Advancing justice in energy renovation for vulnerable neighbourhoods

Ricci, Diletta; Konstantinou, Thaleia; Visscher, Henk

Publication date
2024

Document Version
Final published version

Citation (APA)
Ricci, D. (Author), Konstantinou, T. (Author), & Visscher, H. (Author). (2024). Advancing justice in energy renovation for vulnerable neighbourhoods. Web publication/site, European Commission.

Source: Ricci, D., Konstantinou, T., & Visscher, H. (2024, April 26). *Advancing justice in energy renovation for vulnerable neighbourhoods*. BUILD UP. Retrieved May 13, 2024, from https://build-up.ec.europa.eu/en/resources-and-tools/articles/advancing-justice-energy-renovation-vulnerable-neighbourhoods

Advancing justice in energy renovation for vulnerable neighbourhoods

Article
26 April 2024

Energy renovation processes in vulnerable neighbourhoods are complex decision-making endeavours. The JustPrepare project aims to develop inclusive strategies attuned to local needs to enhance energy renovation and transition effectiveness, considering economic, environmental, and social benefits.

Editorial Team

Authors
Diletta Ricci, Dept. of Management in the Built Environment, TU Delft | Personal profile
Thaleia Konstantinou, Dept. of Architectural Engineering and Technology, TU Delft, and BUILD UP Ambassador | Personal profile
Henk Visscher, Dept. of Management in the Built Environment, TU Delft | Personal profile
(**Note**: Opinions in the articles are of the authors only and do not necessarily reflect the opinion of the EU)

Introduction

Renovating residential buildings presents socio-technical challenges in the quest for **climate goals and equitable sustainable transitions**. The built environment has a significant environmental impact, with 75% of EU buildings lacking energy efficiency, and 80% of EU household energy use going to heating, cooling, and hot water [1]. **Achieving the EU's 2050 climate neutrality goal and a 55% reduction in emissions by 2030 requires a significant escalation in residential building energy efficiency**, necessitating a doubling of the current 1% renovation rate by 2030, as mandated by the EU's Renovation Wave (2020)[2]. In response, the Netherlands developed a Long-Term Renovation Strategy (2020) aiming to insulate 2.5 million homes by 2030 and transition neighbourhoods away from natural gas by 2050 [3], [4]. Renovation processes can significantly affect vulnerable groups who often reside in inefficient buildings and struggle to meet their energy needs. The typical barriers to renovation—financial constraints, communication issues, lack of trust, and insufficient capabilities and knowledge—are particularly acute in these contexts. Thus, there is an increasing focus on the social justice implications of **building decarbonisation**, supported by an emphasis on the energy justice perspective in energy transitions.

Considering social and environmental needs, the recent revision of European legislative frameworks (2023) recognises the importance of addressing critical social transition aspects such as **energy poverty**, prioritising renovation of worst-performing buildings, and providing information and technical support [5]. However, how to implement these policies remains challenging. Scholars have applied the justice perspective to several low-carbon transition scenarios, but with a limited focus on housing renovation and mainly identifying injustices rather than proposing actionable measures.

This article aims to introduce the concept of **energy justice in residential building renovations**, showing how the **JustPrepare project** [6] addresses this issue in multiple phases, from gaining insights through learning cases to developing and proposing strategies for equitable renovation

The JustPrepare Project, objective and methodology

JustPrepare stands for Putting REsident Practices And REsidential areas at the centre of a JUST and effective energy transition in underprivileged neighbourhoods. This requires embracing a

bottom-up perspective to rethink and further develop thematic agendas for municipalities, housing corporations and other institutional actors, repertoires of interface technologies, renovation strategies and governance arrangements. The overall objective is to overcome two main mismatches that hinder energy transition in underprivileged neighbourhoods:

- **Retrofit Technologies vs. Residents' Energy Practices**: Retrofits often do not align with the diverse energy-consuming practices in underprivileged neighbourhoods, leading to inefficiencies and justice issues.
- **Residents vs. Solution Planners and Implementers**: There's a disconnect between residents and those who plan and implement energy solutions, which can result in resistance, rebound effects, and other complications.

JustPrepare seeks to bridge these gaps by integrating values and actions across different levels of energy transitions and renovation processes, from government policies to design solutions and technology development. The project's objectives and expected outcomes are structured around three main themes: first, understanding the diversity of residential practices and technologies; secondly, enhancing resident involvement and renovation strategies; and, finally, developing integrated solutions and governance arrangements.

To achieve these objectives, JustPrepare utilises an **action-research methodology** based on Living Labs in four Dutch municipalities: Rotterdam, Amsterdam, Nijmegen, and Gemert. These Living Labs explore, test, and validate various approaches to effective and just energy transitions (Figure 1). Key components of this methodology include:

- **Mapping and assessing resident interaction**: Mapping how residents, civil society organisations, frontline workers, and policymakers interact around retrofit processes, focusing on uncovering the potential for more resident inclusion.
- **Developing innovative socio-technical design methods**: Developing new approaches for engaging the diversity of vulnerable d residents in retrofit processes through collaborative design, tested within Living Labs. This involves monitoring and documenting retrofit technology and the effectiveness of governance arrangements.

Central to JustPrepare is the partnership between field practitioners and academic researchers to create effective and sharable outcomes. Learning Labs facilitate this, as platforms for collaborative learning, validation, and dissemination of knowledge and outcomes from Living Labs to a broader set of stakeholders. The project brings together a multidisciplinary consortium made up of universities, municipalities, nonprofit organisations, consulting firms, and housing-focused institutions. **It combines the technical expertise of engineering and applied sciences with the social insights of humanities and social sciences**.

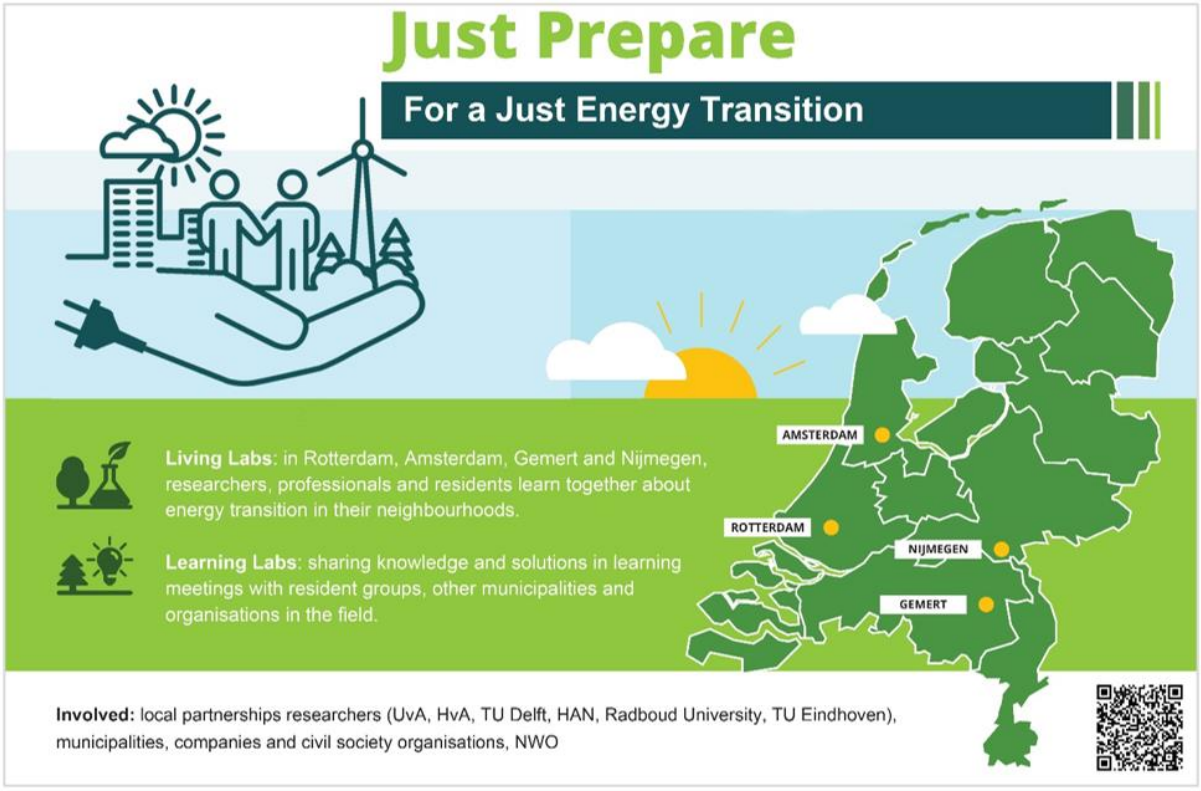

Figure 1: Infographic of JustPrepare project approach and goals

Energy justice perspective and renovation implications

JustPrepare projects are rooted in the theory of **energy justice**, incorporating a flexible definition that emphasises the key dimensions of recognition, procedural, and distributive justice, as outlined in Figure 2 and based on the theoretical conceptualisation [7]. Although there is a risk of these concepts remaining abstract and confined to academic discourse, various initiatives, including JustPrepare, are dedicated to applying these principles in practical settings, uncovering actionable insights for policymakers, and practitioners.

Energy justice promotes an interdisciplinary and inclusive approach to addressing energy systems and services. It calls for an **equitable distribution of the benefits and burdens linked to energy access and consumption**, which also implies energy retrofit, considering both tangible and intangible costs. The process for achieving this must ensure that decision-making is accessible and reflective of a wide range of needs and capabilities, ensuring that no one is left behind and recognising the specific vulnerabilities of different contexts and communities. The three dimensions of energy justice—recognition, procedural, and distributive—are strongly interlinked and mutually reinforcing. For example, effective user participation enhances the recognition of user needs while acknowledging local and individual characteristics helps define appropriate participation methods.

Figure 2: Energy Justice interrelated principles of Recognition, Distributive, and Procedural Justice (figure by author)

This perspective has proven valuable as a normative framework and decision-making tool in various low-carbon transition scenarios. It has been employed to identify injustices in contexts such as smart local energy systems, solar energy management, wind turbine allocation, and other energy chain segments, ranging from extraction processes to consumption patterns. [8], [9].

Renovation projects incorporating residents' perspectives can encompass more than **energy efficiency**; they can also include aesthetic enhancements and broader spatial transformations, such as outdoor areas and building surroundings. These broader impacts are often valued by residents, who benefit from reduced energy costs and improved thermal comfort, along with tangible renovation efforts that foster social cohesion and enhance the quality of communal spaces. Vulnerable and less educated groups often show less interest in energy issues, primarily due to a lack of energy awareness and their focus on more immediate everyday problems. To address this, offering visible renovation measures and involving residents in decision-making through information sharing and collaborative interactions can be key incentives for enhancing project acceptance and satisfaction. This approach is particularly relevant in social rental contexts, where residents with fixed utility rates might not directly experience **the benefits of energy savings.** Exploring mechanisms to improve residents' well-being and minimise project objections is central to JustPrepare, as it prioritises users and helps to boost renovations.

This just and resident-centred outlook aligns the JustPrepare approach with the values and proposals promoted by the **New European Bauhaus (NEB) initiative**. By focusing on our living spaces, the NEB integrates **decarbonisation and energy efficiency** with inclusivity, community cohesion, and a redefined sense of beauty beyond mere functionality that embraces cultural values, quality experiences, and user-centred design [10]. JustPrepare emphasises a user-centric perspective, bringing together technical and social innovation as advocated by the New European Bauhaus (NEB). The project incorporates interactive moments of co-creation and collaborative decision-making, fostering a multidisciplinary assessment for design processes that integrate both technical and local social perspectives.

Incorporating this perspective into residential building renovations can be especially beneficial given the complexities in a multi-stakeholder process, with various interests and the delicate nature of domestic settings. Moreover, in a vulnerable context, the financial implications of building renovation are particularly relevant, such as high investment costs and rent increase issues. There are correlations between energy poverty and spatial characteristics of the built environment, such as low-energy-quality dwellings, but also with personal capabilities, like the ability to engage in renovations, untethering energy poverty from a pure income issue. However, renovation practices are still far from justice-guiding principles. Lack of effective communication and knowledge sharing among residents and stakeholders are primary obstacles in the renovation process.

Externally initiated renovation programs often turn out to be too complex, lacking transparency, and disconnected from local realities and end-users' needs. A just approach is critically needed in vulnerable contexts due to the concentration of socio-spatial fragilities. These include low-income groups, lower education levels, mental and physical limitations, as well as intrinsic vulnerabilities of the built environment at various urban scales—ranging from individual dwellings to entire neighbourhoods—such as poor insulation, low-quality construction materials, equipment obsolescence, and a lack of common and green spaces, as well as disconnection from amenities and urban services.
Justice's perspective relates transversally to the decision-making and implementation processes of the renovation and to the design outcomes of these interventions, affecting how renovation measures interact with users (figure 3).

Figure 3: Transversal approach considering renovation process and outcomes (figure by author)

JustPrepare adopts a similar approach to structure and develops its outcomes by focusing on both the tactical aspects of decision-making and the operational and design-oriented elements. It considers both top-down strategies for managing the renovation process and explores user practices, considering their interactions with building components and energy consumption.

The perceived fairness of procedural practices is increasingly recognised as a crucial prerequisite for the legitimacy and acceptance of outcomes. Indeed, inadequate decision-making methods in developing renovation programs and selecting renovation measures often result in heightened inequalities and a failure to achieve the desired **energy performance**. This is why focusing on project outcomes regarding residents' relationships with the building and renovation technologies can offer valuable insights to integrate into early decisions. This approach also helps mitigate side effects such as **the energy performance gap,** a mismatch between designed and actual energy performance, characterised by prebound effects where models over-predict actual energy consumption and savings from energy-efficient measures because households use less energy than expected. Additionally, rebound effects occur when the expected efficiency of new renovation technologies is not met due to behavioural or systemic responses.

Real-life context cases

This overview of critical aspects reflects the multi-layered decision-making process of **energy transition in vulnerable neighbourhoods** that the Justprepare project proposes to address involving practical cases. The project focuses on four case study locations—Amsterdam, Rotterdam, Nijmegen, and Gemert-Bakel, differing in geographical distributions The specific cases are chosen to be representatives of vulnerable contexts and as arenas of complex and multi-stakeholder decision-making processes for energy transition, involving also building renovations.

In the project's initial phase, case studies serve as learning cases, focusing on contexts where renovation processes are ongoing or completed. These scenarios provide valuable insights into successful strategies and areas where improvements are needed. In subsequent phases, through iterative interactions with the Living Labs, additional case studies will be utilised to develop and validate innovative scenarios.

Case studies are meant to test and validate methodologies developed in the JustPrepare project. This involves working with local partners to test retrofit technologies, energy use practices, and governance arrangements in real-world settings. Moreover, they provide data to be assessed in Living Labs, feeding back into further development of methods and technologies in other project work packages.

First insight from the Rotterdam case

The Rotterdam case study adopted a multidisciplinary area-based approach to transition the Bospolder-Tussendijken (BoTu) neighbourhood away from natural gas use (Figure 4). The plan consists of distinct phases, with a timeline that aligns with JustPrepare duration. Through the initial exploratory phase, we can use the completed projects (such as Gijsinglaanbuurt) as a learning case to identify success and failure factors in the decision-making processes for implementing energy transitions through building renovations in a vulnerable neighbourhood. The insights from these learning cases and other

experiences from the project's other case studies will contribute to developing strategies to improve various levels and aspects of the renovation decision-making process, steering it towards more Just approaches.

Bospolder-Tussendijken stands out because it combines energy and social programmes. It's one of six Rotterdam districts scheduled to transition from natural gas to district heating by 2030. This energy transition is coupled with the Resilient Bospolder-Tussendijken 2028 programme [11], rich in initiatives enhancing community cohesion and social well-being in the area. Additionally, the local housing association is leveraging this municipal-led gas disconnection initiative to implement broader neighbourhood improvements due to poor housing thermal insulation and building components at the end of their technical life span. To keep the transition affordable, the area approach received subsidies from the **National Local Heat Transition Programme (NPLW) and European Local Energy Assistance (ELENA)**.

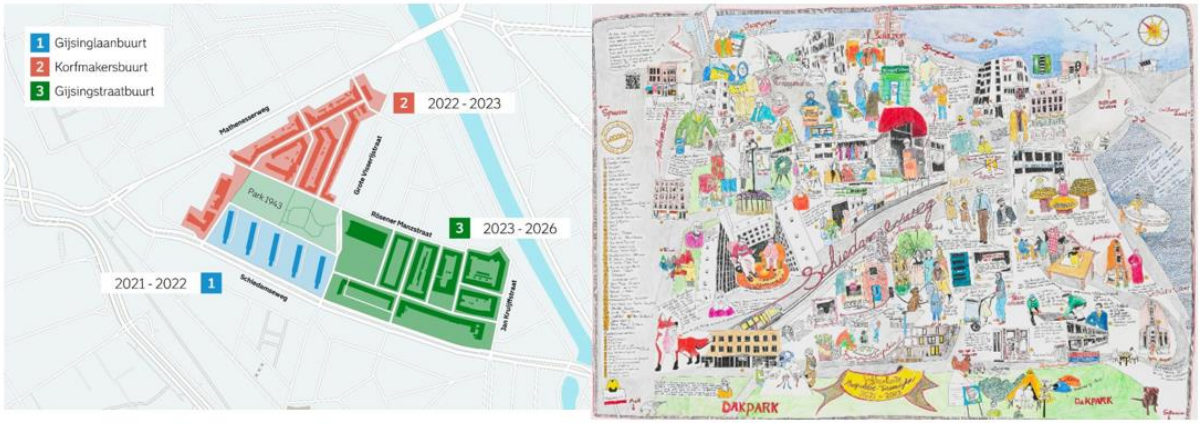

Figure 4 Right: The area approach phases in Bospolder-Tussendijken (BoTu) to disconnect from natural gas [12]. **Left:** Drawing of BOTU stories and activities with people and social dynamics in the foreground [13].

Key stakeholders of the project, including the housing association, actors from the Municipality, the energy supply company, the design team and general contractor, residents, social facilitators from community groups, and tenants association members, were interviewed by the researchers. The goal of the interviews is to reconstruct the decision-making process that led to this innovative socio-technical approach to energy transition.

The focus is on understanding stakeholders' challenges and lessons learned, delving into different aspects of the decision-making process such as governance, technical issues, residents' involvement, and the role of civic society organisations. Reconstructing the decision-making process and understanding the residents' role will allow further development from the project of decision-making approaches and innovative methodologies to be validated in the Living Labs.

Key aspects from the ongoing interviews refer to the key driving role of a collaborative effort from the main initiators' actors, municipalities, housing associations, and energy companies as a base to develop an equitable project and successful coordination with the numerous actors involved. The residents resulted in central prioritising the affordability of housing gas disconnection. Given the vulnerability of the context and personal situations, an approach focused on personal contact by going 'behind the front door' allowed for more responsive solutions to their needs.

Responsiveness in decision-making was achieved through a combination of design measures based on **technical requirements and resident feedback**, as well as social management strategies like continuous information sharing and the use of a language mediator. However, residents' opinions are more nuanced. They positively emphasised secondary aspects of the intervention, mainly non-energy-related measures, such as kitchen and bathroom space improvements.

They also complained about the need for more clarity about why district heating was the only choice and disruptions during the implementation phases.

Conclusions

This article presents the overall approach of the JustPrepare project, highlighting its interdisciplinary nature and the commitment to **bringing justice to vulnerable neighbourhoods'** energy transition. This is planned through an iterative and inclusive methodology to improve residents' trust in local actors and renovation technologies. Recognising residents' needs and energy practices, while proposing user-oriented and proper participation methods to ensure effective and equitable project outcomes, the project reflects energy justice principles of recognition, procedural, and distributive justice. The effort is focused on the effectiveness of a comprehensive performance covering energy, environment, and social aspects, leaving space for creativity and mutual learning.

Acknowledgements

This work is part of the JustPrepare project 'Putting REsident Practices And REsidential areas at the centre of a JUST and effective energy transition in underprivileged neighbourhoods' founded by the Dutch Research Council (NWO) within the NWO-KIC programme 'Energy Transition as a Socio-Technical Challenge'.

References

[1] "Energy Performance of Buildings Directive." Accessed: Apr. 22, 2024. [Online]. Available: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en

[2] European Commission, "A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives." 2020. Accessed: May 21, 2023. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662

[3] BZK, "Programma Versnelling verduurzaming Gebouwde Omgeving." Volkshuisvesting en Ruimtelijke Ordening, 2022. Accessed: Jun. 25, 2022. [Online]. Available: https://www.government.nl/topics/climate-change/climate-policy

[4] RVO, "Implementation of the EPBD in The Netherlands – Status in 20," 2020, doi:https://doi.org/10.54648/taxi2021092.

[5] "Designing building decarbonisation policies for a socially just energy transition > BPIE - Buildings Performance Institute Europe," BPIE - Buildings Performance Institute Europe. Accessed: Apr. 22, 2024. [Online]. Available: https://www.bpie.eu/publication/designing-building-decarbonisation-policies-for-a-socially-just-energy-transition/

[6] "JUST PREPARE," openresearch.amsterdam. Accessed: Apr. 23, 2024. [Online]. Available: https://openresearch.amsterdam/nl/page/97235/just-prepare

[7] B. K. Sovacool and M. H. Dworkin, "Energy justice: Conceptual insights and practical applications," Applied Energy, vol. 142, pp. 435–444, Mar. 2015, doi: 10.1016/j.apenergy.2015.01.002.

[8] L. Mundaca, H. Busch, and S. Schwer, "'Successful' low-carbon energy transitions at the community level? An energy justice perspective," Applied Energy, vol. 218, pp. 292–303, 2018, doi: 10.1016/j.apenergy.2018.02.146.

[9] B. K. Sovacool, M. Lipson, and R. Chard, "Temporality, vulnerability, and energy justice in household low carbon innovations," Energy Policy, vol. 128, pp. 495–504, May 2019, doi: 10.1016/j.enpol.2019.01.010.

[10] European Commission, "New European Bauhaus: beautiful, sustainable, together." Accessed: Jun. 21, 2023. [Online]. Available: https://new-european-bauhaus.europa.eu/index_en

[11] "Bospolder Tussendijken," Bospolder Tussendijken. Accessed: Apr. 23, 2024. [Online]. Available: https://bospoldertussendijken.nl/

[12] Bospolder - Tussendijken - Sustainable 010 (duurzaam010.nl)

[13] Bospolder Tussendijken | Neighbourhood Collection Foundation (wijkcollectie.nl)