Energy Transition and Climate Change in the Contemporary Urban Era. A Sociological Point of View

Special Issue Future of Smart Cities

FUORI LUOGO

Rivista di Sociologia
del Territorio, Turismo, Tecnologia

Guest Editors
Monica Bernardi
Luca Bottini

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Silvia Crivello[1]

Energy transition and climate change in the contemporary urban era. A sociological point of view[2]

Introduction

It is a general consensus that the story of the development of human societies is a story of the transitions from one energy production system to another (Magnani *et al*., 2022).

The political issue of energy transition, and more in general, the concept of sustainability, emerged terribly after the 1970s energy-environmental crises, but these topics spread during the 1990s and the early 2000s, in a scenario characterized worldwide by a growing globalization and, for many countries, by a tendentially stable economic growth. Therefore, it was relatively easy to imagine sustainable development as compatible with economic growth and with forms of mitigation of the injustices generated by the neoliberal capitalist system. In the current scenario, reflection on energy transition and on sustainability can not ignore a severe recession of the economies of the Northern world, started at the end of the first decade of the 2000s, that is laying bare the problems of the capitalist system, indicating the unsustainability of the current development model and the need for a system change (Pellizzoni, 2021).

The quick succession of crises which have recently hit modern societies, and the world at large – financial, economic, austerity, refugee and migration, climate, COVID-19 – has exposed, more than ever, the social, economic, political and ecological vulnerability of consumer capitalist societies and the inability of current societies to move beyond their established 'politics of unsustainability' (Bluhdorn, 2022).

Ecological problems are, of course, nothing new but were part of all human history and they sometimes have led to the collapse of a particular society (Diamond, 2005). However, currently, global societies are increasingly confronted with potential disastrous crises on a global scale, and mitigation measures, until now, have not proven effective (Gorg, 2022).

The last report of the IPCC (Intergovernmental Panel on Climate Change) (2022), the main accredited actor at the international level for the study of the climate change problem, estimated that the average temperature of the Earth's surface has increased in the last century by 0.74°C, as a consequence of the augmented concentration of greenhouse gases. Greenhouse gases are the result of human activity, mainly fossil fuels and deforestation[3]. Beyond the thermal variation, the discourse on temperature easily evokes catastrophic scenarios connected to the reduction of glaciers, the rise in the level of oceans and seas, the expansion of subtropical deserts and the innumerable consequences on human life (Davis, 2010; Swyngedouw, 2013a).

Worries concerning the state of the environment are leading us towards a new so-called "carbon control" logic (Redclift, 2009; While, 2010), or rather a society that aims to limit energy consumption, to improve the use of cleaner forms of energy, to reduce emissions greenhouse gases (Bell, 2011; Hannigan, 2014; Spaargaren, 2003; Voss *et al*., 2006). Degrowth scholarship and activism call for and give a vision of this change, a "post-growth" ad "post-development" world, two umbrella terms that critique the centrality of economic growth and, more generally, the economy in contemporary societies, and embrace alternatives more ecologically sustainable ad socially just (Chertkovskaya, 2022).

This paper investigates the role that urban sociology can have in answering the energy problem in relation to climate change as one of the challenges perceived as most pressing for contempo-

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3 IPCC reports indicate that in next years the average temperatures of the earth will still rise: they estimate that the increase of grades compared to current values could be from 1.1 to 6.4 °C.

rary cities on a worldwide level. The aim is the promotion of critical approaches and innovative practices to protect the environment in relation also to problems as social justice.
The article is structured in three main parts: the first paragraph introduces the problem of the energy transition and frames it within the strategies of contemporary societies; it reflects on the urgency to pursue more environmentally attentive societies – compared to the current ones – and on the importance to reflect on the transposition of the concept of energy transition at the scale of the city. The second paragraph reflects on the relationship between energy transition, economic crisis of the cities and energy justice in relation to the scenarios of sustainability and climate-energy change. Finally, the concluding remarks underline how urban sociology, through conceptual and methodological tools, can help to understand the phenomenon of the energy transition and contribute to identifying possible solutions.

1. Theme and literature

The capitalist economy is inherently based on the principle of growth, that it exploits limited resources. This logic of profitability inevitably implies the instrumentalization and abuse of nature; the belief in the mastery of nature was, and still is, an important part of the cultural dimensions of the making of capitalist societies (Gorg, 2022). The mastery of nature lies behind the acceptance of limitless economic growth and technical progress as the only way to respond to the crises caused by economic growth itself[4].
The current environmental crises, from the climate crisis up to the loss of biodiversity and other ecological and societal crises dimensions worldwide, indicate a deep-rooted crisis of societal development as a whole, including its beliefs in science and culture, a crisis of civilization which requires a critical rethinking of history, society and nature (Gorg, 2022). Some authors diagnose a crisis of civilization in which societal and environmental issues are inextricably interlinked (Lang & Mokrani, 2013; Kothari *et al.*, 2019).
In the face of the deepening social and ecological crises, which call for an encompassing social-ecological transformation of the capitalist mode of production and living (see Brand & Wissen, 2017, 2021), it is pivotal to theorize the interdependencies between societal and environmental issues, to rethink capitalist development and to elaborate on the emancipatory dimension of this challenge (Grog, 2022). The construction of a society more attentive to change climate requires, in fact, far-reaching changes that involve very different fields (Beck, 1986; Agustoni & Maretti, 2012;): it means for instance, changes in behavior and habits, from culture to food, from transportation to social justice (Chatterton, 2013; Osti, 2012). From this point of view, for example, Raymond Murphy discusses how social practices involve the integration between three elements (materials, meanings and competences) into performances: social practices are, of course, involved in their physical context – which is changing because of global warming – but they also impact the environment because materiality is an indispensable element of which socialness is made (Murphy, 2021). Another relevant aspect, at the heart of this reflection, is the urban dimension of the problem; in the energy transition the role of urban centers appears crucial and the urban scale is, progressively, chosen as the site to experiment with innovative solutions to tackle the climate crisis (Bulkeley & Castan Broto, 2013; Pellizzoni, 2021)[5].
It is widely recognized, both by urban experts and international institutions, that the twenty-first century is the urban century: since 2007 the majority of the population of the world lives in cities

4 Even after decades in which an awareness of these crises has slowly risen, the idea of mastery of nature is still effective and deeply rooted in the quest for technological solutions and economic innovations expressed, for example, by approaches of ecological modernization (see for example: Asafu-Adjaye & Mahadevan, 2013; Hajer, 1995).

5 The New Urban Agenda of the United Nations (2017) recognized the crucial role of cities in tackling global issues such as climate change. Specifically, the Sustainable Development Goals (SDGs) directly refer to 'sustainable cities and communities' in Goal 11: 'Make cities and human settlements inclusive, safe, resilient and sustainable'.

and, as stated by the United Nations, between 2009 and 2050, the population of urban areas will grow from 3.4 to 6.3 billion, absorbing most of the increase of the world's population (UN 2010). The growing strategic importance of urban space concerning both the problem's definition and its solutions isn't certainly new in the current economic scenario. Since the last century, cities have been the spaces of the biggest changes due to the conditions imposed by globalization and neo-liberalization. Cities have been forced to become more entrepreneurial and more competitive in attracting – or retaining – mobile capital and in diverting resources from social welfare to economic development (Harvey, 1989; Jessop, 1997; Peck & Tickell, 2002). With the so-called «new urban policy» (Cox, 1993), cities started to be involved in the global competition to attract investments, moving from a broad concern for the management of public goods (including the environment) to an ever more pressing alarm for economic competitiveness, often with negative consequences for the environment. The rule of the market is basically incompatible with the principles of equality and the capitalist economy isn't oriented towards social needs but driven by the imperatives of growth and profitability (Gorg, 2022).

Urban activities are responsible for 80% of carbon dioxide emissions produced globally each year and for 75% of the energy consumed due to the concentration of population (UNEP, 2017)[6]; urban centers are the places that have the greatest influence on global pollution.

In addition to constituting the main polluting spaces, cities represent also the main victims of climate change, exposed to «natural» disasters such as floods, hurricanes, energy blackouts, etc. (Davis, 2010; Swyngedouw, 2013a). Not surprisingly, the debate on the so-called "urban resilience" is receiving a particular emphasis in terms of analyzing (and promoting) the ability of cities to recover and to adapt in front of disasters and massive environmental, economic, social pressures (cf. Newman *et al.*, 2009; Pike *et al.*, 2010; Simmie & Martin, 2010; Vale & Campanella, 2005).

Cities are seen as the contexts where to experiment with new technologies related to energy, water, mobility, etc. thanks to the concentration of people, goods, and information (Hodson & Marvin, 2009) and relevant as spaces for the governance of climate and energy change: in an era of globalization and of intense competition between places, cities represent the new spaces of the relationship between national governments and their territories, within multi-scalar governance (Brenner, 2004).

At the same time, cities are also active places for the contestation of the current globalization and the mobilization promoting sustainability. Social movements against climate change and supporting environmental justice (such as the Indignados, the Occupy Movement and the Friday for Future Movement) are typically urban phenomena (Rossi & Vanolo, 2012; Hannigan, 2014; Asara, 2016; Kaufer & Lein, 2020). Energized by these crises, social movements have promoted post-growth (Latouche, 2006), degrowth (Kallis, 2018), post-capitalism (Mason, 2015), environmental justice (Schlosberg, 2007) and other notions for a more ambitious reframing of the ecological issue and as new concepts for a transformation of modern societies beyond their logic of exploitation and inequality.

Mainly for these reasons a new «low/post-carbon» political rationality based on accountability towards the environment seems to emerge and grow but what this means about urban policies is still an open question (Blowers, 1997; Hajer, 1995; Spaargaren, 2000).

2. Some results concerning the relation between energy transition and sociology

The transition to cleaner forms of energy doesn't include technological configurations only. Energy systems are, in fact, socio-technical systems (Miller *et al.*, 2013) which involve not only infra-

6 UN Environmental Annual Report 2017 : https://www.unep.org/resources/un-environment-annual-report-2017

structure, machines, mechanisms and devices, but also a much more multifaceted complex of features as, for example, companies, consumers, relationships, politics, science, etc.
Analyzing energy changes through the lens of the socio-technical systems allows to see important aspects neglected in many analytical approaches. This lens shows how social processes stimulate and manage energy transformations; changes in energy technologies, in turn, reshape social practices, values, relationships, models of business, forms of work, ways of thinking and living (Miller *et al.*, 2013; Crivello, 2015).
Sociology can offer a wide range of tools to understand the different geometries of power and strategic interests underlying the creation of coalitions of interests, economic rationalities, urban development strategies in a scenario of global crisis.
This perspective relies, for example, to the recent debates on urban metabolism and on the so-called «urban political ecology», aimed at overcoming the hypothetical ontological division between nature and society (the myth that cities are places «where the nature stops», Hinchcliffe, 1999) and to highlight the role of capitalist processes in the reproduction of the environmental problem (Cook & Swyngedouw 2012; Henderson, 2009).
From a theoretical point of view, developing conceptual tools allow us to understand a series of heterogeneous quantitative and qualitative processes (human and non-human), dynamic, interconnected and constantly negotiated and renegotiated between social forces. These processes assemble and re-assemble human and non-human subjects in changeable and unpredictable urban forms: material elements, such as water or oil, are transformed under the action of capital and labor guided by capitalism and surplus extraction (Cook & Swyngedouw, 2012; Gandy, 2004). Understanding such mechanisms requires knowledge and sensitivity close to sociology, but pushes also sociology to confront and hybridize with the strictly «technical» and «engineering» knowledge, essential to understanding the nature and the mechanisms of ecological processes typical of the urban metabolism theory (cf. Padovan *et al.*, 2011; Pellizzoni, 2011).
A sociological analysis of the discourse on energy transition and global change can offer critical perspectives for broadening the interpretative horizon and for questioning «conventional knowledge» that usually limits understanding and intervention; sociology traditionally does not contribute to the quantitative approach of these models, while it addresses the most qualitative aspects.
It's relevant to remember that, since the models about the resources' limits outlined in the 1972 well-known Club of Rome report, the scientific debate, strongly focused on quantitative models, has evolved. These models design future scenarios and, even if they raise inevitable doubts and perplexity among various scholars (Castel & Henderson, 2003; Hulme & Mahoney, 2010; Schiermeier, 2010), they are useful tools for monitoring and reflecting on the evolutionary dynamics of society.
Avoiding the excessively relativistic and constructivist positions, and the haze of the actual reality of the problem too, sociology can reflect on the different rationalities and perspectives grounding these scenarios (i.e. on the diverse epistemologies of global change). For example, the link between energy consumption and the imaginary of the «ecological disaster» is often missing in the technical debate. Many reflections outline the risk of a possible apocalyptic future marked by ecological disaster, a future often described in many recent sci-fi films (e.g. The Day After Tomorrow). This suggestive and troubling imaginary often seems to support the search for solutions to emergencies (e.g. urban technologies able to counteract the rise of the oceans), without questioning the economic model and the lifestyles they are producing. Shifting attention to the analysis of the environmental impacts of production to consumption practices would be a relevant contribution (see for example the works by Carolan, 2004; Spaargaren & van Vliet, 2000).
In social studies, the assumption is that disasters are never entirely "natural" but the destruction's extent depends on the socio-environmental characteristics of the city affected by the disaster. Murphy (2004), for example, investigated the case of the well-known "natural" disaster in New Orleans, underlying that it was not «natural» that the disaster mainly affected the black population, who lived in dilapidated neighborhoods and who was unable, without a private car, to

avoid the hurricane (cf. Allen, 2013; Campanella, 2006; Keil, 2007; Peck, 2006). Tragedies aren't indiscriminately «global» and their impacts are strongly local and socially differentiated.
Then, the catastrophe doesn't seem to be "natural", but strongly "social" related. The differentiated impacts of climate change can reinforce already existing social and economic inequalities and create new vulnerabilities. Also, the COVID-19 virus has reflected social inequalities, with the less privileged groups both more exposed to it and more affected by it.
How can sociology contribute to a reflection on energy justice? Starting from the social justice's debate, it is possible to develop some interpretative strategies for an energy justice's agenda. This process would assume equal access to energy sources, fair distribution of costs, benefits and risks, and unanimous participation in choosing whether, where and which energy systems to build (Miller, 2012), with reference to both production and consumption, from the local scale to the global one (on the issues of environmental injustice on a global urban scale see, for example, Osti, 2013); according to some scholars (O'Rourke & Connolly, 2003), distribution, use and impacts of energy production are largely unequal, as political and economic benefits.
A crucial topic is "who" has the right to choose. Citizens and communities often have different perspectives compared to industries and policymakers about how, where, if, and when to build energy systems. In addition, conceptual frameworks often operate favoring the ideas and values of certain groups, marginalizing the perspectives of those who are at the bottom of the social ladder and, for example, they do not have adequate cognitive, cultural and economic resources to respond.
Energy systems often create inequalities in the distribution of damages and benefits too. As already highlighted in many environmental justice's debates, dangerous pollutants are often concentrated in places where live groups with little political power live, while the strongest energy consumers often live without exposing themselves to environmental contamination (on issues of environmental conflicts see Bobbio, 2011; Pellizzoni, 2011). The growing anxiety about the increasing cost of resources, gas security, and oil supplies (Newman *et al.*, 2009) can justify and legitimize the state of power and control's extension (Swyngedouw, 2007). Over time, this process can help to create or reinforce unequal distributions of power and well-being in industrial societies. This leads to important questions: who will control the access to renewable energy in the 21st century? Who will benefit from the new energy systems? Who will lose? And whose life and livelihoods will be at risk?

3. Conclusions and limitations of the research

Certainly, as it has been argued in this article, energy transition and global climate change are recognized today as the greatest challenges of the twenty-first century. The promotion of an ecological transition, in this sense, implies composite and multi-faceted processes, socio-technical changes and considerable changes in fields of investigation of sociology as habits, behaviors, uses and lifestyles. Issues concerning the energy transition towards lower environmental impacts have, in the last decades, acquired wide importance within the academic and political debates (Chatterton, 2013; While *et al.*, 2010; While & Whitehead, 2013). The reflection on the energy issue and climate change is characterized by a variety of possible epistemologies, scientific approaches and methodological tools; therefore, difficulties of dialogue between different voices are common.
If ecological and energy problems constitute a stark reality – and a multitude of scientific approaches are aimed at quantification and understanding the complex mechanisms of ecological and anthropic systems (cf. Mol & Spaargaren, 2000) – from a strictly sociological point of view it is possible to highlight the multiplicity and heterogeneity of the positions and arguments brought up by experts, politicians, activists etc. (Hoffman, 2011; Nisbet, 2009).

For instance, there is still a large discussion about the quantification of the problem: alarmist positions are opposed to more optimistic ones, and for social scientists (and non-experts of ecology and, more in general, for people without a specific and technical knowledge), it is very difficult to have a clear opinion in front of the data technicality.
This paper doesn't want to support unconditionally constructivist positions in the sociological vision of the problem but, on the contrary, it tries to stimulate a dialogue between sociology and 'technical' knowledge.
More specifically, in the scientific debate, two expressions assume particular importance: the first refers to the idea of a "low-carbon" transition (Hodson & Marvin, 2012). In a nutshell, the goal of this transition is the promotion – for example through technological innovations or market economic instruments – of structures and forms of social and industrial organization with a lower energy and environmental impact. Programs to promote renewable sources or tools such as the mechanisms of tradable emission permits belong to this group.
The second expression refers to the idea of a society not only «low-carbon», but more radically «post-carbon» (Heinberg, 2004; Lerch, 2007). In this case, (and similarly to other social science concepts that use the prefix «post»), the idea is to reverse the perspectives of socio-technical progress, wondering about possible radically different societies, able to free themselves from the use of fossil fuels. The reflections on degrowth made by Latouche (2006), or critical theories carried out by post-development scholars (see, for example, Sidaway, 2007) belong to this second group. According to these authors, the debate on sustainable development and on low-carbon transition has taken on extremely modest tones and conservative objectives: the main goal seems to be the search for minimal adaptations to our socio-technical-economic system that they allow to avoid ecological disaster. In this sense, the search for sustainability becomes comparable to a sort of "ecological modernization" process (Hajer, 1995; Mol, 2003; Spaargaren, 2000; 2011) aimed at finding technological and technical-managerial solutions to make more efficient the system but without really questioning it (a sort of "greenwashing" operation, to use the words of the young activist Greta Thunberg). Differently, authors such as Daniel Lerch (2007) propose to cancel definitively the use of fossil fuels. Lerch's solution consists of a reorganization of cities to self-contain flows of materials, energy and waste through the recovery of local knowledge and austere lifestyles, focused on the principles of recycling and energy saving. Even more radically, authors close to post-development debates doubt about the assumptions of neoliberal capitalism and consumerism (Escobar, 2010; Swyngedouw, 2013b).
In proposing a reflection on the role of sociology in this framework, this article focused specifically on aspects of the problem closely related to the issues and theories developed within urban sociology and urban studies.
In particular, the energy-environmental issue developed reflecting on its eminently urban dimension, on the socio-cultural scenario affected by the economic global crisis, the multiplicity of possible epistemologies that can be employed in the construction and interpretation of the problem, on the possible developments of a reflection on socio-energetic justice. It is precisely in this sense that sociology can offer its contribution: problematizing the question and highlighting the complex relationships between social facts and environmental ones, between space and politics, and between knowledge production and critical knowledge.
Developing such approaches does not imply abandoning the sociological theoretical tools to face complex technical and ecological issues, but it rather supposes the construction of an interdisciplinary dialogue that intersects sociological analysis with "expert" engineering and economic knowledge, as evidenced by urban metabolism approaches and urban political ecology approaches.
As discussed in this article, to understand the complex challenges of the energy-environmental issue is of primary importance trying to overcome the use of simplistic conceptual categories, for example, based on the contrast between «nature» and «society» or on the adoption of strictly constructionist visions of the phenomena.
In this difficult path, the goal is not only the promotion of critical approaches but, more pragmatically, to construct critical sociology aimed to understand and learn from those social forces

that already exist and that are building innovative practices in defense of the environment and of social justice.
In pandemic and post-pandemic times, it is the task of critical scholars to continue analyzing those initiatives through a critical lens, not only to show their contradictions but also to imagine opportunities and innovative frameworks that would allow for a progressive urban socio-environmental transformation that does not leave anybody behind; this brief reflection should not be considered as a real research agenda proposal, rather than an invitation to build an Italian debate on the theme.

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