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Report on key approaches of low-carbon lifestyle changes

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

GDP	Gross Domestic Product
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change

Executive Summary

This report is intended for public authorities, policy advisors, and researchers seeking to develop equitable climate policies for citizens. It integrates a justice-oriented approach to climate policy discussions by utilizing a research approach that prioritizes traditionally underrepresented groups. By employing the concept of intersectional social vulnerability, this report not only elucidates perceptions of exposure to adverse effects of climate change and policies, but also tackles the social and personal limitations of vulnerable groups in adapting to necessary changes, e.g., by way of changing to a low-carbon lifestyle. Furthermore, drawing from semi-qualitative methods of social sciences, it incorporates citizens' perspective on climate change and policies geared towards mitigating and/or adapting to its impacts. One of the report's key insights is that when policies entail enforcement of low-carbon consumption or behaviour patterns, the needs of vulnerable groups must be taken into account. (Voluntary) lifestyle changes are only possible within a limited range, which is dependent on the individual's position in society. Furthermore, empirical evidence suggests that members of vulnerable groups are less prone to support rapid and bold measures against climate change. Therefore, integrating diverse groups into decision making and participatory policy design is highly recommended to increase the social acceptance of measures and successfully achieving the set goals.

Within the LOCALISED project, the results of this study will serve as a foundation for the evaluation of mitigation and adaptation policies and measures (Task 4.1), in particular regarding their fairness (WP8). Additionally, the report will act as an initial step towards mapping vulnerable groups (Task 6.2) as well as creating a Blueprint for Citizens Engagement (Task 6.3).

As demonstrated in this report, selecting the appropriate climate policies does not only hinge upon technical considerations. Instead, citizens' perspectives and societal possibilities must be considered as well. In other words, it is essential to recognize that climate policies – even if called-for scientifically – may face resistance from different social groups, be it due to social vulnerability and inability to act or due to vested interests. Low acceptance may come from vulnerable groups, but also from powerful groups and influential entities. It is imperative that citizen engagement is tailored to the unique needs and living conditions of local people, in particular the vulnerable (and hard-to-reach) groups to ensure their meaningful participation will lead to fruitful discussions.

1. Introduction

The European Union and its Member States committed to reduce the GHG emissions to avoid catastrophic climate change, as per the United Nations (2015) and the European Climate Law (Regulation 2021/1119) (2021). By being at the same time voters, members of civil society, and key consumers of energy, foods and services associated with GHG emissions, citizen emerge as foundational actors of change in the mission to achieve ambitious climate targets. Among the ability of change that citizens hold in this this regard, adopting consumption behaviours that are less carbon-intensive is one of the most important. In fact, certain consumption patterns and lifestyles have been found in the literature to be linked to intense GHG per capita emissions (Akenji et al., 2021). The latest IPCC report emphasizes this correlation: "Behaviour, lifestyle, and culture have a considerable influence on energy use and associated emissions, with high mitigation potential in some sectors, in particular when complementing technological and structural change" (IPCC, 2022, p. 41). By avoiding carbon-intensive consumption, such as using inefficient heating systems or frequently consuming meat, citizens can significantly lower their carbon footprint and thereby reduce emissions. One promising aspect of this line of argument is that changing individual behaviour appears to be much easier than investing in efficient infrastructure, redesigning business sectors, or overhauling entire tax systems. However, the transition should be accompanied by socially-just policies avoiding potential social resistance and the feeling of "being left behind", as demonstrated in this report.

Citizens play a key role in the implementation and, ultimately, success of climate policies as many of them depend on their cooperation or at least their acquiescence. Even more so, if such policies impact their quality of life and – potentially change – citizens' personal lifestyles. At the same time, citizens are unequally affected by climate policies, with several groups being at higher risk of vulnerability and of suffering from unequitable outcomes of both climate change and climate policy(Abram et al., 2022; Lager et al., 2023; Sovacool et al., 2023). This report thus seeks to understand citizens' perspectives and needs regarding climate policy, by utilizing a compass granted by the definitions of just transition and vulnerable groups. By combining findings from desk research and an empirical survey, this report aims to answer the following questions:

- RQ1: What are working definitions of just transition, justice, and social vulnerability in relation to climate change adaptation and mitigation?
- RQ2: Who are especially vulnerable groups in face of adaptation and mitigation measures and climate change issues?
- RQ3: What insights can be derived on perspectives of specific groups of citizens towards fair and equitable low-carbon lifestyle changes?
- RQ4: How can citizens engagement help citizens to learn about the necessity for climate policies and increase their acceptance?

The report is organized around four core parts: It begins with the definition of just transition towards a low-carbon society and with a critical review of existing literature on low-carbon lifestyles in the context of a just transition. The second part delves deeper into the concept of intersectional social vulnerability. A focus is devoted to the impacts of climate change and climate policies on diverse groups of citizens, including vulnerable and traditionally underrepresented groups, from an intersectional perspective. The argument put forward is that citizens are not a homogeneous entity but are comprised of various groups, some of whom are better equipped to adopt low-carbon lifestyles and implement the changes than others who face structural barriers and/or a spectrum of discrimination mechanisms. If this disadvantage is to be alleviated, the needs of these vulnerable groups must be specifically addressed (Kaijser & Kronsell, 2014). It is worth noting that the current report provides a *preliminary* definition of vulnerable groups as a basis for further research in Tasks 6.2 and 6.3.

The third part of this report is devoted to answering RQ3, and weaves the insights gained from the preceding chapters into the layout for an empirical survey that investigates prospects of citizens towards lifestyle changes in the three focus cities/regions of Barcelona, Gdansk-Gdynia-Sopot Metropolitan Area and Vienna. To gain a deeper understanding of prevailing attitudes and views on climate change and related policies and lifestyles, the innovative semi-qualitative Q method is utilized. The synopsis then connects the findings from the empirical survey to the potential of lifestyle changes. It demonstrates that political adaptation and mitigation measures aimed at meeting climate and decarbonization targets need to consider two important aspects. First, the measures must attend to vulnerabilities of citizens and should, therefore, incorporate their perspectives right from the beginning, by utilizing more participatory processes. Secondly, policy effectiveness should not only rely upon altering consumption patterns but, instead, exhaust the full potential of political tools available, including those that do not focus on individual behaviours.

The fourth part describes the purpose and idea of citizen engagement in policy making in the face of climate change and thus responds to RQ4. Citizen engagement is vital for successful implementation of complex policies, including climate change mitigation. It allows for a better understanding of citizens' evolving needs, promotes acceptance and legitimacy, spreads crucial information, and harnesses innovative ideas and resources. However, barriers such as socio-economic, cultural, and subjective factors often prevent meaningful participation, so efforts must be made to overcome these obstacles and ensure the inclusion of marginalized groups.

2. Technical Documentation

This chapter provides a brief overview of the procedural steps and methodological choices made to accomplish Task 6.1.

The following chart illustrates the work process:

Figure 1: Workflow of Task 6.1. Source: Authors

The initial step was to conduct desk research to establish working definitions of just transition and social vulnerability and review existing literature on low-carbon lifestyles and the effects of climate change and adaptation/mitigation policies on vulnerable groups. Based on the insights acquired from this research, it was decided that a semi-qualitative Q methodology would be well suited to empirically gain insights on the perspective of (vulnerable) groups of citizens towards climate change lifestyles and perspectives. As our objective was to include and grasp the prospects of underrepresented and socially vulnerable groups of citizens, a quantitative online survey was not considered effective. Methodological considerations and an iterative consultation with the focus regions/city partners (Barcelona, Gdansk-Gdynia-Sopot, Vienna) were conducted to include regional specificities in the empirical survey. These consultations ensured that the research methodology was well-informed and appropriate for the specific research objectives.

The fourth step involved developing statements for the Q survey. To create the concourse (i.e., a collection of statements for the survey), a diverse range of sources was consulted through desk research, including newspapers, interviews, academic publications, media, official reports, and communication from governmental and non-governmental institutes and administrations. The concourse encompassed positive, neutral and negative views on various aspects and sectors of climate change, climate policies, and behaviour and lifestyle change (Damio, 2016, p. 107). Finally, representatives from the focus cities/regions (Barcelona, Gdansk-Gdynia-Sopot, Vienna) suggested location-specific statements to enrich the concourse and tailor it towards the participants' (lived) experiences. From this concourse, thirty Q Statements (the so-called "Q Set") were selected, and six city-specific statements were added to the generic set of thirty statements to create a tailored version for each focus region, resulting in three Q Sets. Socio-

demographic questions were added to the survey derived from our definition of relevant vulnerable groups to a) track the sample, where vulnerable groups should be represented, and b) to identify the perspectives of those specific participants. The Q Sets, socio-demographic questions and supplementary texts were translated by the project team into Polish, Spanish, Catalan and English. In collaboration with focus cities/regions, the online survey was disseminated in all focus regions once. Finally, the incoming data from the Q study was analysed and integrated with insights obtained from the desk research on lifestyles, policies, and vulnerabilities.

The assessment of Deliverable 6.1 underscored the need to (1) integrate a working definition of a just transition to be utilized across the entire project, (2) incorporate a definition of vulnerable groups that will be central to Deliverables 6.2 and 6.3, and (3) outline how Deliverable 6.1 will be applied in Work Package 6. In tandem with the development of this deliverable, a working group has been established among consortium members to create a Social Impact Assessment (SIA) framework. This dedicated group convenes regularly to define the analytical process for examining potential (primarily negative) impacts of adaptation/mitigation measures and instruments on vulnerable groups. These impacts, rooted in the definition of a just transition and informed by definitions of social vulnerability, encompass dimensions such as inequality, social exclusion, and constrained access to energy or mobility. The insights from this analysis will not only be integrated into the decarbonisation profiler's modelling but will also play a pivotal role in shaping the blueprint for citizen engagement.

3. A Just Transition towards a low-carbon society and lifestyles

The purpose of this chapter is twofold: (a) to give a definition for just transition and (b) to explore the concept of low carbon lifestyles within a just transition framework.

3.1. Defining a Just Transition

The transition towards a low-carbon society is a complex process that involves various stakeholders at different levels, including citizens, firms, cities, regions, and national governments. The Intergovernmental Panel on Climate Change (IPCC) defines "transition" as "the process of changing from one state or condition to another in a given period of time" (IPCC, 2022, p.2925). In the context of combating climate change, a just transition becomes imperative to ensure that no one is left behind in the shift to a low-carbon economy.

Just Transition is a holistic approach that recognizes the interconnectedness of climate change, energy transition, and justice. The term originated in the North-American trade union movement in contexts where polluting industries were being transformed as a result of environmental regulation (Abram et al., 2022). This section explores the concept of just transition, drawing upon the definition of the IPCC and other sources, and integrates the dimensions of distributive, procedural, and intersectional justice as guiding principles for the work of work package 6 in LOCALISED.

The IPCC defines just transitions as:

> "A set of principles, processes and practices that aim to ensure that no people, workers, places, sectors, countries or regions are left behind in the transition from a high-carbon to a low-carbon economy. It stresses the need for targeted and proactive measures from governments, agencies and authorities to ensure that any negative social, environmental or economic impacts of economy-wide transitions are minimised, while benefits are maximised for those disproportionally affected. Key principles of just transitions include: respect and dignity for vulnerable groups; fairness in energy access and use, social dialogue and democratic consultation with relevant stakeholders; the creation of decent jobs; social protection; and rights at work. Just transitions could include fairness in energy, land use and climate planning and decision-making processes; economic diversification based on low-carbon investments; realistic training/retraining programs that lead to decent work; gender-specific policies that promote equitable outcomes; the fostering of international cooperation and coordinated multilateral actions; and the eradication of poverty. Lastly, just transitions may embody the redressing of past harms and perceived injustices" (IPCC, 2022, p.2925).

The concept of just transition encompasses various dimensions of justice (Abram et al., 2022; Lager et al., 2023; Macquarie & Green, 2023). For LOCALISED, the focus is put on procedural (including recognitional) and distributive justice, as these are widely discussed by experts and practitioners working in this area and useful for LOCALISED with case studies in Europe not addressing global issues in particular. Other concepts of justice sometimes associated with the just transition concept are restorative, post-colonial, ethnical, or gender justice (Abram et al., 2022; Sovacool et al., 2023). To a large extent, the concerns raised in other justice concepts can be incorporated into the distributive and procedural dimensions.

Distributive justice encompasses a fair and equal distribution of environmental goods and benefits across society. In the context of climate change and in relation to the concept of a just transition, distributive justice considers how the impacts of low-carbon transition are distributed across society. In adaptation planning, practices of distributive justice often address the varying degrees and forms of social vulnerability, to ensure the protection of all communities from climate impacts and to analyse the consequences of adaptation action for different groups (Breil et al., 2018; Brisley et al., 2012; Reckien et al., 2018). A fair distribution should particularly consider aspects such as income, wealth, education, and access to energy, mobility, green space (and a healthy environment more generally), and health- and social care, and should also consider people's subjective well-being.

Procedural justice emphasizes the importance of equal participation in decision-making processes, with a particular focus on local government decisions (Abram et al., 2022; Schlosberg, 2007; Sovacool et al., 2023). In the realm of climate mitigation and adaptation, it is essential to identify and include all relevant groups in defining strategy objectives, prioritizing actions, and monitoring and evaluating the implemented measures. Questions to be asked of relevant processes include: Who is involved? How are they involved (what roles and powers do they have in the decision-making process)? And when (at what stage in the decision-making process) are they involved?

The definition of just transition used in LOCALISED includes the idea of intersectional justice as essential addition (Lager et al., 2023: pp.17). It considers various forms of social characteristics such as gender, race, ethnicity, disabilities, class and other forms of discrimination (Amorim-Maia et al., 2022; Collins & Bilge, 2020). Neglecting these intersectional dimensions can lead to unequal and maladaptive processes and outcomes, emphasizing the need to recognize diverse needs and ensure inclusive representation in decision-making processes (Lager et al., 2023). A wider focus to the intersectional aspect of a just transition is devoted in Chapter 4 of this deliverable, dealing with social vulnerability in the face of climate change.

In conclusion, in the framework of the LOCALISED project, a just transition towards a low-carbon society is defined as a holistic approach that recognizes the interconnectedness of climate change, energy transition, and justice concepts and integrates the principles of distributive, procedural, and intersectional justice. By incorporating these justice dimensions, public authorities, policy advisors, and researchers can work together to address the social, economic, and environmental challenges associated with a transition towards a low-carbon society. As pointed out by Sovacool et al. (2023) "Justice represents not only a moral obligation but can enhance the legitimacy and acceptance of a rapid push toward global decarbonization" (p.1). This holistic approach will be at the heart of the LOCALISED project and of Work Package 6 more specifically.

3.2. Reduction Potentials of Low-carbon Lifestyles within a Just Transition Framework

To meet climate and decarbonization goals, making changes to current lifestyle choices is vital. Following the notion of a just transition this particularly counts for lifestyles in high-income countries. As the authors of a recent study by the Hot or Cool Institute state, "changes in predominant lifestyles, especially in high-consuming societies, will determine, whether we meet commitments in the Paris Agreement and avoid dire consequences of climate change" (Akenji et al., 2021, p. 12). The study offers an overview over the GHG reduction potentials of low-carbon lifestyles at the national level, comparing ten countries with different cultural backgrounds and GDP per capita. The report suggests an operational breakdown of six lifestyle domains, conceptualized as: food, housing, transport, goods, leisure and services. It introduces the concept of lifestyle carbon footprint as measure of GHG emissions associated with the lifestyle of citizens. It is

calculated from an average household's consumption from domestic sources and emissions embodied in imported goods, while excluding emissions embodied in exported goods (Ibid, p.29). Based on this, ceiling levels in line with pathways to meet emission targets can be calculated for all lifestyle domains, defining a "fair consumption space" (Ibid, p.26).

The study highlights that the implementation of low-carbon lifestyles would imply drastic changes in everyday behaviour of most of the citizens, as GHG emissions associated with current levels of consumption exceed the carbon budget comparable with the 1.5°C target of the Paris Agreement on climate change. As the authors show, the GHG emissions associated with lifestyles need to be reduced by 91–95% by 2050 for high-income countries (Ibid, p. 14). The study identified transport, food, and housing as the lifestyle domains with the greatest reduction potentials, with transport being the most significant domain in four out of the ten countries analysed.

"Lifestyle footprints" are used to measure the total GHG emissions caused by the way people live in a particular country, including GHG emissions resulting from the production of goods produced in other countries, but consumed in the country at stake (for more details see Ibid, p. 33). The authors of the report examine three approaches to enable the reduction of lifestyle footprints: absolute reduction, modal shift, and efficiency improvement (Ibid, p.59). The first examined option consists in reducing the physical consumption of goods and services to reduce emissions– least promising in the food sector, but potentially relevant for the transport or housing sectors (Akenji and Chen, 2016). The second one entails for individuals to shift consumption away from carbon-intensive options (Nelldal & Andersson, 2012). In the context of nutrition, this would consist for example to switch to diets which are more plant-based and reduce meat consumption. The third option consists in employing technological improvements to decrease emissions, for example by purchasing more efficient vehicles or heating systems.

Earlier studies rely on similar frameworks. Schanes et al. (2016), for instance, articulate their framework on reducing lifestyle footprints around similar options, respectively: direct reduction, indirect reduction, and direct improvement. As an additional category, they add indirect improvement, mostly consisting in changing disposal behaviours and creating more efficient waste management structures (p. 1036). Since most studies dealing with the topic of low-carbon lifestyles focus on the aspect of consumption instead of the one of disposal, the report at hand will focus on the first three options as well.

Based on the three previously described behavioural options, Akeniji, Bengtsson and Toivio (2021) calculate the following reductions through hypothetical lifestyle changes:

> In high-income countries the largest reduction potential of 500 to over 1,500 kg CO_2/person/year per option on average are car-free private travel, reduction

> of international flights, vegan diet, electric car, vegetarian diet, renewable grid electricity, vehicle fuel efficiency improvement, renewable off-grid electricity [...]. Most options are based on a modal shift from carbon-intensive to other lower-intensity consumption modes, such as car to public transport, fossil fuel to renewable energy sources, and meat to vegetarian nutrition sources. [...] The majority of the highest impact options are from the transport domain, while housing and food also offer major reduction potential through switching from non-renewables to renewable sources and through shifting dietary habits. (p. 61)

Taking Finland as an example of a European country, the authors show that, in order to respect the total carbon footprint budget set for the 1.5 degrees Celsius target, the *overall* lifestyle footprint of the country (transport, food, housing, goods, and leisure) would need to shrink from a footprint of 9,700 kg CO2/period/year in 2019 to 700 kg CO_2e/person/year by 2050. This would entail a reduction of 9000 kg CO_2e/person/year (see p. 43). As shown in Table 1, behaviour changes in different domains can only contribute to a limited extend to this effort. This comparison makes it evident that voluntary or strictly behavioural changes of lifestyles of citizens won't be sufficient to achieve the emission targets of the Paris Agreement.

Table 1: absolute and relative reduction potential of lifestyle changes in Finland, own compilation, based on Akenji et al. (2021) see pp. 43, 63).

Hypothetical Change	Reduction of GHG emissions (in CO_2e per person per year)	reduction as share of required reduction of 9000 kg CO_2e/person/year by 2050
Reducing international flights by 50%	620 kg	6.9%
Fully vegetarian diet for everyone, living in Finland	530 kg	5.9%
100% renewable grid electricity	490 kg	5,4%
Reducing international flights by 50%, live on 100% plant-based diet, use 100% renewable grid electricity	1 890 kg	21%

The report from Akenji et al. (2021) offers relevant insights regarding the reduction potential of low-carbon lifestyles. However, there are several considerations that are worth to keep hold of regarding the scenarios that have been discussed so far. The first one is that, when talking about lifestyle changes, it is relevant to specify that individual and behavioural changes are not the only factor accounting for an overall change in lifestyle. As pointed out by Costa et al. (2021), "changes in lifestyles are often an umbrella term for changes in both individual behaviour and related changes in technology and infrastructure" (p.2). And, despite the difficulties that might occur when trying to define a clear boundary between the behavioural and technological aspect of lifestyle changes, it is

conceptually relevant to distinguish between them and assign them different relevance levels according to the context. Secondly, it is important to highlight that the level of analysis of the report is limited to a national level and thus fails to account for differences between various groups of people, especially those who are disadvantaged and at risk of social vulnerability.

Most importantly, the above-mentioned studies concerning low-carbon lifestyles often overlook the psychological and structural determinants of lifestyle changes. The Open Education Sociology Dictionary defines the term "Lifestyle" as the "the distinctive pattern and manner of living that an individual or group uses to meet their biological, economic, emotional, and social needs that typically reflects their attitudes, beliefs, and values; a way of life" (Bell, 2014). This definition highlights how the foundation of individuals' everyday practices is based on attitudes, beliefs, and value sets. Indeed, lifestyles are a means of self-expression and thus connected to group affiliations. Therefore, even if people could, for instance, afford certain lifestyles easily, they may not adopt them if these lifestyles do not align with their underlying values and identities (Schanes et al., 2016, p. 1041). Furthermore, research shows that even if beliefs change, for example, due to awareness raising campaigns, "a change in belief does not necessarily result in a change of habit." (Jensen, 2007, p. 68). In this regard, White, Habib, and Hartdisty (2019) provide a set of strategies from behavioural science that focus on encouraging consumer behavioural change towards sustainable practices.

On top of the obstacles provided by the behavioural and psychological dimensions, a relevant point to consider is that such changes are more feasible and accessible to achieve than others. The ease of making changes is influenced by several factors, including the amount of time required, the costs and expenses involved, and the dependence on external infrastructures (Moreau, Vincent et al., 2017, p. 8; Lewis Akenji, Magnus Bengtsson, Viivi Toivio, et al., 2021, pp. 111, 126 and Costa et al., 2021). For instance, individuals cannot as easily relocate to another region or switch to a new heating system than as to opt for vegetarian options for meals or change their leisure activities. Income is another confining factor, as individuals with greater financial resources can more easily afford and adopt new lifestyles, such as purchasing a more efficient car or upgrading their heating system. Finally, and importantly, these choices are constrained by structural factors, like one's position in society, available infrastructure, and political contexts. Socially vulnerable groups, who have fewer personal resources, external opportunities and capitals, face additional barriers to making lifestyle changes (Sharlamanov and Petreska, 2020, p. 26).

In order to develop realistic strategies for promoting low-carbon lifestyles that fit in the framework of a just transition, it is essential to consider how policies affect different groups, especially those most vulnerable, and why certain populations may be more susceptible to change than others. As pointed out in this section, lifestyles are not entirely subject to conscious choice, but largely determined by

socio-economic, structural and cultural factors—often summarized as "social vulnerability". Only by taking these factors into account, we can formulate approaches to reach climate targets that are both implementable and just. Furthermore, besides lifestyle changes, other factors are crucial, some even claim more important, to reach climate neutrality.

4. Social Vulnerability in the Face of Climate Change

This chapter will discuss the concept of social vulnerability in the context of climate change impacts and relate it to concepts such as risk and exposure. The chapter contains a preliminary definition of social vulnerability, that will be refined as needed as part of the on-going work in the project. In addition, a list of vulnerable groups to climate change and climate policy was created as input to the mapping of vulnerable groups (Task 6.2). The chapter aims to clearly illustrate why vulnerable groups need special attention when it comes to taking action on climate change, in particular when aiming for a just transition to a low-carbon economy. Mitigation and adaptation measures – even if they make sense from an environmental perspective – may not be feasible, i.e., met with evasion or resistance, if they do not take into account the challenges of disadvantaged social groups.

4.1 Defining Social Vulnerability

At first, risk and exposure seem to be helpful analytical terms when examining how diverse groups of citizens are affected by both climate change and climate policies. Risk arises from the interplay of natural hazards, vulnerability, as well as exposure. It encapsulates potential consequences with uncertain outcomes when something valuable is at stake. Exposure, on the other hand, is the propensity that people and their livelihoods, entire species and ecosystems, or economic, social, or cultural assets could be adversely affected (Agard & Schipper, 2014; Lee et al., 2023). However, both terms fall short in capturing crucial aspects of social, psychological and political affliction and structural limitations of resilience.

In contrast, the broadest definitions of social vulnerability describe it to be determined by exposure, the sensitivity of a population, a group or an individual to climate-related hazards, as well as their coping capacities including a lack of resilience and difficulties in recovering (Birkmann, 2006). "Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt." (Agard & Schipper, 2014). Today, the term is a key concept in human development research and in climate change assessment (Cutter & Finch, 2008; Ford et al., 2018; IPCC, 2022c).

Natural scientists first used the term social vulnerability in the context of climate change impacts on different spatial domains. Over time, the understanding of the term has evolved in each research community, and there is still no final definition shared by all. Broadly speaking, two approaches to defining social vulnerability can be identified. Risk-oriented researchers define the term at the external level. Accordingly, social vulnerability is about a system's exposure to shocks from external stressors, threats, or climate variability. It points towards the harm that has been or might be experienced by people, societies, or habitats (Burghardt, 2018; Burghardt et al., 2017). In contrast, researchers from the climate change community devote a focus on the ability of individuals and/or systems to anticipate, cope with, and eventually recover and/or adapt from climate change (Breil et al., 2018; Otto et al., 2017). For instance, Cutter and Finch define the term as the sensitivity of a group or community to natural hazards as well as their response and recovery from them (Cutter and Finch, 2008). Similarly, Adger et al. (2005) define the vulnerability of a system, population, or individual to a threat by their capacity to be harmed by that threat. It is important to note that social vulnerability can only be meaningfully discussed in relation to a specified system or exposure unit and a specified hazard or range of hazards. Therefore, social vulnerability is a dynamic characteristic, constantly evolving as a result of complex interactive processes (Adger et al., 2005). Other authors emphasize that social vulnerability is multidimensional and varies among and within social groups, is scale-dependent in terms of time, space, and units of analysis, and is dynamic. Therefore, a region's vulnerability is determined by the potential impacts resulting from exposure and sensitivity, as well as the adaptive capacity (Vogel & O'Brien, 2004).

Another important aspect of social vulnerability in this context is that it captures how individuals and groups are excluded from (literal and metaphorical) spaces in society. Additionally, they are denied tangible resources, such as money, access to land, energy, etc., and intangible resources, such as emotional, physical or spiritual support (Breil et al., 2018; Collet, 2012). For example, Judith Butler conceptualizes vulnerability through the need for protection, support, acceptance, affirmation, and recognition of others in order to survive and live well and happily (Pistrol, 2016). Vulnerability thus encompasses both individual aspects of psychological and emotional distress and structural dimensions of group exposure to harm.

Finally, the term allows us to understand intersectional, and historically conditioned injustices related to climate change (Lee et al., 2023). Most often individuals belong to more than one group and are thus affected by intersecting vulnerabilities (Cho et al., 2013; Crenshaw, 2017). Internal vulnerability factors, including race, ethnicity, age, gender, sex, religion, disability, and general health, often overlap with each other. In addition, external factors might play a role, including the existence of social, cultural, and political networks, education levels, and socioeconomic status (compare Breil et al., 2018; Cutter and Finch, 2008).

Political decisions, regulations and unbalanced or even unfair power dynamics heavily impact all of these factors. Vulnerability thus has a crucial structural dimension: individuals, and groups, might be vulnerable to climate change and to climate policy also because they are not taken into account in political decision making (Cutter & Finch, 2008; Otto et al., 2017).

In this report and in LOCALISED, social vulnerability is defined and assessed by considering not only how certain groups are exposed to climate change and climate policies, but also the sensitivity of a group or community to natural hazards as well as their response and recovery from them. The following section will go into detail in the identification of these groups, following an intersectional perspective.

4.2 Vulnerable Groups and Climate Change

Building on the definition of social vulnerability above, this subchapter addresses vulnerable groups in the context of climate change and climate policy, providing an overview of the research there is in this regard.

Social vulnerability in the context of climate change should be understood as a multi-layered process involving geo-physiological, socio-ecological, as well as economic factors (Breil et al., 2018). Vulnerable groups are highly exposed to extreme weather and environmental disasters due to certain factors they share. These include factors such as health status, age, disabilities; and socioeconomic factors such as poverty and poor education (Gaard, 2015a; Gabriel, 2017; Reckien, 2018). In addition, power dynamics need to be factored into the analysis as well as marginalization based on gender, race, sexual orientation or other factors, which can increase the vulnerability of people in the context of climate change.

With this understanding in mind, supposedly 'natural disasters' are not so natural anymore. To give an example: Famine in countries of the global South is usually incorrectly viewed as a natural phenomenon related to geological and/or meteorological conditions. However, to fully understand how people become vulnerable to famine, socio-political factors and even postcolonial effects have to be considered (Collet, 2012). Simply put, famine does not only afflict a female, analphabetic, middle-aged woman because she happens to live in the Sahel zone, but also because she does not have the same access to resources, knowledge, and power, as a male, educated, and young Israeli person living in the comparably dry Negev desert would. Suffering from hunger is not (only) due to adverse natural causes but is triggered by human agency (Collet, 2012) – these include policy decisions and regulations, but also historical inequalities such as colonial and postcolonial heritages. Social inequality, colonialism and imperial lifestyles amplify serious and life-threatening consequences of climate change, and climate policies (Bohnenberger & Fritz, 2021). It should also be noted that, when failing to consider social justice aspects, climate policies themselves have been found to create

regressive effects and reinforce social inequality and the vulnerability of specific groups (Bouzarovski et al., 2018; Hiteva, 2013).

The following variables are critical for understanding vulnerability in the context of climate change and climate policies. While not all of them might have the same level of effect, they often overlap with each other, thus increasing overall vulnerabilities.

- **Gender and Sexual Identities:**
  Gender has a considerable influence on vulnerability, and heavily interacts with other variables. Because women tend to do more unpaid care work and less paid work than men, they also have less time and income than men. They are therefore limited in their (financial) coping capacities. However, political measures addressing adverse effects of climate change do not usually integrate the precarious situations faced by people with caregiving responsibilities (Gutschow et al., 2021; MacGregor et al., 2022). Other factors to consider include the lack of access to or control over basic resources (e.g. training, information, aid, insurance) that female-read individuals often experience, significantly limiting their ability to cope with the impacts of environmental disasters (Denton, 2002; Sultana, 2014). For instance, a study in Bangladesh that examined immediate as well as long-term impacts of Cyclone Ayla in 2009 found that due to unequal gender roles, women were often not allowed or able to participate in NGO trainings or income generating activities (Thomas et al., 2019). Additionally, women, non-binary people and Trans people tend to have less insurance cover against natural disasters than cis men. Women may also be prohibited from traveling without male chaperones for religious or cultural reasons, which can lead to devastating consequences when floodwaters rise (Crate & Nuttall, 2016; Sultana, 2014). This highlights that vulnerability needs to be thought of as intersectional, meaning that gender, for example, needs to be considered in its relation to other possibly marginalizing factors such as cultural origin, race and class (Thomas et al., 2019). Age, health, and location can also have multiplying impacts on the variable gender. Elderly women, for example, especially widowed and retired women, suffer from poverty more often than men do (Gaard, 2015a; Reid & Swiderska, 2015; Zong et al., 2022), allowing them less room for adaptations such as new heating systems etc. Trans people, as well as cis women, often experience either transphobic and/or sexist discrimination. This decreases mental health (Otto et al., 2017), and emotional and cognitive capacities to cope with changes in daily routines (Gabriel, 2017; Gay-Antaki, 2020; Herbert et al., 2022; Lenz, 2020; Vinyeta et al., 2016). In a similar way, queer and LGBTQ people experience discrimination on multiple levels which magnifies the effect of climate change and climate policies (Bauman, 2015; Gabriel, 2017; Hall, 2014).

- **Health problems and disabilities:**
  Poor health conditions are an important predictor for vulnerability to climate change and climate policies. For instance, people of bad health e.g. suffering from cardiovascular, asthmatic or respiratory diseases heavily suffer from heat waves, air pollution and similar phenomena (Poole et al., 2019). Another research on disability and 'natural disasters' shows that disabled people are especially prone to harmful disasters (Kosanic et al., 2022) because of sensory disabilities, the inability to reach shelters without barriers, lack of accessibility, suitable bathrooms, or medical support. In addition, disabled people have less access to social networks, and are less likely to receive information or warnings in case of extreme events. Health also interacts with other variables. For instance, health and poverty are often interconnected. People with low income are more prone to bad housing conditions and have less availability of green outdoor spaces. This makes them more susceptible to climate change (Breil et al., 2018). Gender also plays a role. Women and girls often take care of sick or injured people, which impacts their education, job opportunities as well as their income and increases the risk of getting sick themselves (Otto et al., 2017; Reckien et al., 2017).

- **Age:**
  Increasing temperature, in particular in form of heat waves, heavily impacts people over 60 years of age (Costello et al., 2009; Reckien et al., 2017; Reckien et al., 2018). Elderly people suffer from diseases and reduced mobility. The mortality rate increases by 2.5% for every degree above 20 degrees Celsius for people over 65 years (Gouveia et al., 2003; Otto et al., 2017). Likewise, the mortality rate of children under the age of 15 increases by 2.6% for every degree above 20 degrees Celsius (Gouveia et al., 2003; Otto et al., 2017). Heat waves thus affect elderly people and children significantly stronger than young adults (Harvey et al., 2019; Meurer et al., 2018; Zong et al., 2022; Reckien et al., 2018). The intersection of age and gender is also important, since women have a lesser heat tolerance than men. This results in a higher risk for women and especially elderly women to die due to heat phenomena (Otto et al., 2017).

- **Poverty and education:**
  Poverty plays a crucial role in respect to climate-induced vulnerabilities. For instance, poor people often cannot afford good housing and/or air-conditioning. Their lodgings are often far away from green spaces. All this increases the risk of heat related mortality (Otto et al., 2017). People with low income often reside in locations, that are not resistant to climate hazards such as floodings etc. In addition, the damage after natural disasters is often more long-term for poor people since they are unable to repair damages, as they have fewer resources and have a lower adaptive

capacity than people who are socio-economically well-off (Breil et al., 2018; Hallegatte et al., 2018). Also, living in poverty means residing in potentially unsafe areas with high crime rates. This might influence the behaviour of the residents during natural disasters, since they might not want to leave their home and evacuate because of fear of looters (Breil et al., 2018). More broadly speaking it can also be argued that poor people lack the social networks and resources that people of higher socio-economic status have. Drawing upon the term of social capital by Pierre Bourdieu (Bourdieu, 2012) it has been argued that poor people with less social capital are more vulnerable to climate change and climate policies than others. To summarize, this means that poor people are heavily affected by climate change, but have, amongst others, traditionally not been included in the decision-making process on how to respond to it (Costello et al., 2009) due to limited access to tangible and intangible resources, and unbalanced power dynamics.

Additionally, people with a low education level are often more vulnerable in the face of climate change due to a multitude of factors. Firstly, they may lack the knowledge and understanding necessary to comprehend the complex scientific concepts and predictions associated with climate change (Moser & Ekstrom, 2010; Patt et al., 2007). This lack of awareness restricts their ability to make informed decisions and engage in adaptive measures to mitigate its impact. Moreover, low education levels often correlate with limited access to resources and economic opportunities, making it harder for such individuals to adapt to changing environmental conditions or invest in sustainable practices. Additionally, inadequate education can lead to a lower socioeconomic status, leaving people with fewer resources to cope with the physical and financial consequences of climate change, such as extreme weather events, rising sea levels, and economic disruptions (Lutz et al., 2008). Overall, a low education level compounds the vulnerability of individuals to climate change, reinforcing the need for ensuring equitable education and raising awareness to build resilience in the face of this global challenge (Adger et al., 2004; Striessnig et al., 2013).

- **Location and migration:**
  The location or region in which people live can significantly influence their vulnerability to climate change. "Locations where the level of impact following adaptation is greater than society's ability to cope are considered vulnerable." (Dunford et al., 2013) Coastal areas, for example, are particularly at risk due to rising sea levels and increased frequency of extreme weather events such as hurricanes or storm surges making the people living there more vulnerable to displacement, economic losses, and health risks. Similarly, people residing in arid or semi-arid regions are confronted with droughts and desertification, which can lead to water scarcity, reduced agricultural productivity, competition over resources and

food insecurity (Intergovernmental Panel on Climate Change (IPCC), 2023; United Nations Framework Convention on Climate Change (UNFCCC), 2007). In conclusion, the location or region in which people live plays a crucial role in determining their vulnerability to climate change (Adger et al., 2004; Otto et al., 2017). These vulnerabilities are often compounded by factors such as poverty, lack of resources, and limited infrastructure, which further restrict the capacity of communities to adapt and cope with the impacts of climate change (Adger et al., 2004).

People with migration biographies and/or experience of racism face multiple structural limitations as well, which lead to precarity, lack of financial stability, and thus higher vulnerability to climate change risks. Also, people migrating to a new place might find it hard to adapt to new ways of behaviour and/or lifestyles (e.g. regarding energy consumption) (Gutschow et al., 2021; Piguet et al., 2011; Sealey-Huggins, 2018).

In addition, migrants sometimes do not master the language of their host country. Thus, they might not receive or understand information about a possible threat or where to get support if needed. By that, they might lack essential information on climate change and/or climate policies, resulting in multiple exclusions from resources and knowledge, which can be life-threatening (Breil et al., 2018; Nerlich et al., 2010; Piguet et al., 2011).

As shown above, vulnerable people are severely affected by climate change. At the same time, they are also least able to influence adaptation and mitigation policies. To rectify this shortcoming, researchers argue for the need to directly address and include the perspectives and voices of vulnerable groups (Kaijser & Kronsell, 2014). Recommendations for a "people's perspective" (Denton, 2002) on climate change and climate policies thus calls for:

- An intersectional analysis of social vulnerabilities: The design and drafting of policies to address climate change impacts should integrate, adapt, and streamline the needs of multiple vulnerable groups and precarious communities (Breil et al., 2018).
- An integration of fairness/justice considerations: Fair climate policies (for instance fair energy policies) should consider social capabilities and structural (in)flexibilities (James et al., 2022) of certain groups of people. Besides, climate policies sensible to social vulnerabilities would require an overall fair (re)distribution of resources, goods, and services.
- Non-discriminatory decision-making processes (James et al., 2022): Not only have the needs of vulnerable groups been left out of policymaking, but also have vulnerable groups rarely been (directly) involved in decision-making processes. Attention should be paid to non-discriminatory ways to include vulnerable groups in political decision-making and/or policy implementation.

In summary, vulnerable groups are affected by both climate change and climate change mitigation and/or adaptation policies. Impacts may be experienced at a

deeply personal level. However, they have an important structural component: sociopolitical and economic contexts mediate how impacts are experienced, and by whom. As discussed earlier, people who fall within more than one category of vulnerability, and are thus exposed to intersectional vulnerabilities, are even more susceptible to climate risks than others. Thus, with a view to our previous discussion on low-carbon lifestyles and the likelihood with which lifestyles could be adapted (see chapter 3 above), we must conclude that vulnerable groups are not only the most affected by climate change, but also that they potentially have the least capacity to change their daily routines and lifestyles. So, even if policy makers were to push for change, the most vulnerable and affected members of our societies would not necessarily be able to and/or would not know how to follow.

5. Empirical Survey – Q Method

The primary objective of this survey is to gain insights into the perspectives of citizens towards low-carbon lifestyle changes and their perceptions over the equity and fairness dimension of these topics in three different focus cities/regions: Barcelona, the metropolitan area Gdansk-Gdynia-Sopot, and Vienna. These three cities/regions were chosen based on their varying geographic conditions and proneness to climate change, as well as their comparability in terms of political systems and economic development. To cater to each region, specific language versions were produced, including a German study in Vienna and its surrounding regions, a Polish study in the metropolitan area Gdansk-Gdynia-Sopot, and two language versions, Spanish and Catalan, in the Barcelona region. Given that work package 6.1. focusses on the specific viewpoints of socially vulnerable groups, small sample sizes with targeted groups were used to obtain more meaningful insights than a representative empirical study (Watts and Stenner 2012). Given the limited number of participants in the surveys (see the results from the analysis in chapter six, from p. 28 below) the findings are thus not generalizable to the whole population.

The online survey was designed based on Q-methodology and incorporated statements on the social vulnerability of different groups of citizens in face of climate change. Q is a mixed or semi-qualitative method that combines a quantitative analysis of data and a qualitative interpretation process (Ramlo 2011). Q-methodology is a useful tool, which generates insights on the subjective perceptions and attitudes of individuals (Webler et al. 2009; Zabala 2014, see Mehleb et al., 2021 for a recent example) and the spectrum of subjectivity within a group of people (McKeown and Thomas 2013). It allows for an analysis of human subjectivity in a systematic and organized manner (Barry and Proops 1999). It is suitable for exploratory studies and small sample size requirement (Zabala 2014). Drawing on a "concourse", which represents as many different statements surrounding a topic as possible, every participant can express their subjective

perspective on the given topic by ranking the provided statements to their subjective perspectives. Additionally, the Q-grid design, which follows a normal distribution pattern, forces participants to make difficult choices, reducing the risk of socially desirable, politically right, or conventional answers. Through statistical analysis, similarities and differences in the individual sorting are identified (Brown 1980; Ramlo 2016) and used to objectively group thought groups based on the subjective data provided. Finally, the collective viewpoints are then interpreted in consideration of the socio-demographic background of participants, as well as the relevant scientific literature. Therefore, the Q methodology was selected as the most an appropriate tool to carry out preliminary research and gain insights on the perspectives and attitudes of specific groups of citizens, particularly of vulnerable groups, with respect to climate change and low-carbon lifestyles.

5.1. Using the Q-Methodology

The process of Q methodology usually follows eight steps (Hofbauer 2022; McKeown and Thomas 2013):

1. Concourse
2. Q-Sample
3. Q-Grid
4. P-Set
5. Q-Sorting
6. Quantitative Analysis
7. Qualitative Analysis
8. Interpretation

The term *concourse* refers to comprehensive and representative collection of all relevant discourses and surrounding opinions on a specific subject (Brown 1993). In constructing the concourse for this study, various sources were included, namely, newspapers, policies documents, relevant city-specific activities, scientific literature, interviews, and conversations with experts. To ensure that the statements were balanced, five key dimensions were identified based on consultation with consortium members and planned research tasks of the LOCALISED project:

a) Lifestyle: to integrate findings from desk research, presented above
b) Climate change opinions: as a key topic for the project
c) Policies: evaluation of policies will feed into the Decarbonization Profiler
d) Vulnerability: as a topic of Task 6.2
e) Business: to provide feedback for work package 7

The *Q-sample* was designed based on these dimensions and consists of a set of statements related to each dimension as identified in the concourse of communication (see above). The aim was to represent a wide range of opinions and aptitudes so that each participant could express their viewpoint (Brown 1993;

Ramlo 2016). For this study, thirty-six statements were used for each selected focus region, with thirty statements designed as "general statements" employed across all selected regions. Two examples of the general statements are provided below (square brackets indicate the associated dimension and were not shown to participants):

> "I would go for private car ownership if the access to more services (not to work) like kindergarten, culture, health, etc... would be in walking distance." [Lifestyle]

> "I am not heavily affected by climate change, but I can see that poor or elderly people are." [Vulnerability]

In addition to the thirty general statements, six specific statements were provided by regional project partners for each of the three focus regions. This approach was taken to meaningfully address the different climate change impacts in each selected focus region. For example, rising sea levels are not relevant for cities that are not located by the sea (Barcelona vs. Vienna). Furthermore, the statements were translated into the four languages widely used in the focus regions (German, Polish, Spanish, and Catalan) to make them easily accessible for all participants. The "Q-Grid" was used to sort each statement according to the individual agreement or disagreement. In this study, a Q-grid ranging from -5 (don't agree) to +5 (totally agree) was utilized.

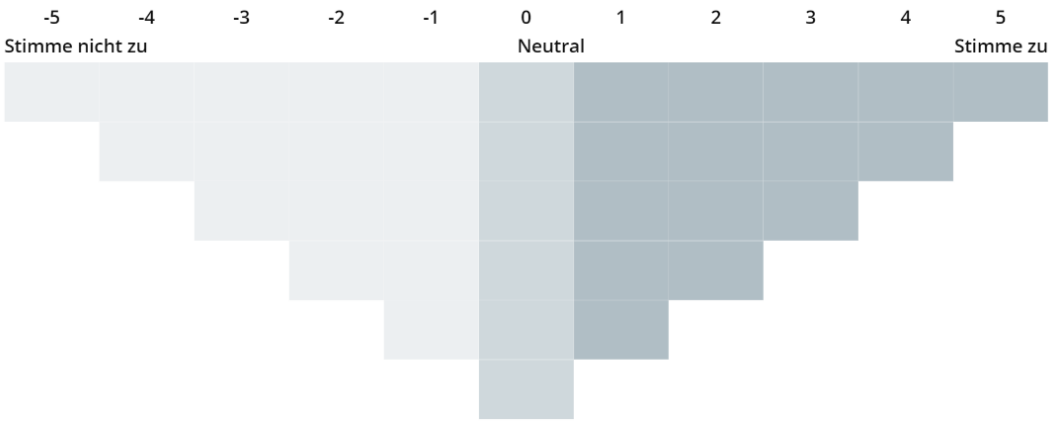

Figure 2: The Q-Grid as used in the German version. The scale ranges from -5 (totally disagree) to +5 (totally agree).

The *P-set* refers to the set of participants who conduct the Q-sort. To distinguish between different viewpoints, it should include participants with diverse backgrounds and attitudes (Watts and Stenner 2012). In this study, particular attention was paid to include the identified socially vulnerable groups (associated vulnerability factors indicated in brackets):

- elderly people (age)
- low income (poverty)
- physical and mental health problems and/or disabilities (health)

- women and trans/intersex people (gender)
- care responsibilities (gender)
- queer and LGTBQ people
- migration/experience of racial discriminations (migration background)
- inability to understand the language of the focus city/region (migration)
- lack of ability to understand technical language (migration background/non-technical or low educational attainment).

Further information about the socially vulnerable groups identified in this study can be found in Chapter 4. To determine whether the participants of our study are disadvantaged or potentially belong to vulnerable groups, we gathered relevant data on their socio-demographic background.

Once the initial four steps have been completed, the process of data collection, which is referred to as the *Q-Sort* begins. During the Q-sorting process, participants are required to sort the statements into the Q-grid according to the degree of individual agreement or disagreement, with each statement being ranked from -5 to +5. For this study the online tool "Q Method Software" was utilized.[1]

After the completion of the Q-sorting process, the collected data is subjected to a *quantitative analysis*, which involves several sub-processes. The first step in this analysis is the multivariate data reduction, meaning a correlation matrix between the different Q-sorts is produced (Zabala 2014). The resulting matrix is then reduced into different factors which describe multiple Q-sorts. For this study, a principal component analysis (PCA) was applied. The subsequent step involves choosing a meaningful number of factors, which is guided by a set of indicators such as the scree plot, the Kaiser-Guttmann Criterion, the Humphrey´s rule, and a parallel analysis. Details on the specific indicators used for each study in German, Polish, Spanish, and Catalan are elaborated below. The quantitative analysis entails a second step, flagging of Q-sorts, to define more distinguishable perspectives (Zabala 2014). The z- and factor scores are then calculated to determine the relationship between each factor and all statements. Lastly, distinguishing and consensus statements are identified in order to gain a deeper understanding of the identified perspectives (Zabala 2014).

After the quantitative analysis, the resulting factors can be *qualitatively interpreted* as they represent hypothetical Q-sorts, which can be seen as a fictional perspective that is based on and explains multiple real Q-sorts. Narratives for each perspective are developed to describe each perspective. For this process, the distinguishing statements are most important, but also the statements with highest (dis-) agreement are relevant (Zabala 2014).

[1] https://app.qmethodsoftware.com/

5.2. Challenges met using Q methodology

To account for the complexity that emerges from the large scope of opinions and attitudes that must be included, it was necessary to conduct extensive research prior to the study (resulting in the concourse as described above). The development of meaningful statements was made possible by incorporating several feedback loops, including input from the project partners and representatives from the three focus regions. These feedback loops facilitated the design of statements that comprised:

- Both generic statements and six region-specific statements for each focus city, which were supplied by the regional project partners;
- Easy-to-understand statements;
- One topic (content-wise) per statement;
- Statements with as little negations as possible; and
- Statements covering extreme opinions (to make the Q-sorts distinguishable).

To reach a diverse set of participants, we pursued two courses of action: on the one hand, the study was disseminated to a wide audience to cover the more mainstream participants. On the other hand, specific institutions, such as queer student associations, local neighbourhood centres, NGOs working with migrants, and more, were contacted directly with the aim of reaching out to individuals from the identified socially vulnerable groups as elaborated above. For instance, we visited a neighbourhood centre in Vienna to conduct offline interviews with elderly people and migrants specifically. Lastly, it should be noted that the design of four distinct Q-samples, each with specific statements tailored to the focus region, necessitated independent analyses of the four studies, without the option of combining Q-sorts from the different focus regions. In comparison to other multi-country Q-studies that used the same set of statements in different countries (Jeffares & Skelcher, 2011), the approach taken in this study was more complex on the one side, but also allowed for a stronger emphasis on the differences between the three focus cities/regions.

6. Perspectives of Citizens

In this chapter, the findings from the empirical survey are presented. As previously stated, the main objective of carrying out this analysis was to gain insights into the perceptions of citizens, especially vulnerable groups, regarding climate change, as well as their attitudes towards low-carbon lifestyle changes across the three different but sufficiently comparable cities/regions. For each surveyed location, we provide a thorough analysis of the perspectives or group narratives found in the data. As explained in Chapter 5.1, we only use statements that are relevant to this

analysis. These statements mostly include those that help to tell the perspectives apart from each other, namely the distinguishing statements. Firstly, the findings based on the German version of the survey executed in Vienna and its surrounding region are discussed, followed by the findings from the surveys carried out respectively in the Barcelona and Gdansk-Gdynia-Sopot metropolitan areas. The full interpretations with references to individual survey statements and the description of the sample date are included in the Annex. Additionally, specific narratives emerging from the results are analysed by embedding the perspectives of participants in the context of social vulnerability. This chapter concludes by comparing the findings from all three locations (and four language versions) and demonstrate how they relate to the overall insights from the preceding chapters on social vulnerability and lifestyles.

6.1. Results from the Vienna Survey

In the German survey conducted in Vienna and its surrounding region, three distinct perspectives or group narratives were identified. These three perspectives were labelled as: (1) the social perspective, (2) the technological perspective and (3) the self-centred perspective.

1. Narrative 1: "Social perspective"

The first identified narrative, the social perspective, is characterized by a strong emphasis on the social aspects of climate change. The group adhering to this narrative heavily agrees with the statement (V6) asserting that the consumption of resources by "big climate sinners" is also a social issue. The participants of this perspective believe that integrating gender-related aspects into climate politics would benefit everyone in society (statement V3). Women and girls (statement 21), as well as low-income people, homeless people, and those with health problems (statement 9), are viewed as vulnerable groups that need protection through climate policies. Another notable aspect of this perspective is the criticism directed at social groups that are less vulnerable. For instance, the top earners are seen as the group that should bear the brunt of climate change measures instead of the working- or middle-class people (statement 25). Participants holding the social perspective view actual measures to address climate change as of subordinate importance: They consider the existence of green infrastructure to be crucial (statement 16), and do not regard technology and innovation as the primary solutions to the climate crisis (statement 23). This group does not see climate crisis as a "purely technological question," and holds a more nuanced view of individual capacities to implement behavioural changes (participant 1DNP). Participants also recognize the challenge of striking a balance between "social and individual decisions" (participant NVIZ) and "social against environmental concerns" (participant R6YF). The responsibility for climate action is clearly perceived to lie with higher-level entities, such as businesses that "have to do more!" (participant EOE2) or "[…] governments that take on responsibility"

(participant NVIZ). Regarding the sample behind the first perspective, it is noteworthy that participants share several vulnerabilities, with the highest number of transgender, non-binary and queer individuals. Additionally, only a small proportion of them have care responsibilities. At the same time, this group also has the highest mean net income and education rate and self-identify as politically left or left leaning. In summary, while this narrative is associated with the most vulnerable people, these individuals still have a relatively high education and a mean net income of 2.000€ per month.[2]

2. Narrative 2: "Technological perspective"

The second perspective places a strong focus on technical and behavioural climate measures, such as building insulation (statement 30), food sharing (statement 7), and reducing air travel (statement 2). Participants who hold this perspective also highlight the urgency of implementing climate measures, emphasizing that local and regional actors must act now without waiting for international regulations (statement 14). Furthermore, they believe that climate measures must be implemented proactively, *before* the demand for them arises (statement 5). In their view, climate measures should also be implemented even if businesses and economists object to them (statement 13). On the other hand, participants of this perspectives do not see the necessity of including social aspects related to vulnerability, such as women and girls (statement 21), low-income people, homeless people, and those with health problems (statement 9), in climate policies. They clearly reject the idea of imposing stronger taxes on climate-damaging behaviour of "wealthy people" (statement 25) and do not perceive a social issue arising from the consumption patterns of "big climate sinners" (statement V6). In their view, everybody must contribute to climate mitigation, including more vulnerable groups. While proponents of this perspective mostly focus on concrete climate actions, they neglect statements regarding social issues and socially vulnerable groups, even stating that they have difficulties to sort statements about those groups (participant FJWI, 2O7F). One participant stated, "I had difficulties sorting the three statements regarding women and […] gender and to put them into context of climate change" (participant 6D2G). This narrative focuses on climate actions that are straightforward and easier for the participants to assess, such as using public transportation (participant 2O7F), waste separation and regional climate neutrality (participant 0Z22), as well as insulation (participant 6D2G). Gender-related issues are particularly viewed as out of place: "Including gender issues into this isn't the right approach - it obviously has nothing to do with the debate" (participant EGQJ). In general, the participants behind perspective 2 do not differentiate the responsibility of different social groups (participant 0Z22), as they believe "climate change affects everyone, regardless of origin, religion or gender" (participant EGQJ). It is worth mentioning that the participants are subject

[2] In 2020, the mean yearly net income in Vienna was 24.401€ (Statistisches Jahrbuch, 2022, p. 151))

to vulnerabilities themselves. For instance, the majority of them have care responsibilities, a diverse educational level and background, and include people who live on a low net income as low as 1.300€ per month. Furthermore, this perspective is distinguished by a high representation of people over 60 years old and a diverse sample in terms of gender and education level and background.

3. Narrative 3: "Self-centred perspective"

The third perspective is characterized by a distinct attitude towards climate policies. On the one hand, it is believed that wealthy people have a greater more responsibility for implementing climate measures than less fortunate citizens (statement 25), and the consumption of resources of "climate sinners" is perceived as a social issue (statement V6). On the other hand, the participants are strongly opposed to strict legislation that mandates the use of photovoltaics for everyone (statement 17) and are only willing to accept restrictive climate policies if they do not come with personal disadvantages. For example, they willingly give up their car, but only if everyday services are located within walking distance (statement 29). In addition, economic aspects of climate policies are emphasized more strongly, and the development of new local production is highly supported, as it is beneficial for the economy and reducing vulnerabilities (statement 28, see Annex). The participants rely on technological innovation in order to "solve the climate crisis" with high effectiveness and low costs (statement 23, see Annex). However, climate measures such as protecting green infrastructures in the city (statement 6) or reducing meat consumption and animal products for health reasons (statement 28) are seen as much less important. One participant states: "I don't want to change my diet because of climate change. Bigger measures are needed[...]" (participant 4Z4F). While this perspective does not put social issues into the spotlight, participants appear surprised by some facts included in the statements: "I was surprised that so many women worldwide are affected. How is it in Europe?" (participant 4Z4F). Therefore, they found it difficult to sort statements on social vulnerability (participant L0BN). Individualists prioritize individual climate policies and, while they may not be fully aware of the vulnerabilities of certain groups, they are open to including some social aspects in their perspective. Most of the participants share a comparatively low level of education and a low interest in politics. This is a crucial vulnerability, since they lack essential information to evaluate what might be relevant or not. In terms of gender, they all identify themselves as cisgender and binary. Lastly, none of the participants with this perspective owns a home, which might put them at risk in terms of vulnerability, because owners might not have an interest to repair and/or adapt the homes to the latest standards, if they rent them out.

Relating the perspectives to social vulnerability

The findings of the Vienna study (in form of the three different perspectives presented above) indicate that intersectional vulnerabilities have an impact on the

individual perspectives on climate change policies. The participants of the "social perspective" (narrative 1) are affected by a total of 14 different vulnerabilities, with 85% identifying as cis female or non-binary, and six participants identifying as trans and/or queer (refer to Annex, Table A5). Being subject to intersectional vulnerabilities (Kosanic et al., 2022), specifically those related to gender and one or more additional vulnerabilities, has multiple impacts on the individual perspectives on climate change policies.

Among this group, the social consequences of climate-damaging behaviour of financially privileged people (Breil et al., 2018; Collet, 2012) are strongly emphasized. Furthermore, participants sharing this perspective demand the integration and protection of vulnerable groups in and by climate policies. Accordingly, these participants show greater acceptance for climate policies that consider vulnerable group perspectives and hold financially privileged people responsible.

Participants of the "technological perspective" (narrative 2) are subject to eight different vulnerabilities, and this group is characterized by a smaller proportion of women, trans, and non-binary people (35%). Consequently, a lower proportion of participants is affected by intersectional vulnerability. The perspective of participants in belonging to this group is found to be centred around the belief that climate change policies should mainly rely on technical solutions and not serve as a means of protecting vulnerable groups. Social vulnerability and other social aspects are not considered significant parts of meaningful climate change policies. As a result, participants of this perspective exhibit greater acceptance toward technical and technological climate change measures and reject the integration of vulnerability-related aspects in climate change policies.

Due to the small sample size of only four participants in the "Self-centred perspective" (narrative 3), a meaningful comparison to perspectives one and two is not feasible. Nonetheless, this perspective provides insight to a different attitude towards low-carbon lifestyle changes. Participants aligned with the self-centred perspective are open to climate change policies, but only to the extent that they do not negatively interfere with their daily routines or generate any consequences for themselves. Accordingly, they advocate for climate change policies that are based on voluntary basis and deny restrictive policies.

6.2. Results from the Catalan and Spanish Survey

In the Catalan and Spanish survey carried out in the Barcelona region, three perspectives were identified, they were labelled, respectively as "Regional economy perspective", "Regional participation perspective", and "Role model perspective". The Catalan and Spanish language versions of the survey were both intended for the Barcelona region and contained the same concourse of statements. This is why both study samples were combined and used as one

sample for analysis and interpretation. Accordingly, the narratives presented in the following paragraphs refer to all participants for the Barcelona region.

1. Narrative 1: "Regional economy perspective"

Participants of perspective 1 advocate for a shift towards a more regional economic and productive system. They emphasize the necessity of altering the existing productive model (statement_B4) which they believe is the primary cause of the current climate crisis: "I am convinced that the model in which we live is the cause of climate change and it is urgent to change it as soon as possible, here and in every city in the world" (participant 4UKM). Accordingly, they express a strong desire for local production to ensure a stable supply of goods and create job opportunities (statement_20) and oppose a global approach to fight climate change (statement 12). As one participant puts it: "I think that it is more important how the subject affects the citizen and the commitment he has on the subject. Policies at the international level have been more a matter of proposing things than of real results".

Interestingly, participants adhering to this perspective do not clearly specify who should be responsible for initiating and implementing these transformative changes. They generally do not attribute this responsibility to end consumers (statement_12), experts (statement_B6), or even cities and regions (statement_14). It is also noteworthy that they do not prioritize accommodating the needs of established companies (statement_27) even though they advocate for a change of the productive system (statement B4).

In terms of concrete measures, proponents of perspective 1 are receptive to non-restrictive, voluntary actions that can be easily put into practice (statement_29). Conversely, they exhibit reluctance toward measures mandated by law (statement_17) or any measures that might adversely affect the working class (statement B2). Women and girls are seen as a vulnerable group that should also be considered by climate policies (statement 21).

2. Narrative 2: "Regional participation perspective"

Participants of perspective 2 attribute the primary transformative power to private citizens at the regional level. They prioritize citizen participation as a crucial tool for effectively implementing climate mitigation measures, acknowledging that this approach may involve some mistakes along the way (statement B6). Additionally, they do not believe that international regulations will be timely, but they advocate for cities and regions to serve as active role models (statement 14). The participatory approach is underscored by their consideration of the needs of working-class neighbourhoods (statement B2).

While Narrative 2 highlights the need for global actions, such actions are found to primarily revolve around individual citizens who can have a positive impact by

purchasing more sustainable products (statement 12). Participants adhering to this narrative also view the general transformation of the existing productive model as a central aspect in the fight against climate change (statement B4). However, they do not emphasize the necessity of local production and the creation of local jobs (statement 20).

Regarding specific measures, perspective 2 exhibits limited enthusiasm for behavioural changes, even if those changes could be easily implemented (statement 29). Nevertheless, they are moderately open to measures that apply specifically to the city of Barcelona, such as advocating for the city to refrain from using greenfield sites for urban expansion (statement 6). Women and girls are seen as a vulnerable group that should also be considered by climate policies (statement 21).

3. Narrative 3: "Role model perspective"

Perspective 3 places a strong emphasis on the significance of the manufacturing and production sectors, highlighting the need for increased local production (statement 20). Additionally, it underscores the role of private firms in taking responsibility for addressing the climate crisis (statement B3). Moreover, this perspective views the city of Barcelona as a responsible actor that should refrain from utilizing greenfield sites for urban infrastructure projects (statement 6).

While participants in perspective 3 express a modest concern for the vulnerability of elderly individuals in the context of climate change (statement 11), they do not perceive women and girls as particularly vulnerable groups deserving special protection through climate policies (statement 21). Furthermore, the perspective does not actively consider the needs of working-class neighbourhoods (statement B2).

Notably, perspective 3 does not promote the transformation of the productive model (statement B4) or technological solutions as means to combat the climate crisis (statement 23).

Relating the Perspectives to social vulnerability

It is worth mentioning that the participant groups in the Spanish and Catalan studies exhibit limited diversity compared to the Viennese sample, both in terms of their socio-economic backgrounds and their exposure to vulnerability. All participants indicated a (rather) left-leaning political orientation, and the mean age is similar (P1: 35; P2: 42; P3: 42 years), with no participant over 60 years old. Additionally, almost all participants hold a university degree (9 out of 12). Concerning vulnerabilities, a high proportion of women, especially in participants of perspectives 1 and 2 (83% and 66%), was observed, and three participants adhering to perspective 1 reported experiencing racism. However, there is no additional representation of different gender identities or sexual orientations, no

participants facing health conditions, old age, disability, or language comprehension issues in their city.

Consequently, there are some commonalities across all perspectives regarding the social vulnerability of various groups to climate change. For instance, in all three narratives emerging for this region, poor or elderly individuals are not specifically perceived as disproportionately affected by climate change (statement 11). This may be attributed to the relatively low mean age among participants across all perspectives (mean age: P1: 35; P2: 42; P3: 42 years) and the relatively high average monthly net income levels (P1: 2,000€; P2: 2,800€; P3: 2,250€).

Conversely, all three perspectives generally agree that other vulnerable groups are most affected by climate change, and that this is a factor that should be taken into consideration in climate mitigation measures (statement 9).

The main divergence among the three perspectives is evident in their perception of the vulnerability of women and girls. In both the "Regional Economy Perspective" and the "Regional Participation Perspective," women and girls are indeed viewed as vulnerable groups deserving empowerment and protection through climate policies (statement 21). These perspectives also feature a higher representation of women (83% and 66%, respectively) compared to the "Role Model Perspective," where only 50% of participants are female. This suggests that participants in perspectives 1 and 2 place a stronger emphasis on vulnerabilities that they can personally relate to and consider relevant for climate change policies.

Another distinction regarding the social vulnerability of groups to climate change and the associated necessary transformation lies in the attitude towards (working-class) neighbourhoods that should not be negatively impacted by the energy transition (statement B2). This viewpoint is shared by perspectives 1 and 2 but not by perspective 3. It's worth noting that this statement was selected specifically in the context of Barcelona. Despite the higher mean net income of participants in Narrative 2 compared to Narrative 3, their focus on participation and regional development appears to be a more influential factor that clearly sets them apart from Narrative 3 and significantly influences the importance they assign to a just transition.

In terms of their willingness to embrace lifestyle changes and specific measures, one key distinction between the perspectives lies in the readiness of participants in perspective 1 to give up private car ownership if crucial destinations are easily accessible without a car (statement 29). This willingness is not shared by the other perspectives. Conversely, all three narratives from the Barcelona sample express support for improving bicycle infrastructure (statement 5) to enhance the modal split in the long term. However, none of the three are inclined to abstain from air travel as means to mitigate climate change (statement 2).

Furthermore, differences among the three perspectives emerge regarding the relevant actors involved. The "Regional Participation Perspective", for instance, places importance on institutional actors like the city of Barcelona but is not open to measures that must be implemented by the participants themselves. In contrast, the "Role Model Perspective" heavily relies on both institutional actors such as the city of Barcelona and the actions taken by private firms. The "Regional economy Perspective" does not emphasize a specific group of actors for initiating or implementing climate mitigation measures.

6.3. Results from the Gdansk-Gdynia-Sopot Survey

The Polish version of the survey was conducted in the Gdansk-Gdynia-Sopot Metropolitan Area. Two group narratives were identified as significant perspectives on climate change and climate policies, including lifestyle changes, the "Participatory perspective" and the "Neoliberalist perspective".

1. Narrative 1: "Participatory perspective"

Participants of the first perspective have a social orientation and emphasize the importance of civic participation in climate policy (statement 24). They prefer policies that "support citizenship, localism and the actions of each person" (participant OMVY). Moreover, they promote the protection of women, girls (statement 21), and other vulnerable groups (statement 9) through climate policies. This aspect accounts for the diverse living conditions that enable or limit individuals' capacities to adopt climate-friendly behaviour. For instance, when confronted with the statement about giving up car ownership if entertainment and shopping infrastructure were available in the area where one lives, one participant notes, "[...] owning a car is dependent on work and/or family factors, such as caring for aging parents. I would give up a private car if there were an available and inexpensive ad hoc car rental service for such needs."

Furthermore, the participants strongly disagree with taking the needs of companies into account when it comes to climate policies (statement 27). In their view, there is a "hierarchy of responsibility", pointing to the need to hold businesses and governments accountable (participant OVMY).

When it comes to the impacts of climate change, the participants believe they are already experiencing the effects. They do not perceive the heavy downpours in their region to be a natural climate variability (statement G6) but as a "result of a climate catastrophe" (participant 9SYG). From their perspective, climate policies should be implemented now, even if the demand for them does not currently exist (statement 5).

2. Narrative 2: "Neoliberalist perspective"

Participants of this narrative promote a neoliberal approach, which holds individuals responsible for climate policies and highlights the necessity of everyday

changes (statement G2). They are willing to take action themselves, such as repairing devices rather than discarding them (statement 26) and support technological and innovation solutions for the climate crisis (statement 23). The participants wish the needs of corporations to be considered in climate policies (statement 27), reflecting their neoliberal perspective (statement 25). This narrative is further emphasized where they argue that the working- and middle-class people should not be exempt from climate policies, and wealthy people are not deemed as more responsible. Nonetheless, they reject strict climate measures, such as a ban on demolishing green infrastructures for the purpose of building and development (statement 6).

6.4. Analysis of the Empirical Findings

The Q surveys provide valuable insights into several perspectives on climate change policies and low-carbon lifestyle changes that exist within the selected focus regions. Since the aim of this study was to achieve a thick description of group discourses (attitudes, opinions) the results have limited potential for generalization. Despite this, a comparison shows some similarities and dissimilarities across the regions. For instance, gender-related issues are only included as a central element in one perspective in the German survey, known as the "social perspective". Moreover, in both the German and Polish surveys, one perspective primarily draws on the importance of considering multiple vulnerabilities, such as women, girls and other vulnerable groups, in climate policies.

In contrast, in the Spanish and Catalan surveys, all narratives reflect a broad consensus that other vulnerable groups are most affected by climate change and should be safeguarded by climate policies. Since two perspectives also highlight the vulnerability of women and girls, there are two perspectives that acknowledge multiple vulnerabilities. Age, health conditions, and other gender issues are less prominent in the Spanish/Catalan narratives, possibly due to a less diverse socio-economic background compared to the German study. "While the perspectives in the German survey vary significantly in their consideration of or protection for vulnerable groups in climate change policies (i.e., the 'social perspective' versus the 'technological perspective'), the two perspectives in the Spanish/Catalan survey show a stark contrast regarding who is perceived as responsible actors. The 'Regional economy perspective' does not identify any responsible actors, whereas the 'Regional participation perspective' sees the highest potential for transformation in the decisions of citizens. Lastly, the 'Role model perspective' distinctly emphasizes the role of the private sector as well as the city of Barcelona.

In the Spanish/Catalan survey, the overall willingness to adopt individual low-carbon lifestyle changes is rather low. Only the 'Regional economy perspective' would consider giving up private car ownership. However, there is a high openness towards more fundamental changes that have to be implemented by external

actors. All three perspectives advocate for the improvement of bicycle infrastructure, and two perspectives emphasize the necessity to transform the productive model, thus expressing their willingness to adopt low-carbon lifestyles."

One similarity found in the German and Polish surveys is the occurrence of a perspective that mainly promotes the individual responsibility while neglecting the diverse capacities of more vulnerable groups (perspective 3 in the German survey; perspective 2 in the Polish survey). Participants of these perspectives may not be cognizant of these disparities or may perceive everyone as equally responsible regardless of their situation. Consequently, individuals holding this perspective are more inclined towards climate change policies that affect everybody equally, without relying on individual financial or social privileges, disadvantages or vulnerability risks. Nevertheless, if awareness about the impacts and implications of climate change policies on vulnerable groups is heightened, participants of these perspectives may alter their stance and consider individual capacities concerning low-carbon lifestyle changes.

The findings of the survey suggest that experiencing vulnerabilities can influence the personal perspectives on climate change policies and receptiveness to low-carbon lifestyle changes. There seems to be an increased awareness for the social dimension of climate change among those that are more diverse. We can see a relationship between exposure to vulnerabilities and perspectives on social and structural implications of climate change policies. However, the study also highlights the intricate nature of intersectional vulnerabilities. Notably, not all participants subject to vulnerabilities share similar perspectives, but instead exhibit divergent and opposing perspectives. This underscores the idea that being affected by vulnerabilities is just *one* of multiple factors influencing the experiences and perspectives on climate change policies and low-carbon lifestyle changes. These factors may include socio-demographic indicators such as level of education, financial stability, and political beliefs. Although political orientation was not found to be a central factor in this survey, low-income emerged as a key factor that increased awareness of the vulnerability of working-class neighbourhoods in both the Spanish and Catalan study.

To summarize, our results suggest that citizens who experience intersectional vulnerabilities are more receptive towards climate change policies that prioritize the protection of diverse groups of vulnerable people. Subsequently, the acceptance and adoption of low-carbon lifestyles is higher among them and perceived as appropriate. In contrast, citizens who are less affected by (intersectional) vulnerabilities tend to favour low-carbon lifestyle changes that are equally applicable to everyone and reject climate change policies that consider individual life circumstances.

This effect is most pronounced in perspectives with a high percentage of female and/or non-binary participants affected by multiple intersecting vulnerabilities. The

presence of intersectional vulnerabilities has been shown to increase acceptance of climate change policies that safeguard or account for vulnerable groups. Furthermore, it leads to a heightened awareness of different needs and diverse capacities for low-carbon lifestyle changes and demands for more tailored and appropriate policies that take individual life circumstances into consideration. Among those more susceptible to be the effects of climate change, a greater consciousness for its social dimensions of climate change has been observed. Thus, the perspectives indicate a higher willingness towards climate change policies that take powerful or more privileged individuals and institutions into account.

7. Citizens' Engagement

As observed in the Q surveys analysis, there is a need to consider especially vulnerable groups in the process of implementing climate change-related policies. In the following, some terms will be defined for a deeper understanding before going on to describe different participatory approaches and to discuss citizen engagement in the face of climate change in order to improve just decision making as well as citizens' acceptance:

- **Citizen and Stakeholder Engagement** refers to the opportunity for all affected and/or interested people to get involved in and to voice their interests and concerns at any stage of the policy cycle, especially in the development of plans, programs, policies, or legal acts, as well as public service design and delivery. Additionally, it describes the efforts of public institutions to take into account the perspectives and inputs from citizens and stakeholders. (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft et al., 2011; Florin & Wandersman, 1990; Hoa & Garcia-Zamor, 2017; OECD, 2022)
- The term **Citizens** refers to individuals, regardless of their age, gender, sexual orientation, religious or political affiliations or their legally recognised national status. Citizens can, but must not be, organised in civil organisations.
- **Stakeholders,** however, are the organised public. This includes any interested and/or affected party, including institutions and organisations, whether governmental or non-governmental, from civil society, academia, the media, or the private sector (OECD, 2022).
- **Public Participation** describes the engagement of a group of people. This can include all members and organisational forms of society, citizens as well as stakeholders. The type of engagement can vary from informing and listening through dialogue, debate, and analysis, to implementing jointly agreed solutions (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft et al., 2011; Hügel & Davies, 2020).
  Involving citizens and/or stakeholders in policy making is equally important, although each require different participation methods. Individual citizens

need methods designed to provide them with time, information, resources, and incentives, while stakeholders have a lower participation threshold, dedicated resources, and clear interests to participate (OECD, 2022). In this chapter, however, we focus primarily on the engagement of Citizens. Furthermore, the terms **Citizen Engagement** and **Citizen Participation** are used synonymously.

- The concept of **Open and Inclusive Policy Making** is strongly related and overlapping with citizen engagement in governmental decision making. The OECD states that open and inclusive policy making is mandatory for democratic governments to improve their policy performance and policy outcomes. In this concept, **openness** refers to providing citizens with information (transparency) and making the policy process accessible and responsive. **Inclusivity** refers to including the widest possible variety of citizens' voices in the policy making process (OECD, 2009). Thus, Citizen and Stakeholder Engagement is a key pillar in Open and Inclusive Policy Making, helping governments to better understand their citizen's evolving needs, to meet citizen's rising expectations, reduce the risk of citizen's resistance and conflict (between governments and citizens, as well as between groups of citizens) and improve citizen's compliance.

Involving citizens in the decision-making process can improve the quality of policy outcomes by integrating diverse perspectives, experiences, and knowledge. Citizen engagement supports the public understanding of the outcome and enhances its legitimacy and uptake. Close cooperation and co-creation enable those involved to identify with the outcome which can mobilize people to take action in policy areas where success crucially depends upon changes in individual behaviour (e.g., climate change or public health). Additionally, the empowerment citizens experience through participatory processes can support the overall legitimacy of the democratic process as it signals civic respect and builds a relationship based on mutual trust (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft et al., 2011; OECD, 2009, 2022).

Participatory Approaches

When it comes to practical terms, a "one size fits all" approach is not an option for involving citizens in decision making processes. To be effective, Open and Inclusive Policy Making must be appropriately designed and context specific for a given country or region, level of government and policy field (OECD, 2009).

While different literature distinguishes different types and levels of Citizen Participation (see e.g. Arnstein, 1969; Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft and Österreichische Gesellschaft für Umwelt und Technik (ÖGUT), 2005; CONNOR, 1988; OECD, 2022; Rowe and Frewer, 2005), three of them are mentioned particularly frequently:

- **Information:** A unidirectional flow of information in which the government produces and delivers information to citizens, informing them about (planned) political measures and its effects. In this case, there is hardly any

possibility of influencing governmental decision making for citizens. Formats can be e.g., leaflets, information websites, information events or public inspections.

- **Consultation:** While consultation processes are usually initiated by the government, the flow of information, however, is unidirectional from citizens to government. Citizens get the opportunity to provide their feedback and ideas on submitted proposals, plans or decisions but this type of Citizen Participation usually does not include any form of dialogue between citizens and the government. Ideally the government gives feedback to the involved individuals and the public on the outcomes of the process. Formats can be e.g., public discussion events or surveys (online or print).
- **Co-determination:** Co-determination takes place in a bidirectional flow of information, a dialogue. This is the most far-reaching form of participation. Citizens are involved in the process of planning, developing and/or implementing (political) processes or measures. The degree of co-determination can range from joint development of proposals to extensive decision-making rights for those involved, including setting the agenda and shaping the dialogue. However, it must be mentioned that in practice the responsibility for the final decision or policy formulation often rests with public authorities. Formats can be e.g. working groups, round tables, mediation processes or citizens budgets (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft & Österreichische Gesellschaft für Umwelt und Technik (ÖGUT), 2005; OECD, 2022; Rowe & Frewer, 2005).

It remains important to mention that a variety of methods for participatory processes exist, each with their specific potentials, effects, and limits. Some are particularly suitable for gathering opinions and reactions, others are designed to motivate people to participate. There are methods that help to get discussions going or to develop projects with those involved. Others in turn prepare the ground for longer-term cooperation or for solving conflicts. For longer or more complex processes, a combination of methods is usually beneficial. A carefully coordinated mix of methods also increases the effectivity of reaching different target groups. Before deciding which method to use, it is important to clarify on general framework conditions such as aim, intended results, target groups, political framework, content, and decision space of the participation process (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie & Österreichische Gesellschaft für Umwelt und Technik (ÖGUT), n.d.).

Citizen Engagement in the face of Climate change (adaptation & mitigation):

Citizen Engagement is especially important when it comes to complex topics where the success of a political measure crucially depends on:

- the better understanding of the evolving needs of citizens
- a wide acceptance and legitimacy of the implementation of those measures
- innovative ideas, resources, and knowledge of citizens

- changes in individual behaviour

Climate policies are one of those complex topics (OECD, 2009). Climate change mitigation policies are known to have **various types of co-impacts**, both **positive (co-benefits)** and **negative (adverse side effects)**. When implementing climate policies, negative impacts on (social) inequalities are likely to occur unless measures are taken to actively mitigate inequitable outcomes. E.g. poor and marginalized people that are highly exposed to the negative impacts of climate change are on the one hand among the greatest beneficiaries of successful efforts to limit global warming to 1.5–2°C, but on the other hand they are also most vulnerable to the adverse effects of poorly designed or inadequately implemented climate change mitigation policies (Markkanen & Anger-Kraavi, 2019). Well designed and carefully implemented climate change mitigation policies, however, have the potential to generate social and economic co-benefits that can reduce poverty and provide opportunities to address inequalities related to gender, health and income (Markkanen & Anger-Kraavi, 2019). This requires a conscious effort, careful planning and the engagement of multiple stakeholders and perspectives in all stages of policy making from planning to implementation, as well as specific attention to the most vulnerable cohorts in society (Markkanen & Anger-Kraavi, 2019).

Through citizen engagement processes, public authorities can include the voice and perspective of the "silent majority" and strengthen the representation of minorities, often excluded groups and those most vulnerable to the possible adverse side effects of the discussed policies (OECD, 2009, 2022). Furthermore Citizen Engagement can boost public support and provide legitimacy for ambitious climate policy (Muradova et al., 2020). However, in practice the reality is often that only those who are particularly vocal or eloquent in representing their opinions are getting actively engaged while the silent majority, minorities and individuals most vulnerable to climate change and climate policies are underrepresented or absent.

The barriers that hinder citizens to take part in political decision making are multiple. Barriers can be e.g., of socio-economic, cultural or geographical nature. Other types of barriers are rather subjective such as a lack of "appeal" of participation. This may stem from a low interest in politics, a lack of trust in how one's own input will be used or perceived limited personal benefits from participation. The described barriers can be lowered by e.g., providing multilingual information, offer childcare or financial compensation during meetings. Additionally, making participation processes more attractive e.g. by picking relevant issues, providing multiple channels for participation including face-to-face, online and mobile options or being transparent with the aim of the process and scope of influence citizens have, can break possible barriers (OECD, 2009, 2022).

To summarize, it can be stated that to facilitate a just transition towards a climate neutral and socially just future, all stakeholders, including policy makers and citizens, will need to work together while paying special attention to the most

vulnerable groups in society (Markkanen & Anger-Kraavi, 2019). Thus, to co-create those just solutions, thoroughly designed and implemented citizen engagement processes are crucial.

8. Conclusion

This deliverable developed working definitions of just transition and social vulnerability to elucidate the potential of low-carbon lifestyles to reduce GHG emissions and the dependence of individual lifestyle changes of vulnerable groups on structural conditions in society. In the framework of an intersectional, semi-qualitative study on citizens' perspectives on climate change and climate policies, this report aims to provide a deeper insight into citizens' acceptance of key behavioural changes to reach climate targets. In addition, the report employs theories of social vulnerability to discern how different groups, especially traditionally underrepresented groups, are prone to unfair and/or socially unjust political structures and policies. Briefly put, the report assesses the feasibility of individual actions towards decarbonization to achieve international and EU climate targets.

Since GHG emissions can be attributed to behaviour patterns of citizens, a shift towards low-carbon lifestyles is often called for in order to reach climate targets. However, this report highlights how lifestyle changes are impeded by psychological limits and structural barriers in society. First, lifestyles are deeply entrenched in value systems and beliefs; thus, citizens are unlikely to make significant changes to their way of life solely due to increased awareness of climate crises. Secondly, unequal access to societal resources, including access to education, information, financial resources, and power, contributes to the inflexibility of lifestyles and unjust effects of transition policies.

Lifestyle changes are challenging to implement, especially for vulnerable groups who are traditionally excluded from participating in the crafting of political responses to climate change. As outlined in this report, vulnerable groups are most severely affected by climate change and climate policies due to shared group criteria, such as age, gender, income level, and more. Simultaneously, they face significant barriers in effecting change in policies due to their limited access to social resources and power.

Empirical findings from the Q-study survey indicate that being subject to vulnerabilities can influence one's perspective on climate change policies and openness to low-carbon lifestyle changes. This effect is most apparent in perspectives with a high proportion of female and/or non-binary participants who are affected by multiple additional vulnerabilities. The occurrence of intersectional vulnerabilities raises the acceptance of equitable climate change policies. However,

not all participants who are impacted by vulnerabilities have similar perspectives; on the contrary, they have shown divergent and opposing views.

Citizens tend to be more receptive to climate change policies that aim to protect vulnerable groups, particularly if they themselves are affected by intersectional vulnerabilities. Consequently, the acceptance of low-carbon lifestyle changes is more likely among individuals who consider the diverse circumstances of individuals and such groups. In contrast, citizens unaffected by intersectional discrimination are less likely to recognize the need to take into account vulnerabilities in low-carbon lifestyle changes.

In summary, the results indicate that being affected by vulnerabilities is only *one* of multiple factors that shapes attitudes towards climate policies and low-carbon lifestyle changes. Other factors, such as socio-demographic factors like education, financial stability, and political views, may also play a role in influencing citizens' perspectives. Further research is needed to fully understand the effects of such factors on citizens' perceptions and attitudes.

With view to mitigation and adaptation measures required to meet the decarbonization targets, it is essential to consider structural barriers and discriminatory factors. Failure to do so could result in resistance or evasion of such policies by some citizens, especially those most affected by climate change. Furthermore, neglecting these factors could reinforce the existing inequalities and/or lead to new inequities that disproportionately affect these groups of people.

Based on the existing literature and the conducted survey, this report recommends the following measures to rectify the inequality amongst those already most affected by climate change:

- Although low-carbon lifestyles can be described in theory, individual behaviour changes alone are insufficient to meet the EU climate targets.
- Policies and measures should not be evaluated solely based on environmental and ecological metrics. Instead, an assessment of the unique circumstances of vulnerable groups in face of climate change is necessary. Specifically, it is suggested that an evaluation be conducted to identify how climate policies might adversely impact (the most) disadvantaged and vulnerable people.
- As there is insufficient information about vulnerable groups across regions, these groups should be involved in the policy-cycle through balanced and well-designed participation processes.
- Awareness-raising campaigns are not enough to bring about significant changes in key behaviours. Rather, the incremental redistribution of structural opportunities and resources is vital to alleviate the difficulties associated with adopting low-carbon lifestyles.

Therefore, the first step in identifying just and effective regional policies should always involve researching the types and proportions of vulnerable groups in the region. In a second step, these groups should be involved in the formulation of policy making from the beginning, as true partners in goal setting and action prioritization—not only as receivers of information. This increases the chances that policy makers and consultants, as well as civil servants develop policies, measures, and strategies that are tailored to the specific needs of these groups and do not inadvertently discriminate against them.

However, further research is needed to examine the potential adverse effects that participatory processes might have on vulnerable groups, particularly if they are not designed with their unique circumstances in mind.

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10. Annex

10.1. The Final Q Surveys – Technical Data

Table 2 : The 32 Final Statements for all Focus Cities/ Regions

1	I will not go vegetarian (or vegan) only to reduce the CO2 emissions.
2	To me, reducing flights is not a useful measure to reduce the CO2 emissions.
3	Public transport and trains should be the first choice if one wants to travel.
4	If we want to solve the climate crisis we cannot only rely on renewable energy.
5	The municipalities don't should not improve bicycle infrastructure as long as people don't like to bike and there is not enough space for cars. The infrastructure has to be modified as people change their behaviour.
6	[Name of the city] needs to stop to build houses and streets on green areas.
7	Given the food scarcity, food waste should be reduced. Thus, our cities must invest more in food sharing possibilities.
8	Climate change is caused by greenhouse gasses, which are emitted worldwide. Therefore, all countries must reduce their emissions, no matter how they benefitted or how they are impacted.
9	It's obvious that the most vulnerable groups (low-income, homeless people, people with health issues) of our societies are those who must carry the heaviest burdens. Mitigating measures against climate change have to be measures against poverty and social exclusion.
10	I would change my diet substantially, if I knew which foods were climate friendly.
11	I am not heavily affected by climate change, but I can see that poor or elderly people are.
12	The climate crisis needs to be tackled globally. Changes of the economies are needed everywhere. But as governments seem not to be able to solve this, the citizens must consume more sustainable products. The supply will then align with the demand for greener products.
13	The international community committed to a clear climate target with the Paris Agreement (limit global warming to 1.5 degrees) and the EU decided to become climate neutral by 2050. So, all the governments should define strict measures, regardless of complaints from companies and economists.

14	We cannot wait for the international regulations when we want to mitigate climate change effects. Cities and regions need to start immediately and become role models.
15	Citizens can contribute substantially for CO2 reductions - also independently from ponderous political actions. For example: Everyone who can, should go by bike, foot, or public transport.
16	Having green spaces nearby is less important to me, than having a workplace, family members or daily shopping opportunities close to my home.
17	We must have a law to install photovoltaics on every building where feasible. I don't think people will take steps by themselves, even if they can afford it easily.
18	In the buildings sector, one of the most significant behavioural changes relates to adjusting the temperature. Lowering heating and raising cooling set points can save significant energy and carbon footprint. This is also a way I can contribute something.
19	Companies cause a large share of CO2 emissions and should therefore be transparent about them.
20	Manufacturing and production are still the most important sectors in our economy. We see that long international supply chains are very sensitive to various disruptions. We need more local production to secure our supply and jobs.
21	80 percent of the people displaced by climate-related disasters and changes worldwide are women and girls. A climate policy priority should be to empower and protect them.
22	Climate adaptation planning in our cities and regions should first and foremost be aligned with the needs of average citizens. Everyone is affected by climate change.
23	Technology and inventions are the key solutions to the climate crisis. They would not only increase our effectiveness but also reduce the costs.
24	Civic participation would make it possible to find solutions that are more effective and accepted. It should be used more intensively at all levels of policy making.
25	In the face of climate change, if rich people do not change their behaviours and are not taxed more, our efforts are just a drop in the ocean. Working class and middle-class people are not the ones that should avoid vacation flights and eating meat.
26	I'm more willing to repair a device rather than buying a new when the device reaches the end of its lifetime.
27	Measures against adverse effects of climate change must go in line with the needs of companies and the options they provide.
28	I will eat less animal products - primary this is a health issue for me. Ecologically it might be beneficial, but this is not that important for me.

29	I would forego private car ownership if the access to more services (not to work) like kindergarten, culture, health, etc... would be in walking distance.
30	Insulating houses is an efficient measure for saving CO2 emissions. More public money should be used for this.

Final Statements for the 3 Focus Cities/ Regions

Table 3: Statements for City of Barcelona and surrounding region

B1	The scarcity of materials is a crucial question in the context of the energy transition.
B2	The energy transition should not harm the (working-class) neighbourhoods.
B3	Private firms must lead the fight against climate change.
B4	The fight against climate change should be based on the transformation of our productive model.
B5	The suggested (energy) transition is based on a centralised model, far away from the consumption centres, controlled by big firms. It is a model that does not contribute to the development of municipalities and counties.
B6	Energy transition is not a question of citizen participation. It needs to be planned by experts. Partly also because the clock is ticking, and we must not make any mistakes.

Table 4: Statements for Gdansk-Gdynia-Sopot Metropolitan Area

G1	A quarter of a million people in Poland will be threatened by catastrophic floods! The sea encroaching on Żuławy and cutting through the Hel Peninsula, flooding houses and streets in Gdańsk is a very real vision of the next century. The first incidents may already happen in our lifetime.
G2	The needed change begins at the level of every inhabitant. Each of us can take actions daily that will contribute to climate protection: starting with our choice of means of transport or purchasing decisions.
G3	Galloping inflation, rising food, heat and energy prices are pushing more and more families into poverty.
G4	The Pomeranian voivodeship has very good conditions for the development of renewable energy sources. I think Pomerania has the potential to achieve climate neutrality by 2040 and become a national leader in green energy production.
G5	In 2040 at latest, there should be no more coal-fired cookers in Sopot. Last year, the city replaced already 230 of the "old coals" in municipal buildings and it is also subsidizing the replacement of private homes. There should be even more support for private households to reduce their building related CO2 emissions.
G6	In the Tri-City Gdańsk, Gdynia, Sopot area, the three heaviest downpours ever recorded have occurred in the last twenty years. But the weather is changing all the time and rain is something we can cope with. Public money should rather be spent on education, tourism, or social welfare.

Table 5: Statements for City of Vienna and surrounding region

V1	Rising temperatures, more frequent extreme weather events and heat stress - the consequences of climate change are also becoming increasingly noticeable in Vienna.
V2	An essential prerequisite for managing crises is open communication and a strong culture of participation.
V3	Integrating gender considerations into climate policy is essential for climate policies to be effective for the benefit of all city residents.
V4	Through smart and compact urban planning, the City of Vienna succeeds in bringing the continuous population growth in our city into harmony with soil protection. Instead of sealing greenfield sites, we rely predominantly on areas that are already in use.
V5	More "zero waste" initiatives are needed. In Vienna, for example, 100 percent of non-avoidable waste is to be recycled by 2050. Environmental protection is important to me, and I am also personally committed to waste avoidance.
V6	At its core, it is also a social issue when the big climate sinners squander resources and the people in the city are the ones who suffer.

10.2. Samples from all Language Versions

Table 6: Sample for German Study – conducted in the City of Vienna and the surrounding region.

	Narrative 1 "Social perspective"	**Narrative 2 "Technical Perspective**	**Narrative 3 "Self-cantered Perspective"**
No of participants	**14**	**14**	**4**
Vulnerabilities overall	8 participants with at least one vulnerability 14 different vulnerabilities: Disabilities, Health Problems, Care Responsibilities, Age, Trans/Queer, low income, Racism/Migration, and Difficulties understanding technical Terminology	6 participants with at least one vulnerability 8 different vulnerabilities in total: Disabilities, Health Problems, Care Responsibilities, Age, Trans/Queer, low income, Racism/Migration, and Difficulties understanding the spoken language of the city they live in	0 participants with at least one vulnerability
Age (20-30)			2
(30-40)	6	6	2
(40-60)	4	2	
(over 60)	4	6	

Gender	85% cis female (8) and non-binary (4); 15% are cis male	5 participants are cis female; 1 participant is trans female; 8 are cis male	2 participants are cis female; 2 participants are cis male
Queer Identity	6 (trans or queer)	4 participants are trans (1) or queer (3)	
Care Responsibilities	2 (cis female)	6 participants (3 cis female, 3 cis male)	
Mean Income	2.000 €	1.300 €	1.400 €
Political Views	93% - left or rather left; 1 unpolitical	9 participants identify as left or rather left; 4 participants are unpolitical; 1 participant is rather right	2 participants identify as rather left; 2 participants are unpolitical.
Education	11 graduated at university; 3 graduated from high school	7 participants graduated at university; 6 participants graduated from high school; 1 participant completed an apprenticeship	1 participant graduated at university; 2 participants graduated from high school; 1 person completed an apprenticeship

Table 7: Sample for Catalan Study – conducted in the City of Barcelona and the surrounding region.

	Narrative 1 **"Contradictory Perspective"**	**Narrative 2** **"Top-down Transition Perspective"**
No of participants	**6**	**3**
Vulnerabilities overall	2 participants with at least one vulnerability 2 vulnerabilities in total: Racism/Migration, Care Responsibilities	3 participants with at least one vulnerability 2 vulnerabilities in total: Racism/Migration, Care Responsibilities
Age (20-30)	2	
(30-40)	2	3
(40-60)	2	1
(over 60)		
Gender	83% are cis female (5), 17% are cis male (1)	3 participants are cis female
Queer Identity		
Care Responsibilities	1 participant (cis female)	2 participants (2 cis female)

Mean Income	1.750 €	2.250 €
Political Views	6 participants identify as left or rather left	3 participants identify as left
Education	4 participants graduated university; 1 participant graduated high school; 1 participant completed an apprenticeship	3 participants graduated university

Table 8: Sample for Spanish Study – conducted in the City of Barcelona and the surrounding region.

	Narrative 1 **"Local Change Perspective"**	**Narrative 2** **"Climate Inactivism Perspective"**
No of participants	**2** (only 1 provided socio-demographic data)	**2**
Vulnerabilities overall	0 participants with at least 1 vulnerability	2 participants with at least one vulnerability 2 vulnerabilities in total: Racism/Migration, Care Responsibilities
Age (20-30)	1	
(30-40)		1
(40-60)		1
(over 60)		

Gender	1 is cis female	1 participant is cis female; 1 is cis male.
Queer Identity		
Care Responsibilities		1 participant (1 cis male)
Mean Income	1.750 €	2.500 €
Political Views	1 participant identified as rather left	2 participants identify as left
Education	1 participant graduated university	2 participants graduated university

Table 9: Sample for Polish Study – Gdansk-Gdynia-Sopot Metropolitan Area

	Narrative 1 "Participatory Perspective"	**Narrative 2 "Neoliberalists Perspective"**
No of participants	**5**	**4**
Vulnerabilities overall	3 people with at least one vulnerability 4 different vulnerabilities in total: Health Problems, Care Responsibilities, Trans/Queer, Gender	3 People with at least one vulnerability 3 different vulnerabilities in total: Care Responsibilities, Trans/Queer, Gender

Age (20-30)	1	
(30-40)	3	1
(40-60)	1	3
(over 60)		
Gender	5 are cis female	1 participant is cis female; 1 participants is non-binary; 2 are cis male
Queer Identity	1 participant is queer	1 participant is queer
Care Responsibilities	2 Participants (cis female)	2 participants (2 cis female)
Mean Income	5.000 Złoty	6.500 Złoty
Political Views	4 participants identify as left or rather left; 1 participant is unpolitical	3 participants are unpolitical; 1 participant is rather right
Education	5 participants graduated at university	4 participants graduated at university

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