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Social Challenges, Policies and Interventions

Master Thesis

A green transition for all? A structured assessment of the social considerations in the European sustainability requirements for buildings

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This thesis has been written as a study assignment under the supervision of an Utrecht University teacher. Ethical permission has been granted for this thesis project by the ethics board of the Faculty of Social and Behavioral Sciences, Utrecht University, and the thesis has been assessed by two university teachers. However, the thesis has not undergone a thorough peer-review process so conclusions and findings should be read as such

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Abstract

Background. To fight against the climate change, the European Union (EU) has set new and ambitious climate goals, with significant focus going to buildings as one of the biggest emitters of greenhouse gases. Simultaneously, Europe is facing a housing crisis and the green transition will be costly, especially for low-income households. This study explored the inclusion of social considerations in the European Union's four most relevant and recent regulations setting requirements for the sustainability of buildings. **Methods**. By using environmental justice as a theoretical framework, the author conducted a document analysis investigating Energy Performance of Buildings Directive, Energy Efficiency Directive, Ecodesign for Sustainable Products Regulation and Construction Products Regulation (and relevant organisations' reports) to investigate how these regulations impact housing affordability, quality and availability for low-income households. **Results**. EU is clear in its intent to support low-income households in the green transition. However, the current legislation is highly ambiguous and the support remains on high-level specialised language recommendations, not providing any clear strategies or guidelines to ensure that low-income households' needs are taken into account. Hence, the EU needs to provide higher level of clearness and enforcement mechanisms, as well as definitions, time and inclusion of vulnerable households in the policy-making, if they want to create policies that truly do not leave anyone behind.

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1. Introduction

The world is facing a climate crisis and to avert catastrophic health, environmental, and economic impacts and prevent millions of climate change-related deaths, the world must limit temperature rise to 1.5°C (WHO, 2023). The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report showed that climate risks are appearing faster and will become more severe sooner than previously expected (WHO, 2023). Greenhouse gas (GHG) emissions must be reduced by 7.6% annually up to 2030 to prevent global warming beyond 1.5°C, (UNEP, 2019). A significant contributor to GHG emissions is the buildings and construction sector, with the construction sector accounting for 37% of global emissions (UNEP, 2023). 65% of Europe's current building stock was built before 1980 and approximately 97% of the EU's buildings must be upgraded to reach the 2050 target of a climate-neutral EU (Bellona, 2024a).

The EU institutions have implemented an increasing amount of environmental requirements on the building sector (e.g. energy performance standards, environmental footprint of construction products etc.), to reduce the negative climate impact of the built environment. Therefore, European countries must respond to the new and increasingly ambitious sustainability criteria for buildings set by directives such as the Energy Performance on Buildings Directive (EPBD), Energy Efficiency Directive (EED), Construction Products Regulation (CPR), and Ecodesign for Sustainable Products Regulation (ESPR). However, the more sustainable solutions are often more costly which opens the discussion of who should pay for these new green technologies and who can afford the green transition. By applying the framework of environmental justice and conducting a document analysis, this research aims to assess the considerations for social concerns in the EU sustainable building requirements.

1.1 Social relevance

Societal debates revolve around the discussion of which challenge should be prioritised: the current challenges of people not having a good quality place to live or the less tangible and long-term environmental goals.

This brings into play the trade-offs between climate needs and housing issues: the responsibilities and impacts of climate change often work in opposing ways since the groups likely to be affected most are the ones least responsible for causing it (Koch, 2022; p. 450). In the case of buildings, it is often the people from low-income households impacted most by this complex issue - low-income households live in lower-quality homes requiring more immediate renovation to follow the climate requirements. According to Eurostat, in 2022, 16.8% of the European Union (EU) population lived in overcrowded households and the share of the EU population unable to keep their homes adequately warm increased from 6.9% in 2021 to 9.3% (Eurostat, 2023). At the same time, 8.7% of the EU population spent 40% or more of their household disposable income on housing (Eurostat, 2022). That creates a situation where the people who already cannot afford higher-quality housing, are the same people who will be the first to pay for renovations. Many tenants from low-income households fear "renoviction" or

the increases in rent following a renovation, which would make renting their current accommodation not affordable (Aldanas et. al., 2022). Therefore, it should be the task of European sustainable welfare to create social policies that counter the inequalities and conflicts that are likely to emerge as a result of the decarbonisation of production and consumption patterns (Koch, 2022; p. 450).

Hence, European policymakers are facing dual pressures when it comes to the built environment. On one side there is pressure to solve the housing crisis and provide people with an affordable place to live, as in addition to being a human right recognised also in the Universal Declaration of Human Rights, stable and high-quality housing is crucial for the enjoyment of other human rights, such as the right to education and the right to personal security, health, social security, voting, privacy, or education (United Nations, 2009). Target 11.1 of the United Nation's Sustainable Development Goals, states that "By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums" (United Nations). On the other side, there are increasing demands from EU legislation to implement new standards for buildings and construction materials, in order to reduce the carbon emissions of buildings and fight climate change.

This research may offer further support for policymakers and stakeholders by examining the relationship between the sustainability factors of the built environment and its impact on housing affordability, availability, quality, and therefore, housing conditions for low-income households. These results can contribute to designing policies that address both the environmental and social challenges, which is crucial to mitigate trade-offs and ensure that the policies do not create further disadvantages for low-income households.

1.2 Scientific relevance

The relationship between the impact of housing and various aspects of the socioeconomic situation has been thoroughly explored by researchers and the impact of housing on health, wealth, and income has been examined. Research by Marsh, et. al. (1999) or Palacios, et. al. (2020) examined the relationship between housing and health and thus delivered valuable insights into the effect that housing can have on socioeconomic status. Their research provides evidence for a potential relationship between housing and health outcomes, for instance by examining the changes in health outcomes and changes in housing conditions. They conclude that instances of doctor visits or sick leave correspond with a housing environment requiring renovation and that changes to the housing environment correspond with fewer instances of utilisation of the health system.

In addition, several researchers such as Oxley & Smith (1996) and Berard & Trannoy (2023) explored the effect of policy and similar steering instruments on housing. They explore the effectiveness of multiple housing policy instruments and their impact on social inequality. Research provides evidence that governments achieve the most success in reducing social inequalities through instruments that impact the costs of housing, both for owners and renters. However, a research gap occurs at the intersection of the European Union's ambitious plans to renovate Europe's building stock and the possible effects on the socioeconomic situation of low-income households in Europe. As the conflicting interests described above are at high risk of creating new inequalities in the fight against climate change, by putting the more unfortunate

at even greater economic and social risk, then it is crucial to address the issue by conducting research that aims to fill this gap of possible impacts of the environmental requirements on housing equality. The framework of environmental justice presents an opportunity to utilise the socioeconomic perspective to gain a deeper understanding of the impact of buildings and sustainability policy instruments. This research may offer additional insights and possible recommendations to mitigate possibly harmful side effects of the European sustainability requirements for buildings by utilising a framework that operates at the intersection of several disciplines and actively aims to understand the relationship between environmental and social factors.

Therefore, this study aims to investigate the extent to which green requirements consider the social implications for housing for low-income households.

Thus, the following research question is formulated: how are social aspects (housing affordability, quality, and availability) reflected in the EU green requirements for buildings and how does that impact low-income households?

2. Literature review

As the most influential EU green requirements related to buildings have been adopted or renewed within the last year or two, there is very little academic and/or scientific research on the impacts of EU requirements on the housing affordability, availability and quality, especially for low-income households. This is also argued by Vainio et.al., (2020), who investigated energy-efficiency and energy poverty related literature and found that even though energy transitions are strongly dependent on individuals' behaviours, the roles of social-psychological processes have been given little attention in energy-transitions literature. Further studies indicate a weak association between pro-environmental attitude and behaviour, meaning that there are other aspects that have not been sufficiently addressed (Vainio et. al., 2020). Barbier's (2020) analysis showed that even though a general presumption on the long-term economic gains of a transition to a low-carbon economy exists, in reality, there is a lack of analyses of the possible income and wealth implications of the transformation to a green economy (Barbier, 2020). The same was argued by Haidar & Bahammam (2021) who found that currently there is a lack of combining the environmental aspirations with social considerations, as there have been developed several sustainability and environmental assessment tools, sustainability rating instruments, etc., but these tools place a far greater importance on the environmental aspects than on the social aspects (Haidar & Bahammam, 2021).

Zimmermann and Gengnagel (2023) reviewed the European Green Deal's (EGD) communication and coded all sequences in which social issues were addressed to explore how different stakeholders respond to the social issues. They discovered that social issues are only marginally present in the eight areas focusing on different sectors. Issues related to social deprivation risks, such as food, energy and housing poverty/affordability, are mentioned only six times as a potential side effect of economic transitions, and health risks and benefits are addressed only in passing and in conjunction with other issues. Overall, questions related to

social inequalities stemming from the Green Deal remain vague and measures such as social dialogue and energy-efficient housing align with economy-oriented productive social policy, not social welfare (Zimmermann & Gengnagel, 2023).

Despite there being very little research on the societal impacts of EU's green ambitions, there has been a fair share of research investigating the share of energy poverty amongst low-income households. Energy expenditure weighs the most on the poorest households' budget: currently, in Europe, the poorest households allocate 2% more of their total budget than middle-income households to energy expenditure, as shown by Faiella et.al. (2023). This finding was underscored by Fragkos (2021), and Adom et.al., (2021) who found that the low-carbon transition would increase energy-related expenditure for low-income households, raising energy poverty and energy affordability issues (Fragkos, 2021), and that between extremely poor and moderately poor people, transitioning to a green energy policy might be more beneficial to the former than to the latter (Adom et.al., 2021). In addition to low-income households, the hardship paying for energy bills is especially stark for racial and ethnic minority households, especially those with children, presumably because it is these minority groups who often also form low-income households (Lewis et.al., 2020).

The challenges linked to a just energy transition are especially sharp in Eastern European countries, as demonstrated by Streimikiene et.al., (2020), where energy consumers can be trapped in inefficient residential housing stock without the ability to change heat suppliers or regulate energy consumption in their homes. There is also proof of the energy renovation being linked with the age of households: the willingness to engage in energy renovation is much lower for those over the age of 70 than that of the younger population (Streimikiene et.al., 2020).

All the while, behavioural responses could exacerbate regressivity because low-income households may be less concerned with environmental quality, even though co-benefits in terms of emission reductions are concentrated among low-income households, environmental quality is also less valuable for them, as proved by Vona (2023). Tan et.al. (2023) identified that the public's willingness to pay for solar photovoltaic tiles strongly correlates with income level and the advances in the wider implementation of solar technologies depend on policymakers developing incentives for low-income groups to increase their perception of personal interest and motivating them to participate in retrofitting rooftops (Tan et.al., 2023). Similarly, Ravigne et al. (2022) found that policies aiming to maximise emission reduction may result in negative economic outcomes for households, which could harm the social acceptance of such measures. However, if these policies are counteracted with measures aimed at reducing the cost burden for households, such as renovation plans that mitigate carbon emissions or reduce the overall tax burden for households, they can contribute to limiting negative distributional consequences of sustainability policies (Ravigne et.al., 2022).

This highlights the importance of identifying drivers of environmental behaviour. There is work on the motivational aspect of environmental behaviour, for example, Abrahamse & Steg (2011) used the value-belief-norm (VBN) theory to investigate people's sustainable behaviour.

According to the VBN theory, environmental concern is related to the extent to which individuals believe their own behaviour has negative environmental consequences. People with a stronger concern for the environment will be more aware of the environmental impact of their actions. Hence, if people are aware of these consequences, the more likely it is that they will take responsibility for environmental problems, and these feelings of responsibility in turn will lead to the activation of personal norms and the moral obligation to act. Therefore, those feelings of moral obligation are positively linked to the willingness to act pro-environmentally (Abrahamse & Steg, 2011). This theory however, does not include the aspect of material capabilities to engage in environmental behaviours.

Thus, Bal and Stok (2022) oppose the line of thought that people from low-income households are not behaving sustainably because of a lack of motivation, since in reality there are more aspects influencing their behaviour, and motivation alone is not enough to determine habits. They propose to use the Capability Opportunity-Motivation-Behaviour (COM-B) model, according to which engagement in the sustainability transition is shaped not only by individuals' motivation, but also by their capabilities (psychological and physical capacity to engage in a particular act) and opportunities (factors located in the physical as well as social environment that enable or prompt behaviour) (Bal & Stok, 2022).
Frondel et.al. (2015) showcased the example of Germany, where energy transition has been accompanied by a near doubling of power prices for private households since 2000. Even though Germany's promotion of alternative technologies has resulted in green electricity consumption increasing at a speed seen nowhere else in the world, that increase has also been accompanied by regressive distributional effects in poor households. In 2014 almost one-fifth of Germany's 40 million households earned an income lower than 60% of the median income, which poses the question as to whether electricity consumers are willing to accept or, in the case of poor households, are able to bear the increasing power expenditure (Frondel et.al., 2015).

Should the well-being of low-income households not get more sufficient attention and targeted assistance, it is them who suffer most both under the side-effects of fighting climate change and under the effects of climate change itself. The need for a social-justic approaches also demonstrated by Loo (2023) whose research found that it is the Indigenous communities, people of colour, and lower-income communities that will be especially burdened and least able to adapt to extreme heat events, respiratory illnesses, migrating tropical disease vectors, food insecurity, and stronger storms (Loo, 2023). Similar results of low-income households being more heavily impacted by urban overheating and extreme weather phenomena was also found by Jabeen (2014), Santamouris & Kolokotsa (2015), and Zografos et.al., (2016).
In addition to the social justice perspective, mitigating harm for low-income households bears importance for the economy and social coherence. Bennett et.al. (2023) found that the environmental burden and health impacts associated with inadequate housing in Europe in 2021 (according to the Housing Health and Safety Rating System) contribute considerably to the costs of the national health systems (Bennett et.al., 2023).
Palacios et.al. (2020), demonstrated that the condition of individuals' homes affects their health in a statistically and economically significant manner, especially when these individuals get

older: residents of poorly maintained dwellings report a lower subjective health status and visit the doctor 11% more often than residents of newer and better-maintained buildings, meaning the state spends more money on their medical costs (Palacios et.al., 2020). Additionally, to appropriate-sized, affordable and adequately warm housing being linked to improved health, it can also promote improved social relationships within and beyond the household, including reducing absences from school or work, as proved by Thomson et.al. (2013). A measurable and statistically significant impact of poor housing conditions on self-assessed mental, physical, and general health was also identified by Baker et.al. in 2016. However, a study (Grewal et.al., 2024) investigating the impact of housing prices on residents' health showed that the relationship between housing prices and health differs according to homeownership status, income level, and the broader economic situation, such as governmental support for low-income individuals (Grewal et.al., 2024).

When talking about future policies that "leave no one behind", Markkanen and Anger-Kraavi (2019) argue that if policymakers want climate change mitigation policies to succeed, they should take a pro-poor approach, meaning systematically considering how a policy can be used to benefit the poorest and taking active measures to address any regressive outcomes (Markkanen & Anger-Kraavi, 2019). This includes ensuring that climate change mitigation measures are not financed by reallocation of public funds from social spending, financially worsening the situation for lowest income groups, and ensuring that policy measures are accompanied by sufficient mitigating measures to limit the extent of any regressive impacts and to ensure equitable access (Markkanen & Anger-Kraavi, 2019). Araújo et.al. (2024) argue that to lead the green transition in a socially just way, policymakers must identify local competitive advantages among available pathways to obtain the best socioeconomic benefits at the least cost. In addition, there is a need for social acceptance (Araújo et.al., 2024). If governments fail to implement proper compensation mechanisms, carbon pricing schemes tend to be regressive, prompting dissatisfaction and protest movements such as the *gilets jaunes* ("yellow vests"), or citizens in Washington (USA) who twice voted against the introduction of a carbon tax (Faiella et. al., 2023).

Overall, there is a scarcity of works devoted to the distributional consequences of the transition, as these have been primarily analysed through a linear and unidirectional perspective, even though the transition is a complex, multidimensional, and multidirectional phenomenon (García-García, et al., 2020). As described by Faiella et.al. (2022), in the end, to decarbonize the economy, the real issue would likely be to convince the losers from the process more than the (few) climate deniers.

In further analysis, the researcher expects to find inadequate societal considerations from the EU green requirements, with the considerations remaining vague and surface-level, without clear enforcement strategies. The two policy areas (environmental requirements and housing/societal issues) are functioning unilaterally, with limited collaboration, making it very hard to tackle housing issues in a way that benefits the climate and is financially attainable for households.

3. Theoretical Framework

As a theoretical framework, this research project uses environmental justice (EJ), which is a framework for understanding and acting to address the disproportionate and unequal environmental burdens that the poor and people of colour populations experience due to exposure to health hazards and receiving less legal and other protections than white and affluent communities and regions (Corburn, 2017; Tschakert et.al., 2013; Field et.al., 2014).

Similar to research conducted by the IPCC (Field et.al., 2014), Tschakert et. al. (2013) explore the vulnerability of communities to climate change. They conclude that the impacts of climate change are unevenly distributed and that vulnerabilities arise from patterns of social asymmetry. Thus, the concept of distributive justice is applied to assess occurrences of injustice and to examine the social considerations of the EU sustainability building requirements. A further important aspect of environmental justice is the assessment of a community's vulnerabilities to structural risks and especially to the outcome of transition processes (IBID). Therefore, the concept of environmental justice is applicable to examine the policy outcome of the EU's sustainability rules for housing as it considers existing structural risks of low-income households in a transition process. Distributive environmental injustice in the context of housing can be assessed via the following parameters: housing affordability, quality, and availability.

Housing affordability is defined as the ability of households to face housing costs. This is assessed by considering the median home prices or rents compared to the median household income; and the housing cost overburden rate, which measures the percentage of the population living in households where the total housing costs represent more than 40% of disposable income, including utilities (Bellona, 2024a).

Housing availability is showcased by the vacancy rate, which is the percentage of buildings in the market that are currently unoccupied or available for rent (Bellona, 2024a). The vacancy rate determines the supply and demand in the real estate market – the less there is good quality housing available, the higher the demand for one-unit housing (Bellona, 2024a).

Several aspects determine the quality of housing, such as overcrowding, energy efficiency, and energy poverty. The overcrowding rate is the percentage of the population residing in a dwelling with an insufficient number of rooms, based on household size, family composition, and the ages of its occupants. High energy efficiency means using less energy to perform a task thereby eliminating energy waste and reducing greenhouse gas emissions (GHG) emissions while lowering energy bills and strengthening energy security. Closely tied to energy efficiency is energy poverty, which occurs when a household must reduce its energy consumption to a degree that negatively impacts the inhabitants' health and well-being (Bellona, 2024a).

4. Methodology

This paper is approaching the aforementioned dilemma by conducting an empirical study in the form of document analysis, investigating the existing quantitative data, legislative files, and reports that investigate the impacts of green requirements on housing for low-income households, therefore comprising the fields of public policy and socioeconomics.
The document analysis consists of two types of features: one looking at the impact of environmental requirements of buildings on housing affordability, availability, and quality; and the second looking at the impacts of these factors on low-income households. The study assesses analytic reports by relevant organisations from the field, documents by the European Union agencies, and legal texts such as European directives and regulations.

Document analysis is a systematic procedure for reviewing or evaluating documents of many types - it includes advertisements; agendas, attendance registers, and minutes of meetings; manuals; background papers; books and brochures; diaries and journals; event programs; letters and memoranda; maps and charts; newspapers; press releases; program proposals, application forms, and summaries; radio and television program scripts; organisational or institutional reports; survey data; and various public records (Bowen, 2009; p. 28). The analysis is commonly used in qualitative research as a means of triangulation, and to draw upon multiple (at least two) sources of evidence, to seek convergence and corroboration through the use of different data sources and methods (Bowen, 2009; p. 28).

The method is best suited for this research project due to the flexibility in data source selection since the research will rely on different types of data - qualitative data, which is obtained through the examination of legal texts (e.g. EU regulations and directives), and analytic reports done by research agencies/NGO's. Using this method the project can analyse the relationship between the EU regulations and their impacts on housing, while also identifying all the actors involved.
To code the documents, the initial coding of the content of the documents was based on 3 groups of search terms: 1) Information on housing; 2) Environmental requirements for buildings; 3) Socio-economic implications of the environmental requirements (for low-income households).

This research project will analyse the Energy Performance of Buildings Directive (EPBD), Energy Efficiency Directive (EED), Ecodesign for Sustainable Products Regulation (ESPR) and Construction Products Regulation (CPR). The selection of regulations was based on relevance and recency: EED entered into force in October 2023, and EPBD, ESPR and CPR were all adopted in the first half of 2024. These regulations/directives are the main EU legislative pieces dedicated to the built environment in the EU's climate change mitigation efforts, aimed to target the environmental impact of buildings. Hence, these are the regulations setting new requirements and mandatory standards for buildings, impacting the socio-economic situation of households in those buildings.

The scope of the document analysis includes policy documents and reports or position papers by different stakeholders. Key search terms to find information about societal aspects from the EU regulation texts were “low-income household”, “vulnerable household”, “green construction products”, “sustainable construction products”, “green premium”, “green cement”, “green steel, “energy efficiency”, “energy poverty”, “social”. To find reports investigating the impacts of the regulations, the search terms included “social impacts of EED/CPR/ESPR/EPBD”, “green construction products impacts on housing affordability”, “social impacts of green construction products”, “construction materials impact on housing affordability”, etc. The adopted full-text regulations were found on a policy tracking tool One Policy Place. Reports by other organisations were found either by investigating the previous work of relevant organisations or by online search tools (e.g. Google).

The inclusion criteria was relevance – when the study was conducted (published within the last eight years), in what region (Europe, to remain relevant for European policymakers), and inclusion of relevant search terms mentioned above. An essential part of the analysis is the application of the EJ framework which is utilised to discern the indicators and evidence for the consideration of environmental justice in the EU-building policy. Therefore, the research project aims to triangulate between the EU requirements (EU legislation), and the impacts of the requirements on low-income households (reports done by relevant organisations).
Therefore, this study used the environmental justice approach in the study of European legislation by scanning the four most relevant EU legislations (EPBD, EED, EDPR, and CPR) for any mention of social topics by checking all mentions of the abovementioned key words in the adopted legislative texts. Overall, the project analysed four legislative texts and four reports/position papers from other organisations, adding also previous research/facts from national statistics/organisations’ statements or joint letters as additional background information.

This project has received an ethical approval by the Ethical Review Board of the Faculty of Social and Behavioural Sciences of Utrecht University (Ref. number 24-1641).

5. Overview of EU regulations

This research coded the four regulations (EPBD, EED, ESPR, and CPR) by first marking all mentions of the key words “low-income household”, “vulnerable household”, “split incentives”, “green construction products”, “sustainable construction products”, “green premium”, “green cement”, “green steel, “energy efficiency”, “energy poverty”, and “social”. After systemising all the relevant recitals and articles the research coded and analysed the findings by being relevant either for housing affordability, quality or availability.

The main objective of the Energy Performance of Buildings Directive (EPBD) is the transformation of existing buildings into zero-emission buildings by 2050 (European Commission, 2024a). Central to the EPBD is the decrease of energy consumption of buildings. According to the EPBD, national measures will have to ensure that at least 55% of the energy

decrease in the average primary energy use is achieved through the renovation of the worst energy-performing buildings (European Commission, 2024d).

The Energy Efficiency Directive (EED) was created with the goal to improve energy efficiency, and by that, reduce overall energy consumption while enhancing energy security and affordability (European Commission, 2023). The directive makes it binding for EU countries to collectively ensure an additional 11.7% reduction in energy consumption by 2030, compared to the EU scenario for 2020, and MS need to set indicative national contributions to help achieve EU's climate targets (European Commission, 2023).

The goal of the Ecodesign for Sustainable Products Regulation (ESPR) is to make all products sustainable by default, encouraging circular use of products (including steel) (Bellona, 2024c). The Construction Products Regulation (CPR) aims to make sustainable construction products the norm in the EU, establish a single market for those products, and make it mandatory for the manufacturers to disclose the product's environmental sustainability performance over its life cycle (Bellona, 2024b).

EPBD	**EED**	**ESPR**	**CPR**
Affordability			
Recital 32 - protecting vulnerable citizens from high energy costs; installation of solar technologies without costly structural interventions (European Commission, 2024a). **Recital 35** - potential reduction of heating or electricity bills (European Commission, 2024a). **Recital 60** - targeted financial subsidies to improve the energy performance of buildings housing vulnerable households, and to other groups for	**Recital 23 -** acknowledges that buildings occupied by citizens with low incomes who are affected by energy poverty are the hardest, but most important to reach; emphasises that the directive should benefit first and foremost people who suffer most under energy poverty, and the directive should not encourage disproportionate increase in housing prices (European Commission, 2023). **Recital 76 -** MS can demand obligated parties to include	**Recital 6 -** highlights that sustainable materials should be affordable and accessible for all consumers (European Commission, 2024b). **Recital 7 -** product requirements established with the regulation should play a significant role towards improving energy efficiency, and substantially decreasing products' energy footprint, which are supposed to also reduce consumer vulnerability to energy price increases (European Commission, 2024b).	**Article 83** - the need to ensure affordability of the products meeting the set requirements, to avoid significant negative impacts on consumers (European Commission, 2024c).

whom access to financing is difficult; states that information about available funding and financial tools should be made available to the public in an easily accessible and transparent manner; highlights that MS must take the necessary measures to provide tailor-made information to vulnerable households and prepare awareness-raising campaigns (European Commission, 2024a). **Recital 63 -** mentions the idea of "leaving no one behind"; adds that financial incentives and other policy measures should target vulnerable households and MS should take measures to prevent evictions because of renovation, e.g. by setting caps on rent increases (European Commission, 2024a). **Article 3** - on National Building Renovation Plans, which need to include a roadmap with nationally established targets and indicators, including the reduction of the number of people affected by energy poverty; and investment needs for	social considerations in energy-saving measures in relation to energy poverty, which has also been extended to alternative policy measures and national energy efficiency funds; specific attention should be paid to groups which are more at risk of energy poverty or are more susceptible to the adverse impacts of energy poverty, e.g. women, disabled people, elderly people, children, and people with a minority racial or ethnic background (European Commission, 2023). **Recital 78** - States that to ensure that energy efficiency measures reduce energy poverty for tenants sustainably, it is important to take into account the affordability of such measures to property owners and tenants, and adequate financial and technical support for such measures should be guaranteed at MS level; acknowledges that the transition may have a particular impact on some disadvantaged groups (European Commission, 2023). **Recital 123 -**		

the implementation of the national building renovation plan, and the financing measures for it (European Commission, 2024a). **Article 9** - on providing financial measures to vulnerable households; monitoring social impacts, in particular on the most vulnerable households; highlights that vulnerable households are to be considered in implementing the minimum energy performance standards, as MS are laying down the rules on penalties, when they need to consider the financial situation and access to adequate financial support of homeowners, in particular for vulnerable households (European Commission, 2024a). **Article 12** - MS need to ensure that renovation passports are affordable and accessible to low-income households (European Commission, 2024a). **Article 18** - sets requirements for the	highlights that EU and national public funding should be invested into helping vulnerable and low-income households improve the energy efficiency of their buildings (European Commission, 2023). **Recital 124** - encourages MS to use their national funding schemes to provide better information, technical and administrative assistance, and easier access to finance to low-income households (European Commission, 2023). **Article 5** - MS shall ensure that the competent authorities take actions to mitigate significant negative direct or indirect impacts of energy efficiency measures on low-income households or vulnerable groups when designing and implementing energy efficiency measures (European Commission, 2023). **Article 8** - MS must establish a share of the required amount of cumulative end-use energy savings among people affected by energy poverty; sets clear enforcement		

operation of technical assistance facilities (one-stop-shops) and the accessibility of those, ensuring the proximity of the assistance; emphasises that the one-stop shops are meant to provide holistic support to households affected by energy poverty and on worst-performing buildings (European Commission, 2024a). **Article 19** - MS must ensure the quality, reliability, and affordability of energy performance certificates and shall consider providing financial support for vulnerable households (European Commission, 2024a).	strategies for environmental thresholds about the share of the required amount of cumulative end-use energy savings among low-income households (European Commission, 2023). **Article 9** - MS may require obligated parties to work with social services, regional authorities, local authorities or municipalities to promote energy efficiency improvement measures among people affected by energy poverty, and people in low-income households; includes identifying and addressing the needs of particular groups at risk of energy poverty; states that MS can require the obligated parties to achieve a share of their energy savings obligation among people in low-income households, and MS may require obligated parties to achieve energy cost reduction targets (European Commission, 2023). **Article 24** - MS are obligated to implement energy efficiency improvement		

	measures and related consumer protection measures, first and foremost among people affected by energy poverty, low-income households, and social housing occupants to alleviate energy poverty; also clear requirements on supporting vulnerable households (e.g. best possible use of public funding, fostering technical assistance to promote vulnerable customer's active engagement in the energy market, etc.) (European Commission, 2023). **Article 30** - The Commission can assist MS in setting up financing facilities and project development assistance facilities at national, regional, or local level with the aim of protecting and empowering people in low-income households, including by integrating an equality perspective (European Commission, 2023).		
<u>Quality</u>			
Recital 45 - deep renovation may act as an opportunity to address the living conditions of vulnerable households (e.g. indoor		**Recital 14** - ecodesign requirements for construction materials should include performance and information	

environmental quality, increasing climate resilience, resilience against disaster risks, etc.) (European Commission, 2024a). **Article 15 -** rating the smart readiness of buildings, which is based on the assessment of the capabilities of a building to adapt its operation to the needs of the occupant, in particular concerning indoor environmental quality (European Commission, 2024a). **Article 13** - on technical building systems which sets that MS need to set requirements for the implementation of adequate indoor environmental quality standards (European Commission, 2024a).		requirements, and those requirements should be used to improve product aspects relevant for environmental sustainability, such as durability, reusability, reparability, energy efficiency, possibility of recycling, and carbon and environmental footprints (European Commission, 2024b).	

6. Analysis

This research categorised the findings based on affordability, quality and availability, but acknowledges that these aspects are all intrinsically intertwined. For example, energy efficiency, which is the main focus of most of the articles, is targeted either as an affordability measure (improving energy efficiency of housing reduces energy costs in the long term) or proposes principles or measures to help make energy efficiency improvements more affordable to low-income households (assistance facilities, saying that the protection of vulnerable households needs to be ensured, etc.). At the same time, improving energy efficiency also improves the quality of housing due to improved insulation of the building which leads to better heated homes, less mould etc. This is important, since energy efficiency is directly linked with distributional justice, as energy efficiency often goes hand-in-hand with energy poverty (EP, 2016). That is because it is often low-income households who live in the worst energy-efficient

buildings, and the worse-performing buildings consume more energy to be sufficiently warm and therefore take more money to heat them to enjoy the same level of comfort (EP, 2016). Hence, as also proven by previous research (Faiella et.al., (2023), Fragkos (2021), Adom (2021), Lewis et.al., (2020)), low-income households spend a bigger proportion of their income on energy and therefore suffer more under the distributional injustice posed by energy costs. Therefore, having better-insulated homes will result in both lower energy bills and better-quality homes for low-income households.

Housing availability is in turn linked to housing affordability - if the houses are less affordable due to increased costs stemming from fresh renovation and/or solar panels on the roof and/or better energy efficiency and/or being built of more sustainable (hence more expensive) construction materials, etc., then these houses are also less available for people from low-income households.

Despite affordability, quality and availability being closely linked, this study analysed the regulations in separate view of those, to be able to conduct more in-depth and targeted analysis of what could be improved and what is needed, as looking at these three aspects as one whole might lead to vague and abstract recommendations, not providing any clear guidelines on how to do that.

6.1. Housing affordability

The European Union has made efforts in its newest climate requirements to protect vulnerable households and ensure that low-income households will not be paying disproportionate amounts in the countries' efforts against climate change. However, as this research has found, the major challenge with the EU-level policies on affordable sustainable housing is ambiguity and a lack of concrete guidelines and recommendations for Member States on how to tackle both the housing crisis and the need for more sustainable buildings. For example, in EED, the need to ensure that people affected by energy poverty, and people in low-income households are "protected", or the impact on low-income households is alleviated, is in some way or other mentioned 85 times (European Commission, 2023). However, in none of these mentions does the text provide any clear guidance or measures on how to do that or how that would be enforced or "ensured".

This can also be seen in reports done by the institutions' research facilities, aimed to provide the background and technical knowledge to enable policymakers create accurate and targeted legislative policies. For example, the European Construction Sector Observatory (ECSO) (2019), which is an analytical observatory operating under the European Commission, provides recommendations such as: "Policymakers need to embrace (and deal with) the complexity around housing affordability," (ECSO, 2019; p.11). This is highly ambiguous and does not provide any clear roadmap, for what actions are required from MS to "deal with" the aforementioned complexity around housing. In addition, different regulations acknowledge the high cost of installing renewable energy technologies, and implementing new requirements but do not provide any clear counselling on how to reduce the cost, remaining on the facile level of "this should be addressed".

Another question is the inclusion of vulnerable households in the policy design. EED mentions that to alleviate energy poverty, MS are to establish a network of experts from various sectors such as the health, building and social sectors, or entrust an existing network, to develop strategies to support local and national decision makers in implementing energy efficiency improvement measures, technical assistance and financial tools for it (European Commission, 2023; p.58). This goes to show the inclusion of a variety of different societal actors. However, the long list of actors does not include low-income households, who, as proven earlier, are impacted most by the decisions of these local and national decision-makers' climate decisions. Yet, if decision-makers want to follow their premise of "leaving no one behind", it is necessary to include people at risk of being left behind, since not taking into account their needs and problems of climate change mitigation, it will be hard to create policies that cater to their issues stemming from climate action.

It is also possible to identify aspects of dissociation from the public by the policymakers. That is visible in ESPR and CPR which both cover construction materials in the buildings sector, with the goal to ensure that cement and steel (some of the most commonly used construction materials in buildings) would be greener. However, based on ARUP's (2024) study, sustainable products often come with the green premium - the extra cost for more sustainable option, stemming from the additional cost of producing a greener product and the small demand the greener products have. That is because bio-based materials often have higher upfront costs compared to conventional materials due to production methods, limited economies of scale, or additional processing steps (ARUP, 2024). According to MacAskill et.al., (2019), green premiums range from approximately -0.4% to 21%, varying significantly by region, the type of principles deployed and the methodology behind the calculation (MacAskill et.al., 2019). This means that living in homes built with more sustainable construction materials, is more expensive and therefore less achievable for low-income households.

Nonetheless, ESPR and CPR have minimal, if any, social considerations mentioned in the regulations, only focusing on economic incentives or motivation to be more sustainable, such as provisions to make sustainability information more accesible. This disregards the main aspect influencing people's (especially low-income households) main motivator in driving their (un)sustainable behaviour - affordability. This is an example of the importance of the COM-B model discussed earlier and showcases the importance of including low-income households in the policy dialogues and policy processes if policymakers want to create legislation that really does not leave anyone behind.
ESPR does indirectly address affordability, by addressing the need to create lead markets for sustainable products, increasing the demand for these products, therefore also reducing the green premium (European Commission, 2024b). However, green public procurement is only now becoming mandatory, meaning that the cost reduction of the sustainable products is happening on the same timeline with the overall sustainability goals. This in turn means that the creation of lead markets will take time and might not be efficiently working by the time households need to ensure their compliance with the new rules.

6.2. Housing quality

The inclusion of rules targeting the improvement of indoor environmental quality shows a facet of the EPBD which could be viewed as a consideration of environmental justice. Accessibility of quality indoor spaces is a contributor to health, physical and mental wellbeing, and may benefit creativity and productivity. According to Patino and Siegel (2018), a strong correlation exists between low-income households and low-quality housing. Poor ventilation, insulation, lighting, or thermal comfort may contribute to negative health conditions that are either caused or exacerbated by housing conditions (Patino & Siegel, 2018). Furthermore, low-income households may have fewer options for schools or workplaces that consider good indoor environmental quality. Wang and Zamri (2013), found that good lighting or good ventilation can play a role in improving creativity or concentration which may positively contribute to learning outcomes, which in-turn may contribute to more opportunities for employment. The mandatory inclusion of IEQ may therefore, limit the exposure of environmental risks of living in low-quality buildings as well as potentially contribute to a more just access to education (Wang & Zamri, 2013)

6.3. Housing availability

While evidence suggests that the European sustainable buildings policy framework contains provisions to impact housing affordability and quality, no explicit provisions target housing availability. The reasoning to not directly address housing availability in the policy framework cannot be fully examined due to a lack of clear evidence. However, several arguments for this decision can be found. Primarily, attempting to manage housing availability through European legislation may lead to a conflict of competencies between the European institutions and the Member States. The EU has no direct competences in the area of housing policies and moreover, many decisions concerning the availability of housing are oftentimes made on regional or municipal level. While the EU cannot affect housing availability it can nonetheless provide guidance which may impact the availability of housing. In particular the relationship between housing affordability and availability should be considered in this context. Should the renovation of buildings and improvements of energy consumption of buildings achieve the desired effect of reducing housing costs, this may in turn improve the availability of housing as this would make more dwellings available for households from a greater range of household incomes.

However, the EU sustainability housing policy instrument may only have a very limited effect on housing availability that is inadequate to meaningfully address the lack of housing and the unequal distribution of access to housing in Europe.

7. Discussion

"Climate change are felt most acutely by those segments of the population that are already in vulnerable situations owing to factors such as geography, poverty, gender, age, indigenous or minority status, national or social origin, birth or other status, and disability," is said in the Resolution adopted by the Human Rights Council in 2015.

Previous research has proven that there is a significant lack of social considerations in the climate aspirations, while it has also been demonstrated that it is the low-income and vulnerable households who are the most susceptible to the negative impacts of climate mitigation efforts and the green transition. These negative aspects on housing affordability, quality and availability also have proven negative impacts on people's health, creating further complications both to the individuals and the healthcare system.

The social considerations included in the climate legislation focus often on the motivational aspect of sustainable behaviour, leaving the behavioural aspect of it unaddressed. That's the reason why many researchers before argued to take approaches more focused on the real capabilities of individuals and households (the COM-B model by Bal & Stok, 2022), social-justice focused approaches (Loo, 2023), and pro-poor approaches (Markkanen & Anger-Kraavi, 2019).

This research was in line with the findings of previous researchers. When it comes to housing affordability, the analysed EU legislation setting requirements for more sustainable buildings include social considerations but they oftentime remain vague, unclear and with little enforcement strategies. There is also an issue with the timeline: as the MS are to hand in their National Building Renovation Plans in 2028, they are left with four years to develop solutions that would comply with the new sustainability rules for buildings while not significantly harming low-income households (European Commission, 2024a). But since there have been no clear guidance on how to balance the two issues, the social implications of complying with the new requirements will likely be considered less, as the MS will not have enough time and resources to give it sufficient attention. Hence, since MS already have very little time and resources to conform with the newest green requirements, it is likely that low-income households will be the ones paying proportionally more for the efforts to fight climate change. Compared to the very little attention to the green construction products and their impact on the affordability of housing, energy poverty gets a fair amount of attention, which, if enforced properly, can help low-income households in complying with the new rules. However, even though housing affordability has been technically taken into account in some way or another (often from the angle of energy poverty), there remain significant issues on little enforcement strategies and with the lack of definitions (e.g. low-income households, energy poverty etc.).

The quality of housing is directly addressed. While significantly less than housing affordability, a joint impact is achieved especially in the field of energy efficiency. Hence, it is understandable why it might be addressed mostly from the aspect of ensuring the affordability of more energy-efficient homes. Housing availability is intertwined in turn with housing

affordability and appropriately targeted market mechanisms, with the latter currently being unaddressed in the legislation. However, if the EU wants to truly create more sustainable housing in accordance with the climate goals, that at the same time leaves no one behind, housing policies targeted specifically at housing availdability, quality and affordability are necessary.

As for addressing the behavoural aspects of sustainable behaviour, some regulations concentrate more on it than others - EED and EPBD pay quite a lot of attention to housing affordability and energy poverty amongst low-income households, while CPR and ESPR only address the motivational aspect. However, viewing environmental behaviour only from the market-centred viewpoint is not only unhelpful to vulnerable households but completely disregards the impacts of sustainable construction materials on the affordability and with that the availability of housing for low-income households.

Additionally, none of the analysed regulations contain mechanisms for active citizen involvement or redress mechanisms. Should national governments fail to implement these directives to the full extent or fail to enforce the legislation, the legislations do not provide tools for citizens to participate in the implementation of such fundamentally significant legislation. This indicates, that while considerations of distributional justice can be found in the legal texts, the inclusion of other aspects of environmental justice, such as participatory justice may be lacking.

Here, getting stuck with the promise of "leaving no one behind" might turn out to be counteractive by turning into meaningless phrase, as it completely disregards the different needs of various social groups - e.g. the needs of racial or gender minorities differ from the ones of low-income households etc. Putting all these groups under the term "no one" can lead to tokenism and vague promises instead of creating concrete policies targeted to solve the issues of specific social groups.

Overall, the EU decision-makers have shown interest in the social implications of climate actions. Nevertheless, even though the regulations claim to want to protect vulnerable households, the execution of that aspiration is currently highly insufficient and in need of further improvement, by taking an approach more in line with environmental and distributional justice: including vulnerable households more in the discussions and addressing their needs; incorporating clear enforcement strategies and using clearer wording, providing definitions for all the terms included, and making the environmental information more accessible.

In the context of this research, a document analysis is practical, as it enables the collection and review of extensive data within a shorter timeframe compared to other qualitative research methods like interviews. The findings could be supported by incorporating methods such as semi-structured interviews, which would offer deeper insights into the perspectives of various stakeholders, which could also yield more detailed results in areas where document-based data is limited.

Applying the framework of environmental justice as an analytical scope to assess the possible outcome of EU legislation and the focus on distributive justice offer an opportunity to explore the impact of policy in an environment where unequal distribution of risks and benefits is already prevalent.

Further research can investigate in more depth the impact of the EU green requirements on housing availability, as the explored materials in this study did not sufficiently include the availability aspect. Housing affordability is directly linked with availability and the impacts of green requirements on housing have other direct and indirect impacts on what houses are available and for whom. This has the potential threat to further increase the socio-economic divide between high- and low-income households, as they can afford houses of different quality, which in turn can decide what houses are available to them.

Since the EU regulations about environmental requirements are very fresh and there will probably be an increase of different green transition related legislation, then further research into the long-term impacts of the green transition on social justice and social cohesion, will be more and more necessary.

Conclusion

People from low-income households are one of the groups of people who suffer most under the impacts of the climate crisis. As found by the results of this research, they are also the ones to suffer most under the efforts to mitigate the effects of climate change.

The European Union is planning significant changes to the built environment in the EU and the green requirements set plenty of new standards that Europe's buildings will need to adhere to. However, it is important to ensure that during that process, the EU will not forget low-income households. As argued by this research paper, in order to achieve that, the EU should implement more concrete rules and guidelines on how to support low-income households in the upcoming renovation wave, also ensuring the enforcement of adhereing to these rules and not remaining on a high-level vague recommendation level. Additonally, it needs to set a common definition of the term "energy poverty" and "vulnerable households", since otherwise it is up for the MS to decide who deserves the financial support, creating further rifts in the environmental justice.

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