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A socio-spatial approach to the energy poverty crisis

Why a socio-spatial approach is required to tackle the energy poverty crisis in the Netherlands: Evidence from Amsterdam Zuidoost

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URBANISM POLICY BRIEFS BY THE TU DELFT

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A socio-spatial approach to the energy poverty crisis

Why a socio-spatial approach is required to tackle the energy poverty crisis in The Netherlands: Evidence from Amsterdam Zuidoost

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Summary

Energy poverty is a pressing issue in the Netherlands, with the number of households struggling to cover their energy bills doubling to nearly one million in recent years. Current policies and subsidies have failed to address the needs of underprivileged social groups, leaving them vulnerable and unable to access support for dwelling renovations. This policy brief emphasises the importance of adopting a socio-spatial approach to tackle energy poverty and incorporate justice into renovation policies. By understanding the underlying factors that contribute to vulnerability and pinpointing their spatial distribution, targeted policies can be developed to meet the unique needs of vulnerable groups. The brief highlights the systemic challenges in Amsterdam Zuidoost, where low incomes, lack of trust, and financial constraints hinder renovation efforts. It stresses the urgency of adopting a spatial perspective, recognising the socio-spatial dimensions of vulnerability, and engaging local communities. Through inclusive and participatory processes, the brief aims to promote social equity, spatial justice, and sustainable solutions to combat energy poverty in Amsterdam Zuidoost.

What's at stake?

Energy poverty has emerged as a critical issue in the Netherlands, driven by surging energy prices. TNO (2022) estimates that the number of households facing energy poverty has doubled to nearly one million over the past two years, with more than 450 thousand households already affected in 2020. While financially privileged households have been able to finance housing renovations through existing subsidies, underprivileged social groups encounter financial barriers and lack access to public support, leaving them struggling to cover energy costs. This has resulted in extreme measures like heating deprivation among some households

Amsterdam Zuidoost is among the cities significantly impacted by energy poverty, with approximately 11% of households already falling into this category. Alarmingly, this figure is projected to rise to 42%, meaning that nearly half of the households will be vulnerable to energy poverty (De Telegraaf, 2022). These statistics raise concerns about the profound consequences of energy poverty, which studies in European countries have consistently associated with severe health issues and excess winter deaths (Thomson et al., 2017; Meyer et al., 2018). Understanding energy poverty requires a comprehensive approach that addresses various factors contributing to vulnerability, including socio-economic factors, building-related aspects, and indoor living conditions.

However, current debates on energy poverty primarily focus on expenditure-based indicators and short-term solutions. Existing measures define energy poverty based on the percentage of income spent on energy bills, failing to consider the multidimensional nature of vulnerability. Government funding introduced in 2022, though including universal support measures and targeted assistance for vulnerable groups identified through expenditure-based indicators, has been criticized for insufficient aid, particularly after significant price increases in late 2022. Moreover, certain vulnerable groups, like full-time students, have been overlooked. The temporary price cap implemented by the government faced criticism as rising energy tariffs caused households consuming above the set price cap to pay more than before its introduction (NOS, 2023).

Recognising the shortcomings of current policies in identifying and assisting energy-vulnerable groups, it is crucial to understand why specific social groups are more susceptible to energy poverty and identify their geographical distribution. This policy brief advocates for a socio-spatial approach to combat energy poverty, highlighting the need to uncover underlying factors contributing to vulnerability and proposing targeted policies tailored to the characteristics and needs of these vulnerable groups. Through a workshop involving local actors and stakeholders, this brief presents a case study of Amsterdam Zuidoost and recommends long-term policies that address energy poverty from a multidimensional and socio-spatial perspective.

Research methodology overview

The present study aimed to identify energy-vulnerable groups and gain valuable insights into their needs and characteristics. To achieve this, the research was divided into three phases, each contributing to a comprehensive understanding of energy poverty and its implications.

In the first phase, a system analysis was conducted to delve into the existing renovation and energy policies. This analysis allowed us to identify the shortcomings of current policies in identifying and assisting energy-poor households, as well as their limited effectiveness in underprivileged neighborhoods. By defining the research problem and mapping relevant stakeholders, we laid the foundation for further investigation.

The second phase focused on leveraging the spatial aspect and refining the concept of energy poverty by considering its social and spatial dimensions. This involved three key steps. Firstly, we built upon existing vulnerability frameworks by incorporating renovation and institutional indicators. These additions were informed by thorough desk research and insightful semi-structured interviews with key actors. Secondly, an index of socio-spatial vulnerability to energy poverty was developed based on data at the neighborhood level. Lastly, a socio-spatial analysis was conducted to identify vulnerable groups and gain insights into their spatial distribution.

Building upon the results of the system and socio-spatial analysis, the third phase entailed a workshop with local actors. The objective was to collaborate and generate tailored policy strategies that address energy poverty from a multidimensional perspective. By involving key stakeholders, we aimed to ensure the practicality and effectiveness of the proposed policies.

Through this comprehensive research process, we aim to provide a clear understanding of the factors contributing to energy poverty and propose targeted policies that address the needs and characteristics of energy-vulnerable groups.

Research results

Systemic Challenges of Tackling Energy Poverty in Amsterdam Zuidoost

In recent years, various government actors, including the Ministry of Economic Affairs and Climate and the City of Amsterdam, have introduced policies to improve renovation rates in underprivileged neighborhoods. Renovating buildings is a crucial step in addressing energy poverty, enhancing living conditions, and stimulating local employment. Yet, the uptake and acceptance of renovation technologies by residents, particularly in underprivileged neighborhoods, present significant challenges.

Underprivileged neighborhoods often face a combination of low household incomes, high unemployment rates, and a general lack of trust in government institutions and housing associations. These barriers contribute to residents rejecting or under-utilizing renovation measures. Financial constraints further exacerbate the situation, as many residents are unable to benefit from subsidies or loans to support the renovation of their dwellings (Sociaal en Cultureel Planbureau, 2021).

The low effectiveness rates of renovation and energy poverty policies are also evident in Amsterdam Zuidoost. Through desk research and interviews with local experts, we have identified multiple factors that contribute to the low effectiveness rates in this area. These factors include the socio-economic status of residents, their willingness or agency to embrace renovation measures, technological and design limitations of renovation and energy efficiency measures, and the current governmental system of policymaking. An overview of these causes is provided in Figure 1.

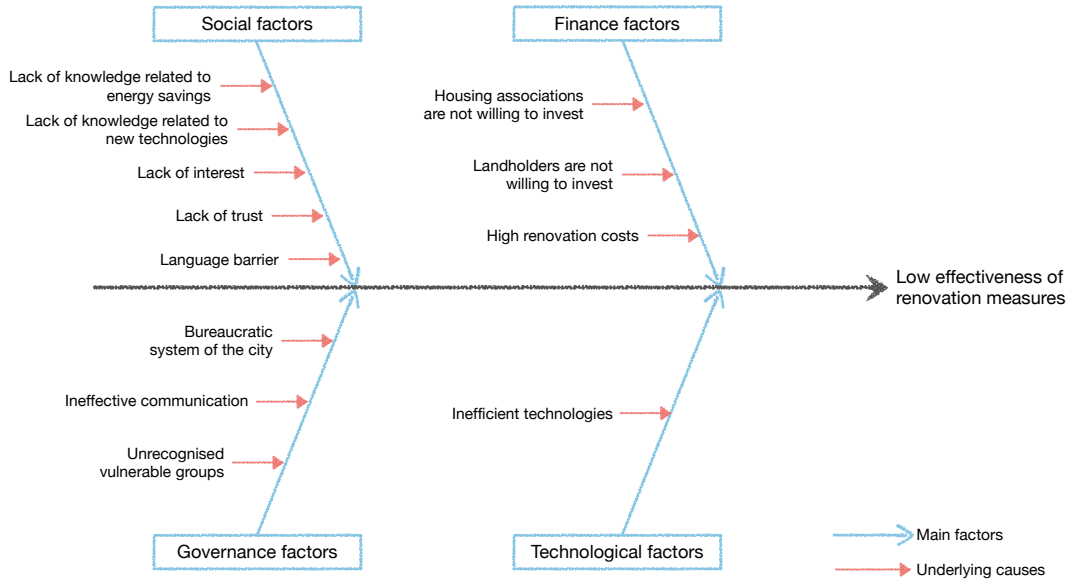

Figure 1: Overview of factors and underlying causes leading to low effectiveness of renovation measures. The factors and underlying causes have been identified based on coded interviews with key actors.

In Zuidoost, several barriers hinder efforts to tackle energy poverty and implement effective renovation policies. Lack of trust in institutions is a significant obstacle, as residents fear that engaging with institutions will incur costs, discouraging their interest and willingness to seek assistance. Additionally, language barriers pose challenges in communicating and generating interest in renovations, as Zuidoost is a multicultural neighborhood with diverse language skills. Insufficient knowledge about technologies and insulation methods further complicates addressing energy poverty, as residents fail to grasp the benefits and proper utilization of these solutions. For example, even providing small insulation materials and shower heads for free proves ineffective, as residents may not open their doors or know how to install them.

High rates of low-income and debt among Zuidoost residents contribute to their vulnerability and isolation from support systems. Some residents purposely avoid institutions to maintain control over their lives, leading to unrecognized pockets of poverty and diminished well-being. Mismatches between renovation technologies and the diverse energy practices of residents in underprivileged neighborhoods further complicate the situation. The decision-making process surrounding renovations and energy poverty policies faces organizational challenges within the City of Amsterdam, with different departments having conflicting agendas and objectives. These conflicts hinder the effective implementation and coordination of measures. Furthermore, national-level policies, such as the Klimaatakkoord, influence the City's priorities, potentially neglecting the needs of vulnerable groups (Dignum et al., 2021).

Housing associations, as key players in addressing energy poverty, have their own agendas and may be hesitant to deviate from established renovation plans. This situation leaves some buildings in underprivileged neighborhoods unrenovated, perpetuating hopelessness among vulnerable groups (Respondent 4). In the private sector, renovation efforts lag, with households that can afford renovations already taking action, while those with limited means or lack of interest remain without support (Respondents 1, 2, and 4).

The renovation process itself suffers from fragmentation, with multiple companies involved in different measures, leading to dissatisfaction and delays. The lack of comprehensive packages and subsidies that cover labor costs poses further barriers (Respondents 1, 2, and 4). Bureaucratic processes within the City hinder aid organizations like Stichting Co-Force and Stichting !WOON, limiting their ability to mediate and provide timely assistance to vulnerable households. The assessment of energy labels also needs to be revised, focusing on individual measures rather than their collective impact, potentially leading to higher household energy bills (Respondent 2).

These barriers perpetuate inequalities, reinforcing existing energy poverty and injustices. The distrust, ineffective measures, and reinforcing impacts create a vicious cycle that must be addressed to achieve meaningful change.

Addressing energy poverty in Amsterdam Zuidoost requires a comprehensive understanding of these systemic challenges. By acknowledging the socio-economic context, resident perspectives, technological considerations, and policy-making processes, we can develop targeted strategies to overcome these obstacles and effectively combat energy poverty in the region.

The Urgency of a Spatial Approach: Advancing Spatial Justice

In recent years, scholars have shed light on the complex pathways through which households can fall into energy poverty, emphasizing the significance of space in understanding vulnerability (Cutter et al., 2003; Cutter & Finch, 2008). These studies have contributed to a growing recognition of energy poverty vulnerability as a highly socio-spatial phenomenon (Bouzarovski et al., 2017).

By acknowledging the importance of space in the context of energy poverty, we gain valuable insights into the spatially varying range of vulnerability indicators. This understanding enables us to recognize that vulnerability to energy poverty is not solely determined by individual characteristics but is also shaped by the socio-spatial context in which households are situated.

The socio-spatial approach to tackling energy poverty considers the interplay between social factors, such as income, age, and gender, and spatial factors, such as housing quality and energy efficiency. This approach recognizes that different social groups are exposed to varying levels of vulnerability due to their unique spatial contexts and socio-economic circumstances.

By adopting a socio-spatial perspective, we can develop policies and interventions that address the specific needs and challenges vulnerable groups face in different locations. This comprehensive approach allows us to target resources effectively, ensuring that the benefits of renovation measures and energy poverty initiatives are distributed equitably across neighborhoods and communities.

Furthermore, the socio-spatial approach highlights the importance of understanding the socio-cultural dynamics and community contexts within underprivileged neighborhoods. By engaging with local communities and stakeholders, we can better understand their unique experiences, needs, and aspirations. This inclusive and participatory process is vital for developing effective policies that not only alleviate energy poverty but also promote spatial justice and empower marginalized communities.

In summary, the socio-spatial approach to tackling energy poverty recognizes the intricate interplay between social and spatial factors, providing a comprehensive understanding of vulnerability and its spatial variations. By integrating this perspective into policy-making and engaging with local communities, we can foster spatial justice, address inequalities, and create sustainable solutions to combat energy poverty in Amsterdam Zuidoost.

Understanding the Socio-Spatial Dimensions of Vulnerability to Energy Poverty

To comprehensively understand the socio-spatial dimensions of vulnerability to energy poverty, we have identified nine key dimensions that play a crucial role in determining a household's susceptibility to energy poverty and its impact on overall well-being. These dimensions encompass various aspects that can either be internal or external to the household, highlighting the complexity of vulnerability to energy poverty. The key dimensions are the following:

1. Accessibility: Examining the ease of access to energy resources, support programs, and information on energy-efficient practices.
2. Financial capacity: Assessing the household's financial resources and ability to afford energy expenses and undertake renovation measures.
3. Energy efficiency: Evaluating the energy efficiency

of the dwelling and its impact on energy consumption and costs.

4. Energy-related needs and practices: Understanding the household's energy needs, habits, and behaviors concerning energy consumption and costs.

5. Building performance: Considering the quality and condition of the dwelling, including insulation, heating systems, and energy performance.

6. Energy price: Analyzing the cost of energy and its affordability for different households, particularly those with limited financial means.

7. Social network participation: Examining the social networks and support systems available to households, which can influence energy-related decision-making and access to resources.

8. Willingness and interest: Assessing the household's motivation and inclination to engage in energy-saving behaviors and adopt renovation measures.

9. Precarity of housing and welfare/state support: Understanding the housing conditions, housing rights, and the effectiveness of welfare and state support programs in addressing energy poverty.

Each of these key dimensions can be represented by a set of indicators. For the context of Amsterdam, we identified 29 vulnerability indicators through desk research, interviews, and neighborhood-level data analysis. This multidimensional suite of indicators allowed us to conduct a socio-spatial analysis, enabling us to identify vulnerable groups and gain insights into their spatial distribution within the city.

Figure 2 shows the resulting vulnerability framework, highlighting the connections between dimensions (colorful bubbles) and indicators (grey bubbles). The figure illustrates the multidimensional nature of energy poverty, as each vulnerability indicator is asso-

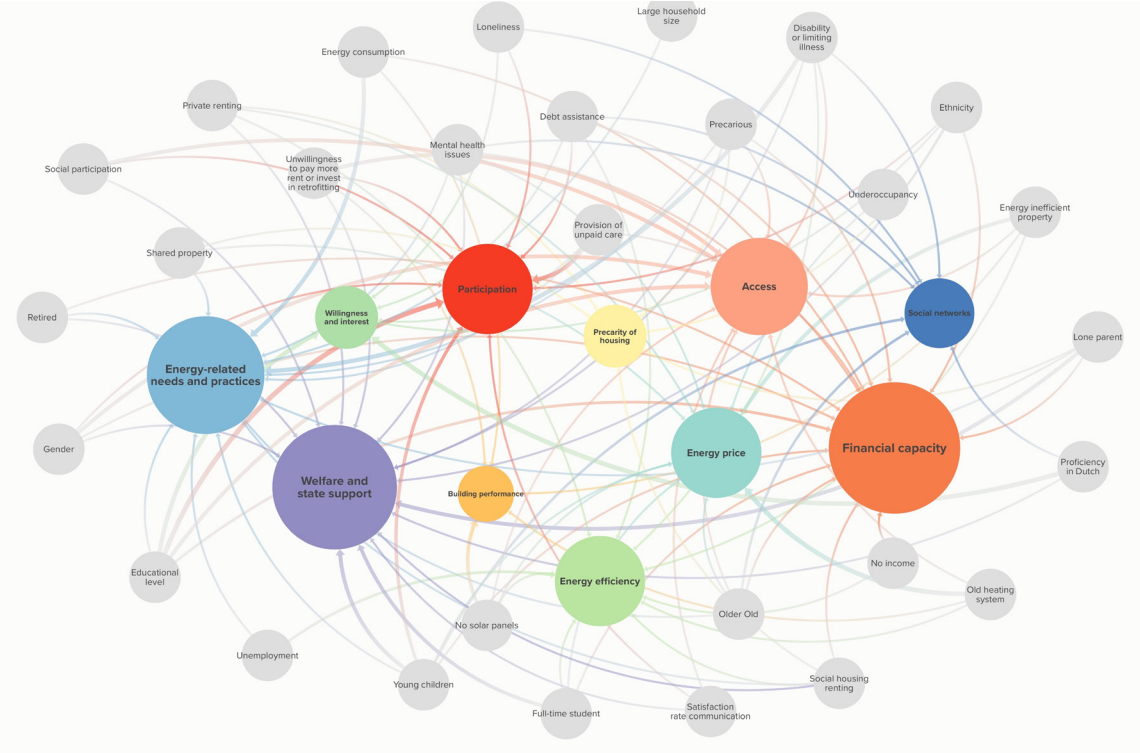

Figure 2: Energy poverty vulnerability framework: Key dimensions (colourful bubbles) and associated indicators (grey bubbles). This figure demonstrates the complexity underlying the multidimensional nature of energy poverty.

ciated with various factors in the vulnerability framework. This holistic understanding of energy poverty vulnerability empowers us to develop targeted policies and interventions that address the specific needs and challenges vulnerable groups face in Amsterdam. By considering the interconnectedness of these key dimensions and employing a multidimensional approach, we can effectively address energy poverty, promote spatial justice, and work towards a more equitable and sustainable energy future for all.

Recognising Vulnerable Groups and their Spatial Distribution

Through our socio-spatial analysis, we have identified seven distinct vulnerable groups disproportionately affected by energy poverty. These groups encompass a range of households, including those with a migrant background, households living on rent, single-parent households, and households with low rates of social participation. Each group faces unique challenges contributing to their vulnerability to energy poverty and the potential loss of well-being (Figure 3).

Remarkably, the results of the socio-spatial analysis have shown that six out of the seven identified vulnerable groups are concentrated in the Bijlmer-Centrum area. This spatial concentration indicates a higher vulnerability and a heightened exposure to energy poverty and its adverse effects on individuals in this region. The prevalence of these vulnerable groups in Bijlmer-Centrum underlines the urgent need for targeted interventions and policy measures to address energy poverty in this area (Figure 3).

Recognizing and understanding the spatial distribution of vulnerable groups is crucial for designing effective policies and interventions. By acknowledging the locations where these vulnerable groups are concentrated, we can target resources and initiatives to areas with the greatest need. This targeted approach enables us to address the root causes of energy poverty

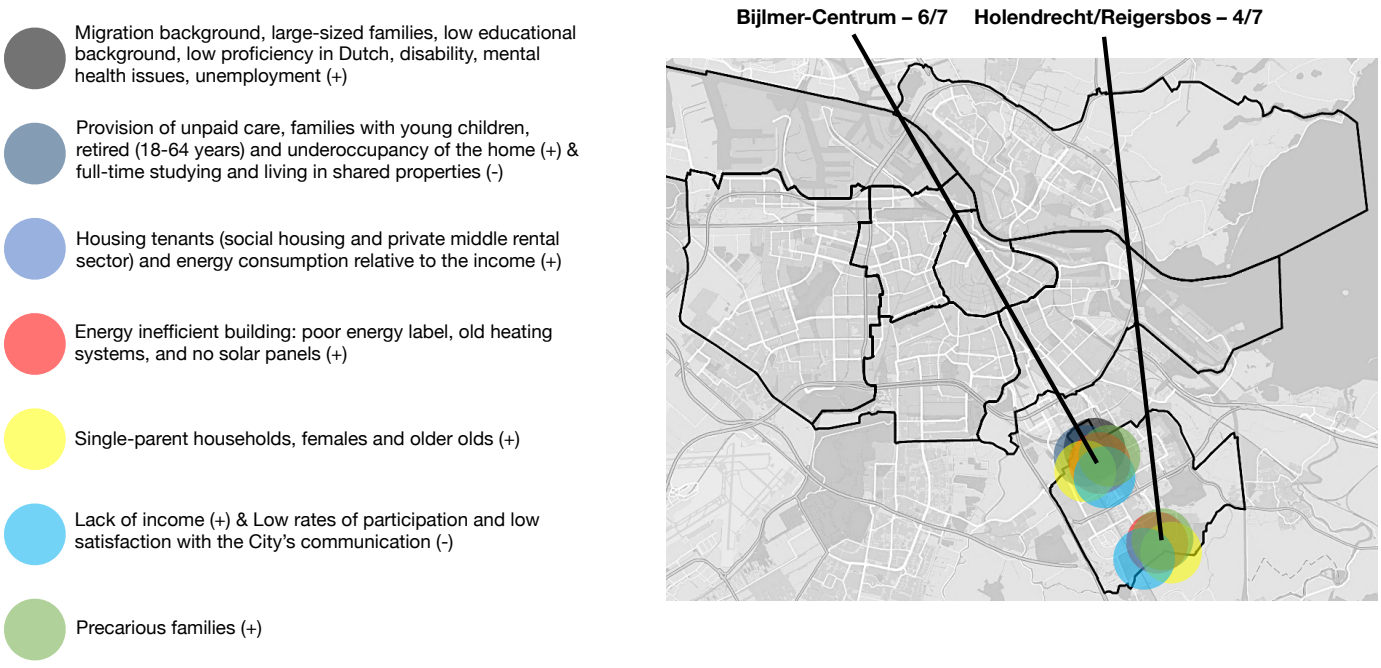

Figure 3: Seven distinct groups vulnerable to energy poverty in Amsterdam, highlighting higher vulnerabilities in Amsterdam-Zuidoost. Six out of seven vulnerability groups concentrate in the Bijlmer-Centrum area, and four out of seven in the Holendrecht/Reigersbos.

and work towards equitable outcomes that improve the well-being of vulnerable households.

Moreover, recognizing the spatial distribution of vulnerable groups helps us to identify patterns and connections between socio-economic factors, housing conditions, and access to energy resources. This knowledge allows us to develop tailored strategies that consider the unique needs, challenges, and opportunities present in different neighborhoods and communities.

In summary, our socio-spatial analysis has identified seven vulnerable groups disproportionately affected by energy poverty. The spatial concentration of these groups in the Bijlmer-Centrum area emphasizes the urgency of implementing targeted policies and interventions. By recognizing the spatial distribution of vulnerable groups, we can formulate precise strategies that address the root causes of energy poverty and promote spatial justice for all residents of Amsterdam Zuidoost.

Targeting Vulnerable Groups: Redistributing the Benefits of Renovation Measures

Based on the findings from the socio-spatial and system analysis, the expert session identified three main clusters encompassing the vulnerabilities of the seven identified vulnerable groups:

1. For the “Lacking the Capacity to Act” cluster, which includes groups 1, 6, and 7, the following policy strategies are recommended:

• Customized communication and support: Provide audio-visual materials and adjust communication to address language barriers, low literacy levels, and low trust in institutions. Use non-technical terminology and translate information into different languages. Personal visits and visuals should be employed to enhance engagement and understanding.

• Community engagement and support networks: Engage with local communities and community representatives to increase outreach and awareness. Organize activities through community networks and resident support groups to foster trust, share information, and provide tips on energy-saving and renovation. Encourage the “social infection” effect by promoting success stories and peer-to-peer sharing.

• Connect social and technical aspects: Combine social and technical elements through “koppelkansen” projects, integrating social aspects into energy-saving and renovation initiatives. Involve the social domain of the city to connect social measures and renovation efforts, building trust and fostering a sense of community.

• Job and education opportunities: Create job and education opportunities related to renovation to address unemployment and low educational levels. This not only helps tackle vulnerability but also contributes to future employment prospects aligned with the EU’s Renovation Wave.

• Financial support and awareness: Provide financial assistance for renovation to low-income residents and raise awareness of welfare support measures. This ensures that individuals have the means to undertake renovation measures and cope with increased expenses. Additionally, create awareness of energy consumption and daily practices to promote energy-saving habits.

• Assistance and prioritization: Prioritize assis-

tance for individuals who cannot renovate themselves due to health issues, such as deploying the FIXbrigade or making houses "WMO ready." Deploy care providers as local ambassadors to provide guidance and support. Prioritize placing vulnerable individuals in newly built residential buildings that meet higher energy efficiency standards.

By implementing these strategies, tailored to the unique characteristics and needs of the "Lacking the Capacity to Act" cluster, we can empower them to address energy poverty, improve living conditions, and foster a sense of community and well-being.

2. For the "Burdens" cluster, which includes groups 2 and 5, the following policy strategies are suggested:

• Unburdening and support: Implement measures to alleviate the burdens vulnerable individuals face. This includes providing assistance and support for informal caretakers, families with young children, older olds, women, and single-parent households. Offer programs such as the FIXbrigade to take care of renovation tasks on their behalf and unburden them from additional responsibilities.

• Training and awareness: Develop training programs and awareness campaigns targeted explicitly at the "Burdens" cluster. This includes providing students with knowledge on energy efficiency and renovation measures through informal lectures and virtual reality environments. Increase awareness of welfare support measures available to them, enabling them to access financial resources for small measures or increased rent after renovation.

• Involvement of the social domain: Engage the social domain, such as neighborhood teams and community organizations, in renovation policies. Foster the creation of self-help groups where vulnerable individuals can support each other, share resources, and exchange information on energy-saving practices and renovation options. Strengthen social networks to create awareness and promote collaboration in addressing energy poverty and improving living conditions.

• Promote energy-conscious behavior: Encourage energy-saving practices and behaviors among the "Burdens" cluster. Provide tailored communication, including visuals and personal visits, to effectively reach and engage individuals with limited control over their energy consumption. Increase awareness of the benefits of renovation and energy efficiency measures to motivate participation.

• Financial support: Provide direct financial assistance for quick fixes and renovation efforts within the "Burdens" cluster. This can help overcome financial constraints and enable them to undertake necessary measures. Additionally, promote programs that create job and education opportunities related to renovation, providing long-term financial stability and skills development.

By implementing these comprehensive policy strategies, tailored to the unique challenges faced by the "Burdens" cluster, we can effectively address their vulnerability, enhance their living conditions, and promote energy efficiency and renovation initiatives.

For the "Building-Related" cluster, which includes groups 3 and 4, policy strategies should focus on the following:

• Energy savings and efficiency: Focus on promoting energy savings and efficiency measures for individuals or households living in social housing, private middle rental sectors, and energy inefficient buildings. This can be achieved by organizing energy-saving challenges, providing energy-saving tips, and stimulating

tenants to lower their energy consumption. Encourage landholdersto provide energy-saving technologies, like LED bulbs or insulation tape, to their tenants.

• Sustainability enforcement: Enforce sustainability measures on landholders to ensure they undertake renovation measures in their buildings. This includes setting energy efficiency standards and regulations that landholdersmust comply with. Prioritize the technical side of renovation in complexes, such as replacing old heating systems with heat pumps and installing solar panels. Include provisions in agreements (convenants) with housing associations to prioritize the renovation of energy inefficient properties.

• Financial support and income enhancement: Increase the disposable income of vulnerable households within the "Building-Related" cluster by lowering "burdens" such as energy bills. This can be achieved through compensation on energy bills or implementing a basic income policy to enhance the financial situation of these households. By addressing the financial aspect, their vulnerability to energy poverty can be reduced.

• Collective purchasing and quick energy-saving measures: Encourage collective purchasing of renovation materials, particularly for housing associations and homeowners, to reduce overall costs. Prioritize quick energy-saving measures before planned renovations to address vulnerability in energy inefficient buildings. Define a minimum increase in the energy label when new tenants move in, ensuring improvement in energy efficiency.

By implementing these policy strategies for the "Building-Related" cluster, we can effectively address energy poverty, promote sustainability, and enhance energy efficiency in social housing, private rental sectors, and energy inefficient buildings. These measures aim to reduce vulnerability and improve living conditions for individuals within this group.

Group 1: Lacking the capacity to act	**Group 2: Burdens**	**Group 3: Building related**
Introducing an integrated approach	Introducing an integrated approach	Focusing on technical solutions that match the needs and practices of vulnerable groups
Increasing engagement among local citizens	Improving communication between vulnerable groups and institutions	Introducing collecting purchase schemes to reduce renovation costs
Improving communication between vulnerable groups and institutions	Supporting local initiatives and networks to tackle energy poverty	Targeted action and support for landlords and tenants to create awareness and tackle energy poverty
Creating awareness among vulnerable groups and deploying local citizens as ambassadors	Deploying FIXbrigade to take small energy saving measures for them	Providing targeted subsidies for landlords and house-owners to co-finance renovation
Establishing and deploying local networks to build trust, create awareness and enhance community building	Relocation of vulnerable groups	
Prioritisation in renovation schemes	Creating awareness among vulnerable groups	

Table 1: Overview of policies tailored to the clusters.

These policies are designed to address the specific needs and challenges of each vulnerable group, promote community engagement, and foster collaboration between institutions and vulnerable communities. By tailoring policies based on the unique characteristics of each group, we can ensure a more effective and inclusive approach to redistributing the benefits of renovation measures.

It is important to note that the implementation of these policies should be accompanied by a holistic and integrated approach that incorporates elements of awareness, capacity building, community empowerment, and targeted support for landholders and tenants. This comprehensive approach aims to break the cycle of energy poverty, improve living conditions, and foster a sense of belonging and well-being among vulnerable groups.

Who Should Take Action?

Insights from the system analysis and expert session highlight the importance of various key actors in addressing energy poverty. These actors include housing associations, municipal departments related to social, housing, and sustainability domains, non-governmental organizations, financial institutions, and informal institutions like home care providers who have firsthand experience with vulnerability to energy poverty. Our research underscores the significance of collaboration and joint action among these actors to tackle energy poverty effectively.

Organizations such as Stichting !WOON and Stichting Co-Force play a crucial role as they can directly engage with local residents and facilitate their participation in various policies and measures. It is important that engagement strategies are designed to minimize burdens on residents while implementing renovation measures. These organizations can also carry out small-scale measures on behalf of the municipality or housing associations, such as installing insulation tape or replacing energy-inefficient bulbs with LED bulbs. Given their emphasis on community building, both Stichting !WOON and Stichting Co-Force can serve as the central point of contact between residents and institutions.

Housing associations that provide social housing are also key actors in addressing energy poverty. They can actively provide information to tenants about energy efficiency measures and ensure that vulnerable groups are housed in buildings with a minimum energy performance level (e.g., energy label E or higher). Additionally, our research has revealed that some buildings with high energy performance ratings may still have poor ventilation, leading to mold formation and compromised indoor air quality. Therefore, addressing energy poverty requires going beyond building-related measures. Housing associations can play a significant role in monitoring the living conditions of their tenants to ensure a minimum level of livability, sustainability, and overall building quality. It is crucial for the municipality to regulate and enforce the roles and actions of housing associations in this regard.

In summary, addressing energy poverty requires the collective efforts of various actors, including housing associations, municipal departments, non-governmental organizations, and informal institutions. Collaboration, coordination, and regulation among these actors are vital for effective and sustainable solutions. By working together and taking appropriate actions, these stakeholders can significantly alleviate energy poverty and improve the well-being of vulnerable communities.

Key take-aways

1. Energy poverty is a pressing issue in the Netherlands, with a significant increase in the number of households struggling to afford energy bills. Current policies and subsidies primarily benefit socioeconomically advantaged households, leaving underprivileged social groups disadvantaged.

2. Energy poverty has far-reaching implications, including severe health issues and excess winter deaths. Various factors contribute to vulnerability, such as socioeconomic factors, building-related conditions, and energy efficiency.

3. Current policies fail to adequately identify and assist energy-vulnerable groups, relying on expenditure-based indicators and short-term solutions. Government funding and temporary price caps have been criticized for their inadequate support and rising energy prices.

4. A socio-spatial approach is essential to tackle energy poverty effectively. It involves understanding the social and spatial dimensions of vulnerability, recognizing the interplay between social factors, housing quality, and energy efficiency. This approach allows for targeted policies tailored to the needs of specific vulnerable groups.

5. The spatial distribution of vulnerable groups is crucial for designing effective policies and interventions. By identifying the concentration of vulnerable groups in specific areas, resources and initiatives can be targeted to address the root causes of energy poverty and promote spatial justice. Tailored policies should improve communication, reduce burdens, and address building-related vulnerabilities for different groups.

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WHY A SOCIO-SPATIAL APPROACH IS REQUIRED TO TACKLE THE ENERGY POVERTY CRISIS IN THE NETHERLANDS: EVIDENCE FROM AMSTERDAM ZUIDOOST

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