The Role of Social Innovation in Climate Neutrality

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Abstract Achieving climate-neutrality by 2030 is a significant challenge for cities involved in the EU 100 Climate-Neutral and Smart Cities Mission. A systemic approach, involving cross-sector collaboration, is essential for cities to identify emission challenges, co-create actions, and implement solutions effectively. Social innovation can support this in meaningful ways and is a crucial component in achieving a just transition, offering a collaborative, inclusive, and people-centered approach to address complex challenges like climate-neutrality. It can support cities accelerate the pace of change through innovative business models, policies, and processes that mobilize knowledge, experience, and resources. This chapter emphasizes social innovation's role in three primary ways: as a collaborative process for multi-actor engagement, as platforms for action and inclusion, and as solutions to emerging needs resulting from the transition, taking evidence from the experiences thus far collected in the NetZeroCities project. It also offers directions for further research on how SI can support cities achieve climate-neutrality.

Keywords Social innovation · Climate-neutrality · System innovation · Co-creation · Engagement · Climate resilience

1 Why Cities Need Social Innovation to Achieve Climate-Neutral Futures

Achieving climate-neutrality by 2030 is an ambitious task for all cities taking part in the EU 100 Climate-Neutral and Smart Cities Mission (Cities Mission). By nature of being a mission (Mazzucato 2018), a unilateral approach to the Cities Mission is not sufficient. Instead, cities must adopt a systemic approach and act as ecosystem orchestrators to successfully define emission challenges, identify impact gaps and potential solutions, co-create a portfolio of actions and, fundamentally, co-implement

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the actions leading to the Mission's success. The transition journey that cities embark on to achieve climate-neutral futures will require cross-sector collaboration on a massive scale and careful orchestration for simultaneous action on multiple levers of change. While technical solutions are one of the more obvious levers, social innovation (SI) stands to play a crucial role in the success of the Cities Mission in the long-term by creating the necessary impetus and buy-in for widescale change.

SI is a bottom-up, collaborative, systemic and people-centered approach to innovation. It focuses on tackling complex, wicked challenges—such as climate-neutrality—through quick, collaborative experimentation and inclusivity. SIs seek to meet unmet needs often in support of marginalized communities. SIs can be entrepreneurial, but they can also be the following: innovative business models; creative solutions that combine latent resources or new relationships and allies; policies that support new forms of value creation; or inclusive processes that mobilize a wider range of knowledge, experience and resources. In short, SIs are collaborative and mobilize communities to action through inclusion and shared value creation, and in the process, often increase society's capacity to act (Howaldt and Schwarz 2010; Hubert 2010; Murray et al. 2010). For these reasons, it is a valuable ally to a city's climate transition plan and should be a transversal component of a city's broader transition journey.

Beyond the innovations themselves, SI, as a discipline and form of innovation, has much to offer city administrators managing missions for the affinities they share in approach: both aim for systemic change and transformative impact, with the common understanding that an enterprise of such magnitude requires a collaborative approach. For this reason, it stands to offer practices and knowledge useful for accomplishing missions from a methodological standpoint as well.

SI, in practice, works best as a systemic innovation approach to generate holistic solutions to societal challenges and to create responsive ecosystems for social change. SI practices can support systems innovation by providing an inclusive and collaborative process for generating solutions that support a city's climate-neutral objectives. In doing so, SIs generate "tangible" value, seen in concrete solutions and economic development, as well as, "intangible" value, which is reflected in the potential for cultural and behaviour changes, relationship building and inclusive growth, among others.

SI can help cities accelerate their transition to climate-neutrality in many ways: (1) ensuring for consideration of economic development and overall wellbeing of people and the planet at every step of the transition to net zero; (2) highlighting the co-benefits of climate mitigation that generate social and economic value; (3) creating new business models and building capacity to address decarbonization challenges; (4) creating engagement platforms for multiple actors to co-design and co-produce solutions contributing to climate-neutrality; and (5) supporting positive behavioural changes by responding to specific local needs and acting within cultural contexts.

This chapter, and the book at large, introduce the need, role and value of SI for cities on their path to climate-neutrality, particularly within the context of the EU Cities Mission, drawing from experience coming from the first three years of the NetZeroCities (NZC) project. More specifically, the current chapter will focus on

how SI contributes to a city's journey to climate-neutrality in three primary ways: (1) as a collaborative process for multi-actor engagement and collective engagement, (2) by providing platforms for action and inclusion, and (3) building solutions to existing and emergent needs resulting from the transition or climate change overall through examples coming from the NZC project.

2 NetZeroCities and EU 100 Climate-Neutral and Smart Cities Mission

Despite urgent recommendations and national agreements to curb GHG emissions and limit global warming to 1.5 °C to preserve a liveable planet, monthly and annual breaches signal the need to accelerate the pace of change and increase ambition (UN Climate Action 2024). Cities, representing 70% of global CO_2 emissions and key influencers of the way we collectively live and work, stand to play a pivotal role. For this reason, the European Union has launched the Mission *100 Climate-Neutral and Smart Cities by 2030* to support European cities in accelerating their transformation towards climate-neutrality. The Mission, along with other policies and programs—e.g. Horizon2020 and Horizon Europe research and innovation programs, the EU Green Deal, etc.—support objectives to push EU member states towards a 55% cut in emissions by 2030 and climate-neutrality by 2050 (NZC 2021). NZC is part of the Horizon 2020 program supporting the EU's Green Deal and, in practice, helps cities achieve the Cities Mission. It works as a service-oriented platform for cities, supported by a large network of expert practitioners, to develop new strategies and capabilities to enable the needed acceleration; in other words, it provides the knowledge, tools and resources to achieve *systemic* transformation. While the main goal is to support 112 Mission Cities achieve climate-neutrality by 2030, the ultimate goal is for these cities to become experimentation and innovation hubs for all EU cities to follow suit and achieve climate-neutrality by 2050.

3 The Role of Social Innovation in a City's Journey to Climate-Neutrality

SI is in a prime position to support cities in achieving climate-neutrality by 2030 or 2050 for its collaborative, inclusive and holistic innovation practices that work in tandem with a systemic approach toward transition goals. SI works on two levels: top-down support in the form of city-level strategic documents, urban planning and policy and bottom-up implementation in the form of individual solutions. We expand on this further in this section by presenting the three primary ways SI can support cities achieve the Cities Mission, as observed thus far in the NZC project.

3.1 Social Innovation as a Collaborative Process for Multi-actor Engagement and Collective Impact

The complicity between a systemic approach and SI in supporting missions has already been discussed. As such, investing in and amplifying SI as a strategic part of a city's portfolio of actions can strengthen a city's effort to achieve a just transition. Missions, as in solving most wicked challenges, require widescale collaboration, and ultimately buy-in, from all stakeholders for success. To be effective at scale will require not only innovations (social, technological, financial), but innovative processes for strategic action. SI has already built-up expertise and a repertoire of tools, methods and practices from different fields to bring a bottom-up approach to top-down strategies and policymaking (Reynolds et al. 2020). Similar to co-created policies that aspire to effectively respond to challenges, engaging diverse communities of stakeholders involved in the emission domain challenge areas through collaborative practices could generate co-created city climate action plans that are, in themselves, SIs (see also Chap. 3). The action plans—which in the NetZeroCities project are part of the Climate City Contracts (CCC),—then act as 'boundary objects' (Star and Griesemer 1989) around which diverse stakeholders gather for reasons of shared interest and negotiate and give shape to a series of commitments and strategic actions to achieve the Mission. In doing so, cities create larger buy-in by directly involving stakeholders in the city's strategic plans and increasing the success in implementation across sectors, levels and localities of the urban context. In the process of co-creating climate action plans, actors bring situated knowledge of the challenge from diverse perspectives and through inclusion ensure that the plan and its actions are directed at real problems. In other words, through the process, the actors embed the plan into the city's specific ecosystem of resources, solutions, and networks of actors. In doing so, the city increases the chance for successful implementation by creating the necessary buy-in to co-produce solutions through a shared agenda and the alignment of value propositions. This, once again, underscores the importance of cities as ecosystem orchestrators. While still too early to report on, several Mission cities have undertaken interesting, collaborative pathways to co-create their city's climate action plans.

We can also see similar mechanisms in policies that foster SI in specific emission domains. Energy Communities, for example, are a promising solution to reduce energy poverty and increase clean energy (co-)production. Through specific policy measures, these communities can generate social impacts and contribute to a just and inclusive energy transition through co-production with local actors (cities, private companies, and citizens). The City of Valencia provides an interesting example in their commitment to create "100 Energy Communities by 2030" (Giovannini 2023; Godson 2023; mPower 2022). The city has created neighborhood energy offices to act as a one-stop shop for citizens on the energy transition, concentrating on all issues related to energy poverty and energy savings, as well as providing pathways for frontrunner citizens interested in contributing to the energy transition through energy communities. Through these offices, the city helps vulnerable households

implement energy savings through educational campaigns and light interventions through their energy savings kit (e.g. a timer to switch off WiFi router, TV, or water heater at night, insulation tape, etc.). The offices also help identify frontrunner citizens to partner with the city to create citizen-led energy communities through the creation of not-for-profit associations. In the first community in Castellar L'Oliveral, for example, a municipal roof was identified for PV installation and is managed by the community. The participation costs for community members are €600 per 0.50 kWp, yielding roughly €130/yr savings per household. The regional government contributes up to 50% of initial investment for the installation once the community is active and the Energy Office provides support on choosing the best energy company for the contract. Extra shares were bought by the Valencia Climate and Energy Foundation and distributed for free to three vulnerable households. In the future, the goal is to include them from the start, through the support of EU funding from the Power Up project. In sum, SI can be seen as a collaborative process that allows for bottom-up engagement in strategic directives, setting up the foundation for successful implementation and greater collective impact.

3.2 Creating Pathways for Action and Inclusion

While technical solutions are a key part of achieving climate-neutrality, successful implementation also requires mass uptake and adoption. In addition, and as already stated above, achieving the mission will require the active participation of all city-holders: public administration, but also businesses and citizens. This will require significant changes in lifestyles, perceived norms and behavior. SIs can accelerate the pace of change by creating pathways for broadscale participation and action. This is achieved in practice in many ways, namely through the sharing economy or the implementation of novel business models; innovative spaces that foster collective impact and build society's capacity to act; creative solutions to local needs; creating awareness to inform new choices and actions,; etc.

By implementing business models based on sharing or access instead of ownership, SI invites larger participation in climate goals. One more mainstreamed example of this is bike sharing programs, in which private companies often partner with municipal agencies to provide convenient micro-mobility alternatives to private transportation that make use of fossil fuels. While the assessment of potential for emissions reductions is still under scientific debate (Li et al. 2022; Chaniotakis et al. 2023; Gebhardt et al. 2022; Krauss et al. 2022), e-bike sharing and e-scooter sharing models give way to micro-mobility actions that encourage more sustainable lifestyle choices, especially when compared with situations in which the user would have used fossil fuel-powered cars.

Other cities are creating innovation labs to foster climate action at the neighborhood level that respond to local needs. Many such examples can be seen in the EU Horizon 2020 research project, SONNET, that worked to understand how SI can contribute to a more sustainable energy system in Europe. Bristol City Council, for

example, created a city lab (Humphreys et al. 2021) to search for ways to make use of crowdfunding—specifically a Community Municipal Bond (CMB) mechanism—as an investment activity to collectively raise capital to install energy efficiency measures in local community buildings. In Mannheim, the city lab (Hoffman et al. 2021) aimed at mobilizing citizens through participatory stands, a gamification challenge and crowdfunding measures in a neighborhood composed of mostly migrants, where language barriers posed a challenge to the city to engage with citizens for energy transition efforts. All these efforts work to build the innovation capacity of cities by building local competences and new networks of relationships are presented more extensively in Chap. 5.

Other SIs target behavior change and lifestyle changes more directly, for example, through labels that promote consumer choice. One example of this can be seen in the Climate Meal label in Helsinki, an initiative of Forum Virium Helsinki, in which restaurant customers could identify meals from the menu that have a smaller-than-average carbon footprint (see Chap. 5). In sum, by creating enabling pathways and access points for diverse stakeholders to take part in climate action and in the transition, SI offers cities, its citizens and urban stakeholders the opportunity to make achieving the mission a truly distributed social accomplishment.

3.3 Respond to Emerging Needs

SI, also, responds agilely to the emerging needs of different communities resulting from the transition. As the transition continues and systems change, SI will respond more and more to emerging needs coming from people directly affected by climate change and/or the transition and those "inconvenienced" by the transition (i.e. those who benefitted from the challenge persisting). Because of its collaborative working practices, SI can rapidly and effectively respond to emergencies, gathering actors to co-design and co-produce solutions to the specific need. One emblematic example is the #WirVsVirus campaign that emerged in Germany to respond to the challenges coming from the COVID-19 pandemic. The initiative is an example of an open Social Innovation. It mobilized actors from across all sectors (civil society, government and the private sector) in a 48-h hackathon to develop ideas responding to the emerging challenges of the pandemic. #WirVsVirus also provided an implementation programme (130 teams for 6-months) that supported the social innovators turn the ideas into solutions. Ideas ranged from how to quickly digitalize health-care services to how to help citizens cope with lockdown-induced isolation, and how to respond to increasing instances of domestic violence. In total, twenty-eight thousand citizens with a broad spectrum of personal and professional backgrounds participated. Examples such as these demonstrate the important role that SIs play when facing climate change and other global risks. Investing in SI and other actions of citizens engagement at an early stage in the Mission is not only strategic for mass adoption of technical measures and broadscale lifestyle changes but also in terms of creating the social competences, networks and capital necessary to react urgently. As will be

further explored (see Chap. 6), SI is an important tool for building climate resilient urban 'places'.

Social cooperatives are another great example of the capacity of SI to respond to emerging local needs. This legal form allows citizens to meet their own needs (economic, social or cultural) through a co-owned and democratically-controlled enterprise. Cooperatives represent a powerful vehicle for cities to adapt to climate change and increase resilience for several reasons. Cooperatives are deeply-rooted in communities, providing stability and a tried and tested solution for sustainable development. They also work on multiple objectives at the same time, adopting a long-term viewpoint, veering away from short-termism. Cooperatives also add to the resilient capacity of a city by increasing human capacity and social capital through training, member engagement, addressing local needs and developing the local economy. Cooperatives are working on the climate change across sectors from transportation to agriculture to energy to finance to retail to housing.

The EWS, ElektrizitätsWerke Schönau, for instance, started out with a group of citizens in the Black Forest who wanted to control where their energy came from. Today, they are one of the leading 100% renewable energy providers in Germany. HesbEnergie is another such example of a citizen-owned cooperative producing renewable energy for their community. Both examples not only work in energy production but in awareness raising and competence building that support other similar plants and cooperatives to emerge (presented in Chap. 5). In sum, cooperatives represent a systemic solution to help cities transition to low-carbon economies and achieve climate-neutrality. Governments would do well to create the right enabling conditions for them to flourish (e.g. legal recognition, access to markets and finance, etc.) (Borzaga et al. 2020).

3.4 R&I Agenda for Social Innovation and Climate Neutrality

In this context—where city action is both needed and increasingly taken—it is crucial to examine and understand where and how Social Innovation can support the decarbonization challenge in cities. If we examine Social Innovation from this perspective what is firstly evident is what kind of research and innovation (R&I) is needed to support cities in accelerating decarbonization efforts, and then to plan an R&I agenda accordingly. From the academic community, research and development agendas have been proposed for several aspects of Social Innovation for climate neutrality that are still in infancy phase and need further research (Howaldt et al. 2021).

Firstly, social innovation can easily create tension with policy silos and related policies, as they do not keep themselves within the boundaries of defined policy domains while developing solutions for societal problems. Many social innovations operate with this tension between traditional "top-down" policies and "bottom-up" initiatives. In this respect, awareness campaigns for policy makers are needed

regarding what social innovation can contribute to decarbonization policies and how social innovation can help to reach decarbonization goals. Research can help to highlight successful examples of the interplay between decarbonization and social innovation and can assist in developing suitable governance models.

The second one refers to the need to assess how social innovation may contribute to climate neutrality. The development of a set of indicators on social innovation and climate neutrality is an essential first step for assessing the effectiveness and impact of people-centered solutions. Bresciani et al. (2024) provide a framework to evaluate progress towards carbon neutrality at the urban level, ensuring that social dimensions are integrated into environmental strategies with an extensive list of quantitative indicators and qualitative open-ened questions for progress monitoring and sensemaking, catalogued according to ten progressive phases of social innovation development at urban level.

The third aspect relates to the testing of social innovation strategies in diverse contexts. Many social innovations start on as small-scale and are very locally situated, which causes them to generally have a problem in getting attention and recognition from policy makers (Martin et al. 2015) and scaling up. Social innovations are developed in a specific local context for a specific local societal problem. Upscaling within the city or replication in other cities is, therefore, a challenge, and probably not possible for many social innovations in their complete form. Deployment of innovative business models, public–private partnerships, collaborations with businesses and public authorities, and targeted replication and upscaling strategies for the (core elements of the) social innovation can help to solve this issue. Research can support these solutions through development of tailored strategies and adequate platforms and business models for upscaling and replication, and development of appropriate forms of cooperation with local governments or businesses. Research can further give insight in how to deal with the question of whether the complete social innovation could be upscaled, and how and when this should be done.

Finally, as mentioned above, SIs flourish under the right enabling conditions, putting policymakers in the unique position to boost their emergence and impact. Research in the following areas would be timely to help policymakers understand the potential for SI and the conditions that allow it to emerge and grow: (1) rationales for action on the macro-level (EU, national and regional); (2) what SI is doing for climate-neutrality at the micro-level; and (3) systemic impact measurement tools and approaches that offer a comprehensive and detailed overview of the transition to low carbon economies and climate-neutrality.

4 Conclusion

In sum, cities stand to benefit from adopting SI as a strategic asset of their climate action plans as a means to deploy a just transition and to accelerate the pace of change through inclusion and meaningful collaboration. Cities should work to foster more strategic bottom-up social innovation practices while also developing more effective

and impactful SI programming. By the latter, we mean measures that aim to support city practitioners in amplifying and scaling SI impact, that is, in supporting innovators—within the public administration but also all local stakeholders—in bringing their ideas to life through the means of SI. SIs flourish in ecosystems that provide the enabling conditions for innovation (capacity building, access to funding, access to markets, network support, etc.). Cities can support social innovators and amplify their collective impact in several ways: (1) creating and nourishing a robust ecosystem for SI; (2) acting as ecosystem orchestrators in these ecosystems; and (3) contributing to these ecosystems by removing barriers and/or filling gaps—e.g. by creating SI policies that support their growth and development, and eventually amplifying their impact through scaling/replication mechanisms.

The rest of the book dives deeper into specific areas where SI can support cities in their journey to climate-neutrality. Chapter 2 looks at how integrating SI in a city's portfolios of action can strengthen the long-term success of cities' climate ambitions. Chapter 3 identifies ways to bolster the strategic potential of SI in a city's transition journey. Chapter 4 focuses on strategies cities can use to scale successful SIs at the urban level. Chapter 5 presents SI case studies that exemplify its role in creating engagement, behavioral change and in ensuring a just transition. Chapter 6 investigates the relationship between citizen engagement and social innovation through a case study on the Wiener Klimateam. Chapter 7 presents tools and canvases for cities to strengthen SI programming and empower bottom-up SIs. Finally, Chapter 8 broadens to topic of social innovation from climate neutrality, connecting social innovation to the New European Bauhaus principles.

In conclusion, this book is part of a much broader and ambitious project and Mission that is currently supporting cities achieve climate-neutrality by 2030. It, in essence, provides a snapshot of the signals and probes that we have collected and synthesized in the first three years of the NetZeroCities project, and hopes to be a starting point for further exploration, practical implementation and learning-by-doing, as researchers, practitioners, city administrators and more tackle the pressing challenges and social changes that climate change requires of us.

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