

ADOPTING SPACE SUFFICIENCY INTERVENTIONS AS A MEANS FOR ACCELERATING ENERGY RENOVATION: SWEDISH HOMEOWNERS' PERCEPTIVE.

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Abstract


Residential energy consumption remains a significant driver of CO₂ emissions in European buildings, demanding urgent action in the face of the climate crisis. While prevailing efforts have predominantly concentrated on enhancing energy efficiency and integrating renewable sources, addressing the climate urgency and resource constraints necessitates a paradigm shift towards sufficiency principles.

Swedish statistics on Single-Family Houses (SFH) show that more than a third of households inhabit oversized spaces in aging buildings needing renovation. Sufficiency-oriented renovation strategies—optimizing, or reducing living areas per capita—present a promising avenue to achieve substantial energy reductions. This approach also opens the potential for space rentals, yielding combined energy and space efficiency advantages. In addition, the literature highlights reduced maintenance costs and potential urban housing crisis mitigation. However, practical implementation faces multiple obstacles.

This paper investigates SFH owners' attitudes towards space-sufficiency interventions, focusing on living size preferences and identifying barriers and opportunities for sustainable housing. Through focus group sessions with SFH owners in November-December 2022, qualitative content analysis revealed that reducing living space per capita faces multifaceted challenges, despite potential benefits. These challenges encompass not only personal and psychological considerations but extend to economic, infrastructural, and policy barriers, including issues such as the potential breach of privacy, disruptions due to noise, dilemmas related to ownership and independency, disruptions to work-life dynamics, inadequate familiarity with sufficiency principles, and uncertainty imposed by space constraints. Strategic integration of sufficiency principles into energy-renovation policy alternatives necessitates a holistic approach that addresses these barriers, and some form of incentives may be needed to catalyze the adoption of sufficiency principles effectively.

Keywords: Sufficiency, climate mitigation, sustainable housing, energy renovations, single-family houses, homeowners, focus group

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1 Introduction

The need to address the pressing issue of carbon emissions within the built environment requires a re-evaluation of “traditional” approaches to residential energy consumption (Erba & Pagliano, 2021). While energy efficiency measures can make substantial contributions to reducing the carbon footprint, the complexity of the challenge demands innovative and holistic strategies. This paper investigates the benefits, feasibility, and barriers of adopting sufficiency (Princen, 2005) principles, mainly through space reduction strategies, within Sweden's Single-Family Houses (SFHs) context.

The built environment significantly contributes to global carbon emissions, with residential energy consumption being a major factor (Erba & Pagliano, 2021). As countries strive to meet ambitious climate goals, it's acknowledged that decarbonizing buildings requires extending beyond the current policy framework (IPCC, 2023), which mainly focuses on energy efficiency and renewable energy (EPBD, 2018). While these measures are crucial, essential to reaching the needed transformation is the involvement of citizens and stakeholders because of their central role in interacting with the buildings and infrastructures. We are beginning to see a recognition (IPCC, 2023) of the need to couple technological solutions with lifestyle and behavioral changes, often termed “sufficiency”. This paper delves into sufficiency, which optimizes resource use and reduces excess consumption. "Sufficiency" emerged from research in both energy and sociology after the energy crises of the 1970s and 1980s (Illich, 1974; Goldenberg et al., 1985), but entered sustainability discussion in 1990 thanks to W. Sachs, who noted that “While efficiency is about doing things right, sufficiency is about doing the right things” (Sachs, 1999). Sufficiency is increasingly prominent in energy plans and policies, now featured alongside efficiency in international energy (IEA) and climate frameworks (IPCC, 2023). Cities such as Amsterdam and Brussels adopting the "doughnut" concept showcase how acknowledging resource limits becomes vital for sustainable practices, ensuring the elements of well-being.

In this research, the focus is specifically directed toward the acceptance and willingness to embrace space-sufficiency interventions within SFHs. These interventions involve rearranging oversized living spaces into new units for rental purposes. Such a transformation not only holds the potential to reduce individual energy consumption and environmental impacts but also generates economic streams that could potentially fund the initial capital required for sufficiency interventions and broader energy renovations across the estate. The exploration of this approach is particularly relevant in the context of Sweden, where a significant percentage of SFHs, similarly to other Western European countries, are owned by elderly people that live in oversized spaces in need of renovation (Sula et. Al, 2022). Amid the emphasis on energy efficiency, the study of sufficiency interventions adds a novel aspect to sustainable renovation discourse, broadening from technical to spatial and behavioral aspects. This shift challenges the assumption that larger spaces equate to a higher quality of life, acknowledging the intricate links between living standards, environmental impact, and resource use. By investigating sufficiency principles applied in space-reduction designs, the study seeks to reveal hurdles and pathways for integrating this novel approach into the broader goal of reducing residential energy consumption and SFH sector emissions. The research examines SFH owners' viewpoints, utilizing qualitative methods and focus group discussions to uncover their perspectives, comprehension, and barriers to space-efficient/sufficient interventions.

2 Methodology

This qualitative study explored attitudes, preferences, and barriers related to space-sufficiency interventions in SFHs. The energy utility Väjö Energi AB (VEAB) and a door-to-door campaign provided access to interested participants. Three in-person FG discussions (Lange, 2002) were held in Nov-Dec 2022, involving 14 homeowners with diverse backgrounds from Väjö, Sweden. The discussions were audio-recorded, lasting two hours each during afternoon/evening hours. Part of the research team, comprising three members, moderated the discussions with a semi-structured questionnaire. Participants were well-informed about the research background and data handling and provided written consent. This study examines the dynamics of acceptance of space sufficiency measures within SFH. Thematic analysis (Braun & Clarke, 2006), utilizing Political, Economic, Social, and Technical (PEST) dimensions, was applied to the recordings for robust analysis. The analysis was strengthened by triangulation, cross-referencing themes with participants' responses, and comparing the three FG.

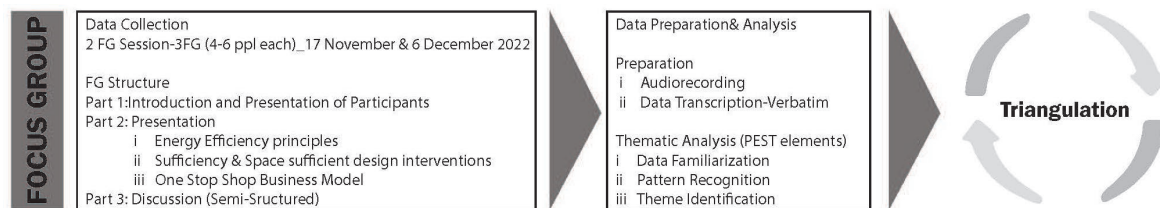


FIGURE 1: Focus Group Approach

3 Findings

Analysis of the focus group findings demonstrated that a notable portion of SFH owners wish to stay in their oversized residences as they grow older, even with the accompanying upkeep expenses. This preference is driven by both emotional connections and economic factors.

“I will live at my plac until someone carries me out, dead or alive. I have a lot of stuff. Where to put them? I have invested a lot too... I know all around”

A substantial obstacle in this context is the tax imposed on property sale profits. This tax serves as a deterrent, as it reduces the financial gains from selling and considering a potential move to a smaller property. Furthermore, the reduced urgency for immediate financial returns, thanks to fully paid mortgages, lessens the attractiveness of relocating and opting for a smaller living space. Implementing space sufficiency measures, involving the rearrangement of underutilized spaces and repurposing it for rental purposes, presents an intriguing economic proposition. Nevertheless, this concept faces a range of obstacles, as discussed in the FG. Results from the discussions are categorized within the thematic framework of the Political, Economic, Social, and Technical (PEST) dimensions:

Political/Policy

Balancing space repurposing and adhering to urban and building regulations (accessibility, fire protection, distances from property border) emerged as a significant obstacle. Obtaining permissions from local authorities was highlighted as a bureaucratic challenge, potentially delaying implementation. Navigating these regulations while ensuring safety and quality is crucial.

“Then you have one more aspect there, we probably only have two media from the gable then, so when you draw the stairs, out to the plot boundary. The building committee is there right away and says nähe then this with the facade and stuff. There are too many tripwires along the way”

Economic:

Capital Constraints: Discussions emphasized that older homeowners, who could be particularly drawn to these initiatives, might struggle to secure initial funds due to potential age-related loan limitations from banks. Banks often fail to consider rental income as part of the equation.

“I'm 74 years old, I can't get any more loans. And then it's not so easy to finance. You can make profits from the rent but you need to have the finances along the way you are doing the intervention.”

Property Value: The FG emphasized the need to evaluate how space-sufficiency measures might impact the property's overall value. A comprehensive analysis is needed to determine if potential rental income balances the costs of construction, maintenance, and potential impacts on property value.

Social:

Privacy and Independence: Homeowners expressed concerns about privacy and independence when considering sharing their property with tenants. This could potentially disrupt their established routines and daily life. Dilemmas related to ownership and independence arose among the FG participants.

“Little Privacy”

Ethical Shift: Integrating 'sufficiency' as the ethical way towards future is relatively unexplored, calling for behavioral change. FG discussions indicated limited knowledge but notable interest in the concept.

Technical:

Construction Logistics: Construction renovation work while spaces are inhabited presents practical challenges, including coordinating logistics, managing contractors, and minimizing disruptions to daily life, as highlighted in the focus group discussions.

Lack of Expertise: Homeowners acknowledged their constrained construction expertise, which can impede informed decision-making and efficient project management.

“What I would really like to have with One-stopshop is someone who helps with all building permits and check what the plans say, what my property allows, what would I then to be able to do, to come up with ideas because I think that's almost the hardest part, “so I have 4 m from the plot boundary” and then there is some plan description that says that you must not pull off there because there is a line”

Noise Concerns: A key concern highlighted in the focus group discussions is noise. Addressing this issue becomes pivotal for the success of interventions. Implementing effective solutions, such as acoustic insulation, is vital to maintain the sense of privacy and tranquility associated with private homeownership while ensuring a more comfortable living environment.

“I thought about the solutions presented. It would be possible to build an apartment on the upper floor, but the sound insulation is not made for having 2 dependents, it will be a huge problem if we have one.”

Rental: Managing rental aspects, such as contracts, payments, lease profit tax, and tenant interactions, emerged as a significant concern in the focus group. Homeowners expressed apprehension about landlord responsibilities and complexities associated with effective management of rental processes.

4 Discussion and Conclusion:

The findings highlight the imperative of adopting a comprehensive and collaborative strategy that encompasses all aspects of PEST to effectively tackle the challenges and seize the opportunities associated with implementing sufficiency principles into SFH stock:

Unlocking Economic Potential: Repurposing underutilized spaces offers economic benefits by providing homeowners with additional income streams while reducing energy and maintenance costs. However, this potential must be carefully balanced against upfront costs and potential effects on property value. Collaborative efforts between policymakers, financial institutions, and homeowners can pave the way for innovative financing options, making these ventures more viable.

Societal Paradigm Shift: The concept of reducing living space per capita and repurposing spaces for rentals necessitates a shift in societal mindset. It calls for homeowners to embrace the notion of “sufficiency” and be open to sharing their homes with tenants. Sufficiency is about ethical sustainable living, not deprivation. Educating homeowners and tenants about the benefits can promote acceptance. Addressing end-use demand shifts needs infrastructures and social frameworks.

Design Intervention: For a successful transformation, architectural solutions must prioritize privacy for homeowners and tenants. Layout solutions with separate entrances and access routes, and flexible adaptable designs can address social concerns, maintain intimacy and daily routines, and foster harmonious living environments.

Technical and Innovative Business Models (One-Stop Shop OSS): Technical challenges like construction logistics and noise disruption can be overcome with accessible resources, expert guidance, and innovative technologies. Effective layout arrangements coupled with technical solutions like sound insulation are crucial to address noise concerns highlighted in the FG. OSS business models could offer support to homeowners during construction, ensuring smooth transitions. Similar business models or real estate digital platforms could facilitate the renting out process, making it easier for homeowners to find potential renters and manage the rental process.

Holistic Collaboration: The challenges and opportunities call for collaborative efforts among stakeholders. Streamlining regulations, creating customized financial solutions, increasing awareness, and offering technical assistance can facilitate successful transformations.

Future Vision: Repurposing underutilized spaces offers a forward-looking housing solution. The insights from this analysis can inspire policymakers, stakeholders, and homeowners to create adaptable homes that contribute to sustainable growth and inclusive living environments.

In conclusion, this paper contributes to the discourse on sufficiency by highlighting the potential of space-sufficiency interventions in single-family households (SFHs) and investigating homeowners' willingness and barriers to adopting such design changes. While repurposing underutilized spaces for rentals holds economic potential, energy reduction, and environmental benefits, it also encounters complex challenges. This study underscores the importance of holistic approaches that acknowledge and incorporate the complicated interplay of individual preferences, societal norms, economic dynamics, and policy landscapes. Nonetheless, limitations exist in this study. The small sample size and unique cultural context of Swedish SFH owners may limit generalizability. Focusing solely on homeowners excludes perspectives from other stakeholders, suggesting avenues for future research.

5 Conflict of Interest

The authors declare no conflict of interest.

6 Author Contributions

Conceptualization & methodology M.S., K.M.; data collection M.S., KRP, GP.; formal analysis, M.S; writing—original draft preparation, M.S.; writing—review and editing, M.S, K.M, B.M.; funding acquisition, K.M. All authors have read and agreed to the published version of the manuscript.

7 Fundings

This study will contribute to the project “Scaling up energy renovation through smart design and one-stop-shop business model”, which has received funding from the Knowledge Foundation, HÖG 20.

8 Acknowledgments

The authors express their gratitude to VEAB AB, Linnaeus University students Lisa Folkesson and Lina Halvarsson for their assistance with door-to-door notifications, as well as to all FG participants for their collaborative efforts.

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