two ASHPs	2021	Terraced; detached	Below middle income
r15	25–34	Female	Electricity, ASHP, wood stove	2022	Terraced; detached	Middle income
r16	55–64	Female	District heat, ASHP	2021	Apartment flat; semi-detached	Sufficient
r17	35–44	Male	Electricity, ASHP, two wood stoves	2021	Terraced; detached	Sufficient
r18	55–64	Female	Electricity, ASHP, solar panels	2011	Detached; detached	Sufficient
r19	55–64	Female	Electricity, solar, wood stove, two ASHPs	–	n.a.; detached	Sufficient
r20	65–74	Male	ASHP, wood stove, electricity	1989	n.a.; detached	Constrained
r21	65–74	Female	Electricity, two ASHPs, two wood stoves, sauna	1985	n.a.; detached	Sufficient
r22	65–74	Female	WAHP, wood stove	2023	Apartment flat; detached	Sufficient
r23	55–64	Male	Electricity, two wood stoves, ASHP	1998	Semi-detached; detached	Middle income
r24	55–64	Male	WAHP, wood stove, electricity	2011	Detached; detached	High income
r25	75–84	Male	GSHP, ASHP	2001	Detached; detached	High income
r26	n.a.	Female	GSHP, wood stove	2014	Detached; detached	Middle income
r27	65–74	Male	Electricity, wood, EAHP	1994	Detached; detached	Low income
r28	45–54	Female	ASHP, electricity, wood stove	2013	Apartment flat; detached	Middle income
r29	55–64	Female	Electricity, ASHP	2023	Detached; semi-detached	Middle income

Table 1: Backgrounds of the research participants.

Note: [a]ASHP = air-source heat pump; EAHP = exhaust-air heat pump; GSHP = ground-source heat pump; WAHP = water-to-air heat pump; PV = photovoltaic.

[b]'Sufficient' income level refers to a situation where a respondent's income level is not exactly known, but the interview situation did not reveal the existence of significant economic constraints. 'Constrained' refers to an income level that is not exactly known, but the respondent is a pensioner, in debt or without a financial buffer.

permanent job or were entrepreneurs, whereas one-third of the respondents were pensioners. Most of the interviewees were middle income, while a few were either high or low income. A vast majority of the respondents were living with someone, usually a spouse and possibly children. Two-thirds of the respondents had moved house in the 2020s. Almost every participant was living in a detached house; the interviewees' houses and apartments were almost without an exception owner-occupied. The heat arrangements drew on hybrid arrangements, which is typical for this housing stock (Numminen *et al.* 2024a). Median house area was 155 m². Half of the respondents lived in outer urban areas, and their hometowns represented both migration gain and loss areas.

Most of the Finnish housing stock (47%) was built during the 1960s–80s, and a large share of Finnish buildings needs renovation (Statistics Finland 2022). Housing owners can apply for financial support for energy renovations concerning, for example, insulation and making a change from oil-based heating (ARA 2022).

4. ENERGY ACTION: PRACTICAL CONSIDERATIONS AROUND DOMESTIC ENERGY USE

In the interviews, energy action unfolds through everyday concerns, practical adjustments, and reflections on past and future housing choices. The data also show how households navigate energy vulnerability through varied forms of action, grounded in their resources, capabilities and perceptions of risk. In the following, the findings are organised into three analytical sections: (1) the contours of energy actions space; (2) energy vulnerability as constrained or compromised energy action space; and (3) housing trajectories and the prospect of moving as energy action.

4.1 THE CONTOURS OF ENERGY ACTION SPACE

Energy-related action is articulated in various ways. Not only focusing on energy consumption (bill, usage), respondents associated energy with a wide range of practices and concerns: heating routines, room use and seasonal living, household maintenance, comfort, pets, and the timing and organisation of daily activities. Energy was discussed in the interviews as something that is *managed, lived with, worked on, and reflected upon*. Alongside households experiencing strain, the respondents reported feelings of satisfaction with their homes and energy arrangements. The following respondent describes how they perceived their living environment in a positive light, highlighting good access to local services:

> But honestly, it doesn't get any better than this. In a way, it's like having a summer cottage as well, when you think about having a yard and this lovely environment, with all those elements right nearby that you'd expect at a cottage: there's a nearby forest, there's a swimming beach within walking distance. All services are accessible, you can reach them by bike, there's public transport—basically everything you could possibly need. You really couldn't imagine a more perfect place to live.
>
> (r21, female, 65–74, single)

Many took a broad perspective and expressed strong personal preferences regarding the type of house they preferred, and were willing to tolerate, *e.g.* cold indoor temperatures, such as the following interviewee:

> Well, I'm really satisfied [with the housing and the comfort], but of course, since it's an old house, during really cold spells it can feel a bit chilly. So that's maybe a small downside, but, overall, we really, really like our home.
>
> (r08, male, 35–44, couple with children)

Some households also reflected their choices and preferences against a perceived public opinion. Below, an interviewee compares her positive experience with electric heating with the negative-toned writings of the media:

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> I do [follow] what the media writes as well. Yes, I think that's really where it comes from, when you follow the media coverage. In a way, that's where the initial idea came from that electric heating is a bad thing. It feels like the media writes very negatively about electric heating. But still, like I said, I haven't personally found it to be too bad. It has worked well for our family.
>
> (r15, female, 25–34, couple with children)

The media attitude toward direct electric heating being referred to here concerns the 2022 electricity price shock that was exceptionally steep in Finland. A broadly popular and earlier affordable heating solution suddenly became undesirable and much-maligned and houses relying on this heating technology lost their selling value.

These descriptions show that energy vulnerability is not ubiquitous and that many households experience an energy action space, marked by confidence, competence, comfort and satisfaction. Respondents also appear to practice citizen duties when they report a feeling of shame because of their domestic arrangements of, for example, living in an over-sized home.

At the other end of the spectrum, some households describe an unconstrained energy action space, supported by strong financial resources. One affluent retiree (r25), for example, lived in a large, detached house equipped with ground-source heating and cooling technologies. Despite relatively high energy costs across both a primary residence and a second home, these were not perceived as problematic. The household reported no need to adjust energy use during the energy crisis and instead emphasised maintaining comfort and investing in the upkeep of the dwelling. In such cases, energy action space is wide, stable and even imperceptible, allowing households to prioritise comfort, leisure, and long-term dwelling quality with ease and without significant constraint or effort.

4.2 ENERGY VULNERABILITY AS CONSTRAINED OR COMPROMISED ENERGY ACTION SPACE

Energy vulnerability manifests as various limitations on action. Interviewees explicitly describe what they *cannot* do: renovations are postponed, inefficient heating systems are not replaced, preferred temperature cannot be reached. These accounts are nevertheless often framed through expressions of endurance, adaptation and acceptance.

> *Researcher:* Do you feel that your financial situation allows you to cope with these kinds of unexpected bills?
> *Interviewee:* Well, they say that you have no choice but to try. You live out here in the countryside. You can't really sell this either, since no one buys large rural houses, especially when they usually start needing renovations. This house was built in '94, so it really should be renovated, but we're not planning to do any renovations right now. The goal is just to get by for the time being and get back on our feet.
>
> (r27, male, 65–74, couple)

Energy vulnerability appears as financial pressure, but more so as a narrowing of possibilities and an increase in work, as households adjust various practices and expectations to fit constrained circumstances. These constraints can be related to income, health, age or uncertainty about the future, and they shape how people define sufficiency, comfort and adequacy in their homes.

A different form of constraint can emerge within households through uneven distributions of knowledge and responsibility. One interviewee living in a detached house with her spouse described how energy-related decisions and technical management were largely delegated to her partner, whom she referred to as a 'knowledge repository'. While the household as a whole was not under financial strain at that time, and had invested in multiple energy technologies, including a heat pump and solar panels, her own capacity to act independently was limited. She expressed concern about how she would manage the house and its technical systems alone in the future, reflecting on gendered divisions of competence:

> I've often found myself thinking about elderly women living alone, and wondering how they ever manage to handle all of this. I mean, I have a really strong source of support and expertise right beside me, and even I don't understand everything.
>
> (r09, female, 65–74, couple)

This example highlights how energy action space may appear extensive at the household level, yet remain fragile and unevenly distributed, with vulnerability emerging through dependence on specific individuals and forms of expertise.

4.3 HOUSING TRAJECTORIES AND THE PROSPECT OF MOVING AS ENERGY ACTION

Energy-related concerns manifest through comparisons between past, present and anticipated housing situations. Interviewees reflect on how their current dwellings differs from previous homes and how it compares with a future imagined home. These comparisons trajectories reveal how moving, whether realised, postponed or merely imagined, functions as part of the energy action space.

Rather than treating relocation as a single decision, this section shows how the prospect of moving is shaped by bodily capabilities, economic resources, housing markets, and expectations about ageing and care. For some, moving anticipated relief from burdensome energy arrangements; for others, it remains an unrealised option due to lock-in, risk or attachments. Energy considerations are intertwined with anticipated housing situations, sometimes through heating costs and technologies, and sometimes indirectly through the perceived suitability of the home for future life circumstances.

4.3.1 Moving home as an emerging option

Moving home can be subject to explicit contemplation and reorientation. Below, a pensioner recognises a growing discrepancy with her abilities and the house and anticipates moving:

> I'm turning [65–74] this March, so I've managed well up to now. But the reality is that with each passing year you get older, and there's this small worry that if something more serious happens, you could end up in quite a difficult situation living in a house like this. So in a way, you should move before things get that far.
>
> (r21, female, 65–74, single)

The same interviewee expressed very strong emotional ties to her house, which led her to find the means to stay in the house despite financial difficulties. In the following quotation she expresses the mixed feelings of attachment and guilt that are shadowed by economic strain:

> Well I mean I love this house and I enjoy living here. The two main reasons why I might want to move are, first of all, a kind of sense of guilt—guilt about having so many square meters all to myself. That's one factor but then there's also the financial side, and especially that became more prominent when electricity prices went up. I had a fixed term contract for two years, and during that time the electricity bill was disproportionately high.
>
> (r21, female, 65–74, single)

In such situations of strong attachment, the 'rational' energy-efficient option may seem alienating, yet 'easy':

> And then there's the fact that I really like living in an old house. The thought of living in a new one kind of puts me off, and I don't really like apartment buildings or even terraced houses that much. But on the other hand, common sense says that as you get older, even if you don't like it, you may just have to learn to. Living there would be easier.
>
> (r21, female, 65–74, single)

Put together the above three quotations help to develop an understanding of how the prospect of moving is part of coping with energy issues and the energy actions space.

4.3.2 Lock-in in energy vulnerability

For some interviewees, vulnerability was characterised by the lack of capacity to make meaningful changes to their living conditions. At the extreme, the energy action space narrowed to coping within existing arrangements, even when those arrangements had become financially and physically burdensome and unsustainable. The home becomes a site of lock-in: unaffordable to heat but impossible to exit, and in such instances knowledge and motivation do not translate into agency. Instead, energy vulnerability manifests as a condition of enforced immobility which is basically a shrinking action space in which the only remaining strategy is to endure.

r27, a man living with his spouse in a detached house in a depopulating rural area in Finland, presents a case of such lock-in. He is a pensioner with a low income. They were stuck with an expensive electricity contract for two years. During the contract period, the monthly electricity bill was over €800 in wintertime. Meanwhile, the r27's net pension was €1200/month. The energy expenditure of the household has been hundreds of euros a month even after the especially expensive contract expired. The house is decades old, and it has never been renovated. r27 thinks the house would be hard to sell. He also suspects it would be too risky to sell the house: he is afraid the buyer would accuse him of selling a house that does not follow building regulations.

r27 has a severe disease, and he was previously hospitalised for half a year. The costs of the period were thousands of euros for him. He is still recovering from the illness, and also thinks that monetary recovery from those times is needed before it is possible to renovate the house. He has been planning to conduct renovations, but he lacks the finances and physical ability to function due to his illness.

r27 wishes he could live in a house with lower electricity consumption. He has knowledge of housing technologies, and he follows the energy markets. However, this knowledge does not convert into renovating or moving house—poverty and poor health are restraining his energy action space.

4.3.3 A safe haven?

A different trajectory is visible among households who have already managed to relocate in response to changing needs and resources. One retired couple described moving from a large, multistorey house in an urban area to a smaller, single-storey home in a more natural setting. The move was motivated by a combination of factors, including the physical demands of the previous dwelling, changing financial circumstances and a desire for a more suitable long-term living environment. The new house, designed for their needs, was perceived as a 'final home' and equipped with multiple energy technologies, including a heat pump and solar panels. In this case, relocation enabled a reconfiguration of both everyday practices and energy arrangements, reducing the need for ongoing adjustments and aligning the dwelling more closely with the household's capabilities and expectations. At the same time, the case highlights how such proactive mobility depends on the availability of resources, planning capacity and access to suitable housing options, conditions that are not equally available to all households.

r05 reports a move from a terraced house to a detached house, and a situation whereby the current house is under threat of demolition. His choice is to occupy the house for as long as possible and, as he states, to prefer comfort over considerations about market value. The current house is nevertheless a source of anxiety as:

> The stress level jumps from zero to one hundred when the plumbing freezes. [...] This [house] is potentially expensive, stressful and laboursome in winter conditions.
>
> (r05, male, 35–44, living with his aunt)

For r05, a pending compulsory purchase that would lead to demolition of the house reduced the energy action space in multiple ways as he doubts the feasibility of retrofitting and expects the house to be hard to sell.

Lock-in often appeared as a state of being settled yet compromised, where the prospect of moving was present but deferred. This can be described as being 'on a waiting line' until circumstances allow for a change. For some interviewees, reorientation toward a future move was already taking shape, even if action remained postponed.

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One widowed interviewee living in an old, detached house exemplifies this position (r21). She had tried to sell the house nearly a decade earlier, but now expects it to be even harder to find a buyer because of its electric heating system and the resulting high running costs. Living alone in a large house has begun to feel disproportionate, and both her financial situation and older age suggest that moving would be the sensible choice. Yet a tension persists: she remains emotionally attached to the home and enjoys living there, even while recognising the practical pressures that suggest moving.

The energy crisis intensified these pressures but also prompted an unexpected turning point. High winter electricity bills put pressure on her pension, and she took on paid work to stabilise her finances. Ultimately, she adapted her situation more radically by renting out a room in the house, which helped her regain a sense of control. As she puts it:

> So when I got spooked by the energy crisis, I actually felt kind of empowered, in the sense that I'd figure out a way to keep living in this house and, like, no catastrophe would happen.
>
> (r21, female, 65–74, single)

This account illustrates how lock-in can coexist with agency: the decision to stay is not simply resignation, but a negotiated compromise shaped by emotional attachment, economic necessity and a gradual reorientation toward a future move. r21 illustrates a situation in which the energy action space is progressively narrowing. Despite finding ways to cope, the situation is not sustainable indefinitely. Future planning revolves around bodily ageing and anticipated challenges in maintaining the house. r21 expresses guilt about occupying a large home alone and imagines selling in future but only once she feels ready and the right buyer appears. In this situation, there is capacity to cope, but this capacity is precarious and time limited. Moving home is framed as a planned rather than an immediate action, and as such it is a form of anticipatory energy vulnerability, where relocation is envisioned as necessary 'before it's too late'. Unlike r27, r21 feels able to hold the situation together for now yet acknowledges the inevitability of change.

A similar tension between present coping and future-oriented reorientation appeared in a couple living in a relatively spacious semi-detached house. They spent much of the summer at their cottage, but during the winter they engaged intensively with managing the home's energy use. After switching to a spot-priced electricity contract, they began adjusting their everyday routines with considerable precision: lowering indoor temperatures, adapting lighting, shifting activities in time, and even adjusting what and when they cook. Rather than viewing these adjustments as burdens, they described them as a source of enjoyment and shared purpose.

Yet despite this high level of engagement, the couple also looked ahead to a different kind of dwelling: one that would itself take care of energy frugality without requiring constant monitoring or bodily adjustments. As they put it:

> That we're not going into some old rundown building; it has to be either well renovated or on the younger side [of building stock], so that the household's energy stinginess automatically derives from there.
>
> (r16, female, 55–64, couple)

Their current strategy is feasible largely because they are physically able to adjust their comfort preferences and coordinate their activities with fluctuating energy prices. They acknowledged that such embodied flexibility may not be possible as they age.

Finally, a more turbulent trajectory is illustrated by an interviewee who initially viewed relocation as a pathway to a desired and carefree retirement (r02). After moving to a detached house on an island, he planned to spend his days fishing and maintaining the property. However, a sudden serious illness disrupted these plans, leaving him unable to manage everyday tasks such as cutting grass or clearing snow. The dwelling quickly became uninhabitable for him, and he was forced to move away. Selling the house proved difficult, taking two years and resulting in the loss of his savings. During this period, he described experiencing significant strain and depression. Only after

eventually selling the house was he able to relocate to a small apartment in a different city, where proximity to services and a more manageable living environment restored a sense of ease and comfort. As he described it, his current housing situation is both affordable and well suited to his needs, and he intends to remain there as long as possible. This case illustrates how relocation can move from imagined relief to experienced vulnerability, and eventually to a reconfigured and more sustainable alignment between bodily capacity, dwelling and everyday life.

4.3.4 Affording to speculate

Yet another and different dynamic emerged among interviewees who faced no acute financial pressures and possessed both technological competence and stable resources. For these households, the energy crisis had limited impact on everyday life, and prospective mobility was evaluated primarily through market reasoning rather than through coping or constraint. One such case is a family with young children (r15) who had already invested in smart thermostats and other optimisation devices, enabling them to maintain comfort with minimal effort even during periods of fluctuating electricity prices. Their energy use was highly visible, controlled and efficient, and they reported that the crisis had caused no significant disruption to their everyday routines. When considering the possibility of moving in future, they approached the question not from the standpoint of energy vulnerability but from the perspective of housing value. For them, the relationship between electricity prices and dwelling prices was central. Rising electricity prices were seen as a direct threat to the market value of electric-heated homes, and thus as a deterrent to selling. As they explained:

> When I think about moving, I feel that if electricity prices go up, then moving would be the last resort, because that also makes electrically heated houses even harder to sell. So in a way, I think the opposite: if electricity prices went down, then moving could become a real option.
>
> (r15, female, 25–34, couple with children)

Here, mobility is framed as a strategic choice tied to the maximisation of household assets. The home is treated less as a site of vulnerability or misfit and more as a financial object whose value is influenced by wider energy price dynamics. Moving becomes a calculation about timing and market conditions rather than a response to bodily capacity, affordability or dwelling incompatibility. In contrast to households with constrained or compromised energy action spaces, this family's position illustrates a wide and flexible action space, one in which energy considerations are relevant primarily through their impact on property value. Their trajectory underscores that, for some, energy concerns shape mobility not through pressures or hardship but by anticipation of how energy markets affect the worth of the home as a capital asset.

5. DISCUSSION AND CONCLUSIONS

The concept of energy action space was introduced to identify factors that support or limit individuals' abilities to understand and act upon energy-related issues and energy vulnerability. Housing mobility was examined as part of energy action space, asking how the possibility, or impossibility, of moving home shapes energy vulnerability. The findings challenge the assumption that owner-occupants of detached houses are largely insulated from energy poverty due to their asset ownership. Energy system transition may have accentuated impacts particularly on such small-holders of assets, whose life savings are attached to the house, and who for good reason worry about whether they can continue to live in the house, and if it has value in the eyes of potential future residents. This finding contributes to ongoing debates about energy vulnerability by showing how vulnerability can emerge within ownership, not despite it, as well as to understanding the scope for action and experienced tensions amongst citizens in the energy transition (Wahlund & Palm 2022).

The analysis of household interviews indicates that everyday concerns constitute energy vulnerability and a need for energy action in multiple ways. Moving homes—a specific interest of ours—and the logic of the interview sample selection proved to be a relevant aspect in the space

of energy action. Indirectly, interviewees report (dis)content with their current house, and in some cases directly address moving homes as their strategy for energy action, or the undesirable lock-in where heating costs make the selling of the house very difficult. However, overall, moving house is coupled with other aspects of life, including proximity to close relatives, pensioning, concerns about bodily abilities to climb stairs or conduct household maintenance, or, in a more positive tone, as an opportunity to utilise one's varied resources. Hence, amongst these interviewees moving home was not a common trajectory of energy action, but the results nevertheless underscore the multiple entanglements of domestic energy use with other aspects of everyday life conduct.

These findings open up new questions for the literature on energy vulnerability and show that vulnerability is constituted through multiple, interlinked concerns rather than the risk of exposure to high energy costs alone. Moving home emerges as a significant but rarely straightforward element of the energy action space. Interviewees describe dissatisfaction with their current dwellings, consider relocation as a possible response to energy-related strain, or encounter lock-in situations where high heating costs and low energy efficiency make selling difficult. At the same time, decisions about moving are entangled with other aspects of life, including proximity to family, retirement, bodily capacity to maintain a house and opportunities to mobilise available resources. Moving home thus appears less as a common or immediate strategy for addressing energy vulnerability and more as a contested, anticipatory and unevenly accessible form of action. This highlights the need to move beyond household-level accounts of energy vulnerability and to address the housing and market conditions that shape the possibilities for action. It also challenges policy approaches that frame energy vulnerability primarily in terms of affordability, pointing instead to the structural conditions that shape whether and how households can act. A key insight is that moving home as an energy action requires anticipation. Several interviewees described situations where rising energy prices and low energy efficiency had already undermined the perceived market value of their dwelling, making relocation difficult or impossible. Interviews revealed where the high energy prices and low energy efficiency of the house make it non-sellable in the eyes of the resident. Moving home hence might be an anticipatory strategy, but not viable as a responsive action, particularly during a turmoil of skyrocketing energy prices and other forms of uncertainty, as in the dataset. This temporal dimension highlights an important limitation of mobility-based responses to energy vulnerability. While relocation may, in principle, offer a route to more affordable and suitable housing, in practice it is a strategy that depends on foresight, resources and favourable market conditions. As financial pressures mount, the energy action space contracts toward less demanding forms of action, such as endurance, downsizing within the home or modest adjustments in routines.

These findings have implications for housing and energy policy, particularly in contexts where home ownership is widespread. Rather than assuming that owner-occupants can autonomously adapt or relocate, public authorities may need to consider how housing development, renovation support and mobility options shape the energy action space. This raises questions about whether policy should support not only energy retrofits but also feasible housing alternatives that allow households to move before vulnerability becomes entrenched. Planning and housing policy could play a role in ensuring that attractive, accessible and energy-efficient dwellings are available for those wishing or needing to relocate, particularly in later life. Energy policy instruments that focus narrowly on prices or on energy efficiency risk overlooking how energy vulnerability is produced through housing trajectories and immobility. Particularly for regions with declining housing asset value, retrofit subsidies may not suffice to upgrade the housing stock towards moderate energy costs. Hence, policy attention should be geared towards the phenomenon of vulnerability through immobility.

The findings can also be contrasted with vulnerability in the rental market. At the outset, it seems that people owning their home are in a less vulnerable position. However, while vulnerability in rental housing arises from property owners' disinterest and disregard of energy efficiency (Ambrose 2015) and can be compounded by the characteristics of particular housing stocks and local housing markets (Atkins *et al.* 2025), owner-occupants may also lack abilities and have limited scope for action in energy retrofits. When so, they face both high direct energy costs as

well as reduced housing asset value. These differences apart, the premise that people may move home because of high energy costs and poor energy efficiency supports market developments towards energy retrofits, not only in the stock of owner-occupied detached houses but also in the rental market in which property owners need to retrofit to keep their assets attractive.

This paper draws attention to a form of energy vulnerability that arises in response to housing mobility and trajectories of moving home. Recognising that people may move, or be forced to move, because of high energy costs and poor energy performance of their home also signals a new type of domestic energy action. When successful, people may avoid the stark conditions of energy poverty; some may even be able to speculate and increase their domestic asset value. However, there are those who are locked in a house with declining property values. This implies the need for sensitivity in the study of energy vulnerability for the overlaying and multiplying burdens including but not limited to direct energy costs.

Several caveats need consideration. First, the very hypothesis of this paper that owner-occupants may move home to remediate energy vulnerability is premised on Finnish housing arrangements, where home ownership is typical and does not imply a break with the concerns of energy poverty or energy vulnerability (Numminen *et al.* 2024b).

Second, the concept of energy action space is intentionally centred on the household perspective. Although energy vulnerability is produced through broader socio-spatial and institutional relations operating across multiple scales (Bal *et al.* 2025), the research aim has been to examine how these conditions appear within households' perceived possibilities for action, particularly in relation to housing mobility.

Third, for owner-occupants of detached houses, moving home is a significant undertaking. Insofar as pressing financial concerns reduce people's general capacity of action (Sovacool *et al.* 2012), the energy action space may reduce to less demanding forms of action. Hence, while moving home might be an effective strategy to cope with energy vulnerability, in practice it is hard to resort to. In more detail, for some, moving appeared as a potential strategy to reduce energy-related strain; for others, it was foreclosed by financial constraints, health, housing market conditions or emotional attachment. Moreover, citizens obviously lump aspects of living together and make compromises: negative aspects of the energy arrangements are coupled with and even 'disappear' against a set of other attributes that make the dwelling appealing and desired.

AI DECLARATION

The research was not generated or written by programs using artificial intelligence (AI).

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COMPETING INTERESTS

The authors have no competing interests to declare.

DATA ACCESSIBILITY

The data are not fully anonymised and therefore are not available.

ETHICAL CONSENT

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