



Perspective

Just energy transitions? Energy policy and the adoption of clean energy technology by households in Sweden

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ABSTRACT

The Nordic countries, including Sweden, are often considered to be at the forefront of the drive to introduce sustainable energy technology, including at the household level, as part of the transition to sustainable societies. For a transition to become reality, all groups of society have to be part of it, and the social sciences have a role in investigating the conditions for these groups to be involved. The extent to which diverse (including marginalised) communities and households are part of this transition and have equitable access to the relevant technologies, including smart technologies, and the degree to which the transition is a shared value and aspiration is still unclear. We want to explore what steps are being taken in Sweden to incorporate these groups in planning and technology access, and to what extent this is supported by a range of entities, from the Swedish Energy Agency to grassroots organizations, with a particular focus on social, gender and migrant perspectives. Our preliminary evaluation of Swedish energy policy documents indicates that, while social justice and gender considerations are acknowledged, little funding is actually allocated towards social justice covering these areas. Moreover, there is no mention of ethnic equality or the inclusion of migrant communities in the documents that we reviewed. With this Perspective we highlight the need for further research to develop a more nuanced understanding of the different narratives embedded in household sustainable energy usage and decision-making around the adoption of sustainable energy technologies at the household level.

1. Introduction

The term ‘just transition’ calls for society to shift towards low-carbon energy systems in an equitable way [1–3]. These transitions range from the complicated dynamics of a coal plant being shut down, to the challenges of land acquisition for wind-farm expansion, to the fair distribution and implementation of clean energy technologies (e.g. solar panels) at the household level, which is the focus of this Perspective. Academic literature on access to energy, just transitions and energy justice has ignited intense debate, with some arguing that the dominant emphasis on the adoption of smart and green technology alone is unlikely to facilitate the creation of sustainable communities and societies [4–10]. One of the few studies financed by the Swedish Energy Agency on this subject points to the importance of inclusive perspectives, especially gender [11]. There is a need to support further social-science studies in this area. In order to become a sustainable society,

environmentally and energy-wise, we need to understand how social characteristics shape energy transitions. Without this awareness and understanding, policies will fail to address the diverse needs of different social groups, which will: (a) limit the uptake of new technologies (a key policy goal for the energy transition); and (b) limit the effectiveness of new technologies to improve peoples’ lives across the social strata (a key goal of ‘just transition’ proponents).

While many clean energy technology initiatives consider the importance of targeting underserved communities, failing to incorporate a diversity of voices from policy development to implementation often results in unequal decision-making, impacts, access and distribution of clean energy and its benefits [3,8,10]. Key factors underlying inequality around access to new energy technologies – or the benefits generated by them – include property ownership, land tenure and decision-making power (or ‘voice’), all of which are frequently determined along lines of gender, class, ethnicity and race [12–14]. Yet many

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promising opportunities open up if decarbonization pathways follow a just transition pathway. This requires a new perspective on environmental decision-making, paying particular attention as to why decarbonisation interventions fail or are successful [15]. Much research finds that an active, bottom-up, participatory and socially inclusive approach is essential for successful and equitable design and implementation of new technologies in a way that reaches the poorest, most vulnerable and marginalised, as well as those who are already committed to the energy transition and can easily afford to adopt new technologies [3,16–18].

In this Perspective, we focus on Sweden as a country that has demonstrated leadership in the transition to sustainable, low-carbon energy systems, not only at the national level (through large-scale wind farms, hydropower and biomass), but also at the community and household level (with the help of district heating plants and smart grids) [1]. In 2021, Sweden topped the World Economic Forum's Energy Transitions Index for the fourth consecutive year [19]. Currently, 54 % of Sweden's electricity comes from renewables and it has a target of 100 % by 2040 [20]. A key part of its success has been the introduction of smart grids, which are transforming households from energy consumers to 'prosumers' [21,22]. However, at the individual household level, adoption of renewable energy technology is quite uneven, as evidenced by studies of the uptake of solar photovoltaics by individual households [23,24]. It has also been observed that Swedish households use renewable energy directly from renewable sources at a lower rate than households in other European countries [25]. Sweden was one of the first countries in Europe to introduce smart meters, which are also playing a key role in the household-level energy change. Smart meters have a number of benefits, such as targeted billing, greater security, more effective energy management, and more accurate behavioural monitoring and intervention [26], although studies have also begun to identify ways in which these systems trigger inequalities among consumers [27–29].

Our key concern here relates to the relative lack of progress in renewable energy adoption at the household level, given Sweden's low-carbon transition progress at other levels of society. Accelerating the adoption of clean energy technologies is not just a matter of changing people's consumer behaviour or innovating the smartest user gadget. It is also shaped by spatial factors that determine access to, and control of, energy resources, as well as socially-determined conditions, such as location (urban/rural), psychology and beliefs, gendered household decision-making, income stability and access to financial capital [25,30,31]. Becoming a sustainable society will require learning about the challenges and opportunities that people face across the social strata, which determine their access to clean technology and enable or frustrate sustainable energy consumption. In this Perspective, we therefore stress the importance of bottom-up participatory pathways for just transitions. We focus in particular on the need to develop supportive energy policy and encourage community- and household-level social-science research to understand the needs and preferences of diverse households, as a way to build societal support for a just and fair transition and to encourage broader uptake of sustainable energy technologies, including at the household level.

2. Energy transitions and social justice

Transitioning to a low-carbon economy requires more than a simple technological fix; it needs to acknowledge that new technology itself can lead to further inequalities, as it is embedded within social and geographical processes that reconfigure current spatial patterns of economic and social activity [12]. Socioeconomic relations, inclusive of race, ethnicity, class and gender – and intersections thereof – influence spatial patterns of just transitions. This acknowledgement has been made in the context of the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC), where gender considerations are increasingly being brought into climate policy debates, as it is becoming clear that gender plays a key role in mitigating

and adapting to climate change [32]. Research has shown that climate solutions might exacerbate inequalities when they fail to be inclusive in climate science, policy and action [32–34]. The exclusion of different perspectives in resolving the climate crisis means that our dominant frameworks, responsible for climate change, go unchallenged.

The rise of clean energy technologies has the potential to exacerbate inequalities in all parts of the diverse supply chains. As Mulvaney [12] stresses, the negative consequences of the production of photovoltaic technologies, such as working with toxic materials or disposing of these, often falls disproportionately on disadvantaged communities. Gay-Antaki's [13] research on windfarms in Oaxaca, Mexico, finds that women are automatically excluded from participating and benefiting from clean energy initiatives in rural Mexico because most do not own property, a common arrangement in much of the Global South. In addition, the lack of consultation with local officials and the community caused dismay, as the placement of the wind towers has disrupted key environmental corridors. The windfarm company (from Spain), did not attend to social relations, including those of gender, when attempting to implement their clean technology [13].

While inequity can be found throughout clean energy supply chains, in this Perspective we focus in particular on the individual/household nature of decision-making. At this level, one may be looking at the adoption of solar power, heat pumps and smart meters, rather than the larger-scale renewable energy technologies, such as wind or hydro power. Sovacool et al. [3] find that 'the risk of inequity abounds in decarbonization pathways' (p.1), cutting across demographic, spatial, interspecies and temporal dimensions. For instance, in countries, such as Germany, they find that adopters need to own property to mount the panels, which excludes millions of non-property owners [3]. Property ownership, while largely determined by class, is also determined along lines of age, gender, citizenship, ethnicity and race. If solar panels are only reaching those already better off, it is not difficult to see how clean energy can exacerbate inequalities, as those who do not own property, and are thus at risk of hiking rent prices, are also paying more for energy, as illustrated by a case study in California [14].

The need to unpack spatial patterns of families, communities, societies and regions, then, is vital around household-level clean energy technology adoption. This focus helps underline the importance of intra-household dynamics and intersectionality of social vectors in adopting smart/clean technology. Yet among decision-makers, awareness is limited on how and why different strata of society adopt or eschew green energy. This is where social-science studies can help to guide policy-making. Analysis of household adoption of such technologies requires a multiple and simultaneous examination of different places (urban/rural, northern/southern) and consideration of which social groups (high-/middle-/low-income groups, local/migrant/indigenous, men/women) are more likely to adopt or abstain from embracing green technologies at the household level and the reasons for their choices.

The importance of attending to the factors influencing differential access to, and control of, natural and other resources, such as living wage, mobility, energy and education, and how these shape life opportunities across race, class, gender lines and location, has already been noted [13,35]. Our goal here is to underline the importance of the micro-politics of everyday life, as clean energy technology is introduced into communities and households, while focusing on broader global processes pushing for just and clean transitions [36]. To become a sustainable society, both environmentally and in terms of our energy use, we also need to understand how social location and related public values also shape energy transitions [8,37–39]. Studies across various countries, including Mexico, the United Kingdom, South Africa and India, have underlined that transitions to sustainable energy may end up exacerbating inequalities around gender and class, especially if public consultation is inadequate [13,40–42], an aspect of particular concern in the post-COVID-19 recovery period [43,44]. Energy justice and energy poverty are hence inextricably linked; yet is that lexicon explicitly entering Sweden's energy transition?

3. Sustainable energy policy in Sweden

When assessing the social and intersectional reach of Sweden's sustainable energy policy, there is a need to unpack the spatial patterns of families, communities, societies and regions, as these offer a spatial view of the uptake of clean technology. Social science research is critical in providing data and guidance in this respect. When scoping the Swedish Energy Agency database of funded projects [45] from as far back as 2009, using a whole range of energy transition related keywords, the results were meager for words such as 'migrants', 'gender' and 'justice'. Only one funded project focused on migrants, ten funded projects focused on gender, and no funding was granted for projects focusing on 'social justice' or 'class' [45]. This was out of a total of 129 projects funded between 2010 and 2022 (personal communication).¹ According to its 2021 annual report, the Agency aspires to an equal distribution of research funding from a gender perspective [46]; however, only 20 % of the project leaders funded by the Swedish Energy Agency during this time were women [45]. The future strategy of the Energy Agency also indicates that these issues will continue to be of negligible interest for energy-related research [47]. In this case, politicians have passed onto the Agency the responsibility to implement innovations without knowing or observing that the ambitions of justice, gender and migrant perspectives are lacking.

To explore this in more detail in the context of a specific policy document, we reviewed Sweden's Integrated National Energy and Climate Plan ('the Plan') [48], which covers inter alia Sweden's current energy policy, objectives and targets and how these relate to EU energy policy (on which Swedish policy is based); an outline of the relevant government-supported research programmes [49]²; and a summary of the public consultation that the Plan went through, with public comments, included as Annex 1 [48].

The Plan refers to promotion of 'renewable energy self-consumers' and 'renewable energy communities' (with reference to EU Renewable Energy Directive Articles 21 and 22), and various efforts to support self-generation (through programmes and incentives). There is also reference to new requirements to the Measurement Ordinance introduced in 2018 (which will apply from 2025) [50], including enhanced access to information for consumers, and improvement of grid operation to make it easier and cheaper to integrate electricity from microgeneration (such as solar) [48] (p.37).

The Plan states in two places that the Swedish Government 'makes no distinction between energy poverty and poverty in general' and therefore 'the term energy poverty is not used, and there are no targeted policies to deal with it', as the issue is 'addressed within social policy' [48] (pp.38,75), although there is no further discussion of 'social policy' or 'poverty' in the Plan. Section 3.4.3.4. of the Plan does, however, cover policies and measures to protect 'vulnerable customers', who are defined (quite narrowly for our purposes) as people who cannot afford to pay for domestic electricity or gas. Such vulnerable customers, who number around 20,000 in Sweden, have the right to receive financial support to pay their bills, while there is also a statutory procedure that companies need to follow before disconnecting them for non-payment of bills, and there is a price comparison website to improve information on the cost of energy suppliers.

There is a section in the Plan on gender mainstreaming, which refers to Sweden's current gender equality work and its feminist foreign policy [48] (p.72). However, in regard to Sweden's climate policy, it states only that 'the Government intends to step up work on gender equality', adding that '[a]t the Government's request, the Swedish Environmental

Protection Agency has submitted a proposal for further integration of gender equality in the implementation of the Paris Agreement' [48] (p.73).

The term 'equality' is used 14 times in the document, but only in relation to gender. Similarly, the term 'human rights' is used twice, only in the 'gender mainstreaming' section. There is one reference to municipalities in 'remote' locations (in the context of providing local energy and climate advice). The term 'inclusive' is used only once, as 'inclusive society' in the description of a research programme. The Plan does not contain the keywords 'justice', 'migrant(s)', 'ethnic', 'indigenous' or 'disabled/disability'.³ By contrast, the term 'smart' is used 41 times.

Annex 1 of the Plan presents a summary of the comments raised during the public consultation around the Plan. No comments relate specifically to household-level renewable energy access and social equity. However, Klimatkommunerna (an association of cities, towns and regions in Sweden) requested that 'the role of communities be clarified and highlighted in the plan' [48] (p.189), while SKR (the Swedish Association of Local Authorities and Regions) commented that 'the plan should highlight stakeholder engagement efforts and opportunities' [48] (p.190). These comments indicate the extent to which even the most general community-level concerns and issues are lacking from the Plan and the related research agenda, and how far they are from incorporating a nuanced consideration of diverse and marginalised communities and households and their needs.

While there are discernible patterns and processes to the ecological and gender equity ethos embedded in Sweden's policy framework, there is a need to draw out and learn from the diverse voices that are shaped by income, class, migrant status, social location and gender. The information gleaned will help inform policy that may currently be overlooking marginalised voices. A more inclusive policy framework, we suggest, based on current literature findings, can help to ensure greater uptake of energy transition initiatives and low-carbon technologies, while also ensuring greater social benefits from the energy transition throughout different social strata. However, further targeted social science research is required to provide evidence to support this.

4. Gaps in the research agenda

Considering the fact that half of the population in Sweden are women (approx 5.1 million), about two million people have a recent migrant background, and some Sami communities live in remote locations, there is a lacuna within the research domain to understand household-level energy technology adoption practices within these groups. This is a gap that has particular value, since the goals for equality are explicit in all public authorities and organizations in Sweden.

Attentiveness to social vectors and effective public engagement by the public and private sectors are important for scaling wider adoption of energy technology, as it attends to the fact that energy and technology are gender- and class-coded. Consequently, the framing can provide important equity and gender perspectives. Also, significant work is needed to collect data from different socio-economic groups, focusing in particular on gendered and marginalised (e.g. migrant and indigenous) perspectives, which are often underreported in technology and energy research. The low-carbon transition needs effective participation in restructuring the energy system and ensuring efficiency and equity. It is vital to include gender, socio-economic and differently socially located groups into existing initiatives and narratives. As Skutsch [51] argues, if gender aspects are not prioritised in the energy field, it risks deteriorating and hindering the transition to an equal society (see also [52]).

¹ Email correspondence with a representative of the Swedish Energy Agency.

² Energy research policies are set out in the Government bill on Research and Innovation for Sustainability, Competitiveness and Security of Supply in the Energy Sector [41]; and implemented by the energy-related activities under the National Energy Research and Innovation Programme.

³ The term 'just transition' is used in one heading in the table of contents, but has been changed to 'fair transition' for the heading in the text (which is the one time that the term 'fair' is used); while the word 'Sami' is used once in relation to climate adaptation.

Within Scandinavia, Sweden prides itself as the country most open to migrants in the region. However, its ability to integrate migrants is mixed. This has resulted in individual, collective and institutional (political economy) angst for Swedes, as Hansson and Jansson [53] have underlined in the case of migrant beggars. Instead of ignorance, denial and projection that comes with Sweden's social contract and its exceptionalist discourse [54], one way of redressing tensions might be to examine more closely how integration may also occur by making energy transition opportunities more widely available. If clean technology efforts are the privy of dominant (white) Swedish communities, such exclusions also have the potential to marginalize migrants further. Encouraging the adoption of clean energy technology may conversely offer a pathway to bring in diverse communities to Sweden's energy transition and encourage wider societal integration. Hence, the need for further research along these lines – which remains a neglected field of study in Sweden.

It is pressing, then, for Sweden, and the Swedish Energy Agency in particular, to address scientific issues related to understanding energy systems and the just transition, while holding insights based around gender, income, social status, age and place central. The added value created by conducting research along these lines can contribute to the development of technology-related energy policy and its usage practices, so that principles of inclusivity and equality can be shown to percolate through to all of Sweden's increasingly diverse communities. Through recognition of possible energy poverty among migrant and marginalised communities, it becomes feasible to take practical steps to hold the interests of Sweden's wider society central. Moreover, further research undertaken along these lines that will shift community interests towards clean energy and the just transition, can help to shift social, cultural and economic values that benefit scientific institutions, the private sphere and the public sector.

5. Conclusions: sustaining sustainability and inclusivity?

The extent to which individual households within diverse communities are open to adopting renewable energy technologies, including smart technologies, is largely an unaddressed issue in Sweden specifically and continental Europe more broadly. This attention is pivotal if transitions to sustainable energy forms are to become mainstream. This requires acquiring a nuanced understanding of the different narratives embedded in household sustainable energy usage and decision-making around the use of smart technologies for clean energy consumption. It is this focus that will help identify how different strata of society are able to adopt them, even within Europe.

Such research and analysis would be in consort with the IPCC panel's recommendations for creating protocols around social and just energy technologies and systems. This emphasis also comes with the recognition that learning through case studies from other European countries may facilitate more effective strategies for deploying and encouraging the adoption of clean technologies. The pillars for assessing shared knowledge and technologies following the IPCC are thus: 1) science – conversation with research agendas and socio-political discourses on clean energy, climate policy and just transitions within and beyond Sweden to improve our understanding of the political economy of clean energy more broadly; 2) policy makers – informing and involving politicians and funders on different scales to create the means and the conditions for social and just energy production and consumption on a global scale; and 3) actors at the grassroots level – implementing and highlighting the needs of users and producers of renewable energy. This will enable better targeting of energy policy and clean energy provision on a global scale.

Turning to international case studies may firstly assist Sweden to gain an international perspective as well as a multi-level view to create impact on matters concerning energy consumption. Secondly, politicians need to be alerted to the fact that other jurisdictions may have alternative interpretations of the goals of justice, gender and migrant

groups in relation to the energy transition. Thirdly, an international perspective will help acknowledge and create important conversations and comparisons with spatial patterns, institutional dynamics and political systems specific to national contexts – giving explicit recognition to the possibility of uneven geographies in the adoption of clean energy technology. Research is thus still needed to seek to understand the patterns and processes of the ecological and gender-equity ethos embedded in Sweden and elsewhere in Europe, both to draw out and to learn from the diverse voices, as shaped by income, class, social location, migration status and gender. The information gleaned will help inform policy that may be overlooking marginalised voices, thus ensuring greater inclusivity, greater attention to households' needs and preferences, and ultimately greater buy-in to clean energy technology, while ensuring that low-carbon transitions do not leave the poor and marginalised behind.

Ethical statement

This commentary is based on a short review of academic literature and policy documents and was carried out by Mikael Ring, Emma Wilson, Miriam Gay-Antaki and Kanchana N Ruwanpura. We declare that there are no conflicts of interest. As a review/commentary article, this study does not contain any studies involving animals. All other international, national and institutional standards were followed in writing this commentary article.

Declaration of competing interest

The authors declare that none of us is aware of any conflicts of interest related to the submission of this article to Energy Research and Social Science.

Data availability

No data was used for the research described in the article.

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