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Review

Repoliticising users in energy transitions: A critique of dominant ideas and their effect in policy and practice

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ABSTRACT

Energy studies as a field is, due to its strong grounding in engineering and economics, overall dominated by reductive ideas around the role of people in energy systems. In particular, the diversity and agency of local level energy users is commonly overlooked and poorly understood, with consequences for energy transition policy and practice. This conceptual review brings together critiques of simplistic and idealised portrayals of energy users, who they are and what roles they are thought to play in energy system transformation. It forefronts studies that pay explicit attention to power relationships and injustice through a critical theory lens, in particular feminists, intersectional, decolonial and indigenous power theories. The review deconstructs the concept of energy user and contrasts such dominant ideas with alternative perspectives. It employs framing as analytical tool for sense-making and reflection around the power relationships that have shaped how global energy systems function and the role of the users in reshaping, resisting and reframing these systems. The conceptual analysis illustrates the myriad ways in which energy users can be framed and shows why these representations matter for knowledge-making, practice and policy aiming at low-carbon transitions. We identify current knowledge gaps and future research frontiers in proposing framings and user-oriented interventions which embrace rather than smooth over the heterogeneity, messiness and politics of user roles in energy systems and transitions.

1. Introduction

Envisioned roles for domestic and community-level energy users lie at the heart of many user-centred energy studies concerned with processes of sectoral change. This includes for example supporting a political direction towards lower emissions; adopting low-carbon technological innovations; or making substantial changes in everyday life to curb energy use. In some future visions, energy users, operating community energy models and decentralized systems, play important transformative roles in facilitating the scale of transitions desired through collectivist actions, building energy communities and co-creating new business models or sharing arrangements [1–5]. In other

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framings, prosumers[1] are seen as smart energy consumers who optimize the use of their homes [6] and so, are the main target for centrally orchestrated awareness campaigns and/or economic nudging thought necessary to change user behaviours.

Universalist policy frameworks, such as the sustainable development goals (SDGs), envision a future with affordable, reliable and modern access to energy services for all, wherein user needs are met. These provide a shared starting point for energy transition policies in both high and low income countries—thus emphasizing sameness, shared experience and collective goals. In contrast to such unified visions of change [7], this conceptual review brings attention to scholarship that highlight difference and/or conflict between groups and interests. This is done to counter the observed tendency in energy research and policy to treat users as a circumscribed homogenous group which ignores the highly unequal access to, capabilities of and control over energy services [4,8–10]. Acknowledging the underlying inequalities and injustices is a precondition for more just and effective policy interventions. Even with a shared goal of universal access, profoundly different future energy systems architectures may be envisioned to deliver those services to users, reflecting actors' conflicting interests and understandings of what is a desirable energy future [11–13].

This article builds on the insight that current inequities and power relationships in energy sectors worldwide shape how "energy transitions" are understood, defined and steered. Unless there is explicit transformative work done to acknowledge and address unequal power relationships and their constitutive role in current energy systems—including in energy infrastructures, policy and research practice—these will be reproduced along with new harms and exclusions [14–18]. In this conceptual literature review, three analytical questions drive the analysis: What is believed to be the role of energy users in global-scale energy transitions? How do ideas around users and their roles in transitions relate to categories of social difference? How are these ideas articulated in energy research, and what do we know of their effect for energy policy and practice? Taking inspiration from historian Joan Wallach Scott, and her way of asking questions around how social categories and ideas of roles, relations and differences come into being in specific and situated ways [19], this analysis of the energy research field deconstructs the concept of the "energy user" using the related concept of framing [20].

Our critique draws primarily on feminists, intersectional, decolonial and indigenous power theories. While current research on energy users centralize them and even insist on them as key agents in energy transitions, relationships of power, influence and equity are rarely brought to the forefront of the discussion. Rather, and as this review will show, what is quite common is the adoption of a user-centred framing that is still chiefly devoid of power and politics,[2] attention to difference and unequal burdens. Feminist-theory based studies in particular have shown how problematic simplifications and fictive ideals lie at the heart of dominant energy user portrayals, with a homogenous and one-dimensional user framing that reduces people's interaction with energy systems to a transactional relationship between supposed equals [22,23]. Attention to these framing processes helps explain how the user is constructed, and highlights how analytical choices forefront certain objects and render other aspects and relationships invisible to the analyst.

Thus, this study seeks to achieve two interrelated objectives: first, to provide a theoretically driven review of the critique that targets dominant conceptualisations of *energy users*—who they are and what roles they play—for their depoliticising effects and, second, to contrast these with alternative framings that bring the politics of energy use into view. These objectives are achieved through a collective and step-wise review exercise analysing scholarship with a base in critical theory and as well as the target of its critique. Critical theory is here understood in its broad sense, as theory that aims to explain and counter domination in all its forms and support emancipation and freedom from oppression [24]. We are not limiting our scope to a certain conception of power but rather explore how energy users are discussed in work which forefronts power relationships and political struggles across a multitude of arenas. The critique comes from many fields, including: feminist science and technology studies, sustainability transitions, development studies, post-colonial and decolonial studies, political ecology, human geography, design studies, energy anthropology and policy studies. To clarify what scholars push against, we introduce and exemplify three dominant, mainstream framings of energy users that are seen as having depoliticising effects: The rationally acting user; the behaviourally predictable user; and the socially motivated user.

In relationship to previous research and energy studies more broadly, the study makes a contribution by showing why user representations matter for practice and policy aiming at low-carbon transitions. Based on this review of how users are conceptualised, knowledge gaps and research frontiers come into view. The review's attention to framing provides an opportunity to think more deeply about the power relationships that have shaped and continue to shape how global energy systems function and the role of the users in reshaping, resisting and reframing these systems.

The next section details the chosen analytical and methodological entry points. Section 3, the result section, starts with a broad-brush contextualization (section 3.1) of the target of critique, namely the three dominant framings of energy users that excludes the question of justice, politics and power relationships from view. In sections 3.1.2–3.3 we review the critiques and draw out what the alternative user framings may mean for research, policy and practice. Section 3.4 highlights future research directions identified in relation to current gaps. For practical reasons, the review leaves out an analysis of mechanisms of exclusion, which is instead expanded in another paper. Section 4 concludes.

2. Analytical and methodological entry points: User definition and scope

The article adopts the concept of *framing* as a device for deconstructing understandings of energy users in the literature. A frame can be broadly understood as a "mental structure of beliefs, perceptions and appreciations that people use to make sense of the world around them" [25,23] cited in [20]. Mezirov [26,5] defines "frames of reference" as the "structures of assumptions through which we understand our experiences. They selectively shape and delimit expectations, perceptions, cognition, and feelings." In the context of research and knowledge-making, framing refers to a key process of interlinked steps [27–29], where researchers (in this case): (a) frame something as a problem to be addressed, (b) identify an analytical object as central to their study, (c) set the scope for analysis, and (d) operationalise this into a specific research design and methodology. This process of framing is dynamic and researchers develop their research designs over time. However, there is an element of standardization and routine in research, based upon disciplinary frames of reference that influence the idea of what constitutes high quality research and relevant problems, suitable analytical objects, reasonable scope and rigourous methodological approach. In this article, framing is used at three levels: first, to describe our own process of setting boundaries of our inquiry (accounting for our methodological choices in section 2.1); second, as analytical tool for analysing what other scholars do as they study energy users. Here, we can think of articles as embodying certain framings of topics, and then becoming "actants" who stabilise certain framings to the detriment of others [30]. Third, attention to framing can be used for meta-level

[1] Prosumers refer to people who produce and consume a good, in this case typically decentralized renewable energy based electricity that is used for household consumption and/or for sharing/trading/selling it back to a local or the centralised grid.

[2] We use the term"politics" in its broad sense here, as "collaboration and contestations that serve to order and govern everyday affairs". [21:13].

analysis of how framings work at the collective level of research fields, perspectives and approaches, where they connect a certain ontological stance to a typical problem framing and way of understanding the world [26,31]. These become clear when contrasted with alternative framings. The three dominant framings of energy users that we characterise in section 3.1 belong at this meta-level, where they reflect a certain world view and interpretation of human behaviour and motives for action, that go beyond a specific study to a disciplinary paradigm.

2.1. Framing the energy user

To account for our own framing of energy users which helps set the boundaries of our inquiry, this article aligns with the definition of energy users provided by Schot et al. [32], who identify users as "individuals or groups that use energy, including elements of the systems (e.g., wind turbines) necessary to produce and distribute energy" (p.11). This definition is encompassing in how it applies to individuals as well as collectives, and to multiple phases of the production-use value chain [see also 33]. We build on this definition, yet delimit the review to literature pertaining to certain *types* of energy users, namely individual users and collectives within the boundaries of a community. This includes the typical domestic user, but may also take the shape of small-scale public, cooperative or private users (for example businesses, schools or healthcare centres), that individually or collectively use energy services.[3]

We focus on the local level-user for several reasons. First, community-scale transitions are poised as the middle ground for transformation because global large-scale companies and national-scale transitions of institutions, agencies and state-owned electricity systems have been "slow" [34–36]. Concurrently, the urgency for climate mitigation is used to justify large-scale renewable energy infrastructures for urban and industrial needs, which are often accompanied by environmental destruction, dispossession or violence at the expense of local, rural communities [17,37,38]. In addition, the idea of "communities" as a certain spatial scale that "fits" with renewable energy systems generates problems of its own [39]. To avoid this problematic assumption, we seek to explore how communities are (historically and today) delineated and involuntarily drawn into the energy transitions for the benefit of other "users", elsewhere.

Second, the literature on users at the community-scale scrutinize discourses around the impact of local energy autonomy and governance on local politics, social inclusion, livelihoods and living environments. Third, it enables us to unpack domestic energy use which currently accounts for the largest sector for end-use energy demand for electricity, heating and cooling needs in buildings [40]. This focus on the relationship between the domestic, the community in its many heterogenous constellations and higher political levels up to the international is important as we can see how contestations and resistance to, but also maintenance and use of, energy systems are embedded in ways of everyday life. These entanglements motivate a multi-scale, cross-sectoral and multi-actor perspective.

2.2. Scope

The literature review has a global scope and covers the period of 1987 (the earliest paper identified) to work published in 2024. The review process has been carried out stepwise, combining searches using the Scopus database, between August–September 2021 and May–June 2022, two team workshops,[4] followed by an extended period of in-depth reading with authors' doing additional searches and integrating more recent work. The first steps with database search and workshops resulted in a bibliometric analysis and quantitative mapping of the research landscape (Author citation). The focus and scope was set in the team workshops where the team discussed preliminary keywords and methods for database searches (see Author citation) which were then refined and iterated. The goal of database searches was to ensure the review identified and included relevant work that authors may not be familiar with as well as to gain an overview of the field's progression over time. The key exercise that enables the following analysis is selective in-depth reading and an integrative review [41], undertaken by each coauthor with the freedom to bring in work of relevance. The shared focus is user-centred work that explicitly deals with power relationships, and does so based on critical theory perspectives.

The review is thus shaped by author positionality. The Appendix accounts for author positionality in terms of disciplinary and theoretical grounding and areas of empirical interest that authors brought to the review work. While there is an entire family of approaches that may fit under the umbrella term "critical theory", we have by necessity chosen a delimited scope. The team prioritized studies that adopt feminist, indigeneous, decolonial perspectives or based on intersectional approaches to power, especially how these intersect with class. We searched for work based in other streams of critical theory (e.g. queers studies) but found that these were largely missing. We exclude articles in the Marxist tradition and current anti-capitalist debate as these would merit an article on their own. Similarly, we do not exhaustively cover work based in political theory broadly (on energy communities or grassroots movements that speak about politics and agency) unless these include than the feminists/intersectional/decolonial or indigenous power theories we focus on.

The review includes a total of 254 articles (see reference list) and among these, the large majority are user-centred and forefront power relations in energy systems and transitions. In addition, we include articles from the mainstream literature and use these as contrasting examples (in section 3.1). We also cite broader work in the introduction and method section, and in the results we include what may be considered field-establishing articles to contextualise debates and fields (for example user typologies and practice theory). The cited papers provide a rich resource and entry point to further examples and wider debates.

The searches are conducted in English. This is balanced to the extent that the authors are familiar with and fluent in literatures in other languages (German, Dutch, Spanish and French), but there was no attempt to systematically represent these other literatures. All the researchers are affiliated with institutions in high-income countries, and predominantly Northern European. This mirrors the broader geography in energy research [42]. Author team members have different nationalities and geographical focus in their work which may be in other regions of the world to where they are based.

3. The user category in energy research—critique and alternatives

This section starts with the question: who is an energy user, and how do ideas of users relate to categories of social difference? To answer it, section 3.1.1 characterises three dominant (meta-level) framings of energy users with examples. These are outside of our in-depth review and instead work as the kind of scholarship that we argue needs to re-think their user image. With these three frames set up as a counterweight, we present critiques and alternative framings (section 3.1.2–3.1.5), coming from the critical theory-based scholarship. We show how these make

[3] We exclude the following users from analysis: large energy consumers, such as industry, hospitals, and large businesses; workers and communities negatively affected by a transition to renewables, such as studies centered on 'just transitions' for workers within fossil fuel industries. For the purposes of this review, workers are not considered to be 'users', whereas the "prosumer" role is included in our scope.

[4] The first team workshop happened in September 2021 and the second in June 2022.

categories of social difference central to unpacking the concept of the "energy user". Secondly (section 3.2), the review explores answers from critical scholarship regarding the question: how are users conceptualised to play a role in energy transitions? Thirdly (section 3.3), we present how critical scholars view the effect of dominant and alternative framings for energy policy and practice.

3.1. Who is an energy user?

3.1.1. Dominant framings of energy users in diverse contexts

In the 1970s and 1980s, the "energy consumer" emerged as a dominant term to qualify energy users. Writings on the energy user as energy consumer were strongly influenced by the international 'oil price shocks' of 1973–74 and 1979–80, and their domino effects on consumer reactions to price changes from the oil price shock, energy security and policy. One of the earliest review articles to assess how energy consumers were conceptualised in the 70s–80s was McDougall et al. [43]. The authors evaluated over 600 publications and found that consumer energy research was either focused on understanding the social aspects of energy consumers (what they do and think around energy conservation) or evaluating the techno-economic aspects (the impact of energy conservation measures taken by consumers). Since McDougall's review, the term energy consumer has metamorphosed into energy users, and research on this group has flourished across different country contexts and attracted a variety of disciplinary perspectives in the social science domains.

We use the meta-level of framing to illustrate what we argue to be three widespread and dominant framings (in the sense of sharing a certain worldview and interpretation of human behaviour and motivation) of energy users that have in common a depoliticising effect, and thus contrast with the way critical theory forefronts unequal power relationships. These meta-level framings are broad (and thus simplified) categorizations, yet have strong disciplinary underpinnings: (1) **The calculative rational user**. With roots in economic/statistical theory, this framing conceives energy users as rational agents that rely on markets and techno-economic analysis to make energy use decisions [44–50]. In the engineering and physics-oriented studies the focus is on economic viability and affordability as a main explanatory factor for technology adoption. Sub-theories include for example: rational choice theory; bounded rationality, framing effects, decision heuristic; the energy ladder and fuel stacking.

(2) **The behaviourally predictable user.** Based in behavioural science theories, this frame analyzes energy use and efficiency, as well as the values and preconditions shaping users' transitions beween different energy sources and services. The framing explains such actions as influenced by cognitive, social and emotional factors. Sub-theories include for example: theory of planned behaviour; social cognitive theory; norm activation theory; value belief norm theory; attitude, behaviour, choice theory [51–58].

(3) **The socially motivated user**. Based in sociological, socio-technical and mainstream development theories, this frame conceptualizes energy users as actors whose practices emerge from a co-constitution of meanings, capabilities, institutional and infrastructural frames. These perspectives examine how socio-technical systems shape social relationships, socioeconomic development and broader societal outcomes. Sub-theories include for example: social construction of technology; technology acceptance model; social diffusion theory; leap frogging theory; social practice theory; development theory and structural determinants of energy use [59–67]. The focus on social factors or dimensions does not necessarily make unequal power relationships or political struggles visible. It its depoliticised form, the energy user appears as a socially motivated, yet politically unconcerned, actor and energy use as a private-sphere practice.

These three dominant framings are widely deployed across different geographical contexts. Research on energy users across high and low-income country contexts seemingly draw from the same theoretical origins. Yet, there is also a divergence in the language of use and how studies employ the dominant user frames across high and low-income (country) contexts. Studies of energy transitions in high-income contexts or countries are primarily framed around individual responsibility and adaptability to energy curtailment measures [68–71]. In contrast, except for emerging research around curtailment and demand side management in emerging economies like India, Brazil, South Africa and China [72–79], research on energy users in low and middle income countries remain largely tied to pathways to expand access and shift use from "traditional" to "modern" sources, or fossil fuel-based systems to renewables. Without wishing to simplify a rather complex problem or reproduce problematic binaries, we note that the contrast between contexts opens up for learning across regions.

In contrast to these framings—which we may think of as mainstream energy studies—there exists a diversity of alternative conceptualisations of energy users that share an understanding of energy use as embedded in power relations that are historically and spatially specific and grounded in unique cultural contexts. Critical theory—here understood as a theoretical stance that brings explicit attention to oppression, inequality and marginalization, aiming at identifying strategies to counter oppression, emancipate or empower the individuals or groups that are in focus—has been introduced to energy studies by scholars from various disciplines. In the following, we present these alternative framings of energy users and draw out the key critique they leverage towards the three dominant framings as well as show what they propose instead.

3.1.2. Moving beyond the one-dimensional energy user

A key concern for many critical theory scholars is a perceived fictive user ideal present in mainstream energy research, policy and practice. The critique is leveraged primarily against the economistic understanding of the energy user as a rational individual consumer, and behavioural studies that assume predictable rational behaviour.

A central part of this critique is that energy policy and utility organizations both suffer from overly simplistic understandings of the user/consumer. With data at the household level, utilities can see economic differentiation among customers (what is often categorized as customer segmentation), but commonly treat these as gender-neutral and socially standardized units. Research from Northern Europe show how households and users are collapsed into an imaginary consumer [80] that Strengers describes as the "resource man" [81–83]. This fictive person is envisioned by many policy makers and energy companies in a particularly narrow ideal of a user, who is tech-savvy, data interested, behaves according to "rational choice" theory and is in control of "his" own energy behaviour. The vision also permeates ideas of the"smart home" which is supposedly emerging without friction [84], an illusion addressed in a collection of articles edited by Strengers et al. [85]. The authors highlight the magnitude of changes required to attain an equitable design and use of smart technologies within the home. A number of "personas" are presented to bring attention to fictive ideals that are devoid of politics and the work necessary to maintain all these new technologies in the home [86–88].

In contrast to the rationally acting and behaviourally predictable depoliticised user frames, the socially motivated user frame nonetheless places emphasis on the social shaping of technology, and users as a heterogenous group between and within households (a major distintion with the economist's concept of a household) that is actively involved in energy system change, even if they "only" adopt new technologies, practices or modify their preferences. In the past two decades, a group of socio-cultural [89–91] and practice-theoretical studies [63,92] have broadened the earlier somewhat narrow explanatory model and provided richer accounts and case studies from all over the world, vastly improving our understanding of energy users in their societal context [93].

3.1.3. Embracing complexity and heterogeneity within social categories of energy users

A second area of critique concerns how the energy user as object of analysis is understood in relationship to social differences and power hierarchies. Directed at all the three dominant frames, the problem is the common use of categories by researchers, utility companies, donors and policy-makers alike that do not account for the power relationships within households [39]. Data aggregated at the household level treats the home as a black box, leaving stereotypical ideas of household composition and roles intact [94–96]. Further, there is potential bias in who gets to represent the household. Clancy et al. [23] highlight methodological bias where researchers—also those working with a social motivated user frame—assume that men are "household heads" and involve them as interlocutors in data collection. Early critiques came from scholars of gender and energy, who used individual level data, disaggregated for biological sex, to show significant statistical differences between behaviours and attitudes of the two groups of men and women regarding energy use and sustainable living [97]. Evidencing these group differences was seen as a crucial step towards addressing socially blind energy research and policy. Later studies nuanced this further, finding differences between men's and women's attitudes and behaviour but also revealing that other social factors, such as age, education, household composition and size influence energy demand patterns. [96,98–100].

Furthermore, questionnaires as well as analytical methods regarding gender, energy and climate are today changed to encompass intersectionalities of various kinds [101]. Some countries are improving their data collection. For instance, the UK government collects household energy data in terms of a range of dimensions including household tenure (private/social rented and owner occupier), household composition, ethnicity, age and employment status to create a more nuanced understanding of household energy access and to ensure that there is no discrimination in access to energy services [9].

However, the data issue is complex. Data gathering is hindered by increased privacy legislation as well as lack of transparency on behalf of energy companies. The gathering of gender dis-aggregated data also leads to issues of how to measure certain shared activities in the home, such as watching TV, and how to reflect fluidity of household composition [102]. Even with statistics for women and men as groups we are stuck with a binary understanding of biological sex, which silences people who do not identify with the binary categories. Quantitative work with household-level gender data tends towards generalized claims regarding gendered aspects of user circumstances which scholars argue may obscure contextual specificities [103]. In contrast, Fraune [104] provides an example of an exploratory approach that uses small-sample statistics to tease out what institutional and cultural factors that may explain the overrepresentation of men in renewable energy associations, thus providing a nuaced discussion around agency and capabilities to participate [see also 101].

3.1.4. From sex, to gender, to intersectionality

Within the energy research landscape, exclusion of women has been historically identified as the central power differentiator along with class in shaping energy poverty, energy access as well as participation in decision-making [105]. However, the majority of studies that analyze "gender" do so without anchoring in theories about gender relations. Instead, gender is commonly used synonymous to biological sex and assumed to be a self-evident category. In more recent years, relational, sociomaterial and intersectional feminist perspectives are finding their way into energy studies [106]. These focus on the co-creation of male and female gender roles, how these intersect with class and other important social hierarchies, and how these may change in relation to new technologies and patterns of energy use. The theoretical bases include gender studies and social practice theory [107], feminist economic and human geography [108,109], feminist technoscience [110–112], feminist political ecology [113–115] care theory [116] and materialist ecofeminism [117,118]. Our review shows a richer theoretical base in later years, which has also enriched the empirical analyses. While scholars employ different lenses depending on their disciplinary backgrounds and positioning in various fields, the "gender-only" analyses are increasingly giving way to intersectional analyses that unpack a *nexus* of social categories and power relations. Gender and energy research has yet to significantly address the issues of coloniality and the impact on non-binary gender roles which exist in indigenous communities and how this links to the vulnerability of indigenous peoples [119,120].

Despite these contributions, a review by Johnson et al. [121] substantiates the argument that there remains an important gap in careful intersectional analyses. Similarly, Bell et al. [111] argue for the need of applying intersectionality as a lens to identifying diverse energy needs, as basis for designing energy systems based on deepened democracy, community economies, care for people and planet. Intersectionality offers a more complex conceptualisation that examines how contextually specific collective identities are formed around categories of social difference which mutually construct and reinforce eachother, including but not limited to gender, race, class, age, religion, caste, nationality, education, sexual orientation, marital status, ethnicity and physical ability [122–124].

3.1.5. The need for mixed methods and context-sensitive explanatory models

Many critical scholars conclude that statistical studies of user behaviours or attitudes are inadequate as a basis for policy. Beyond correlation, scholars argue that effective policy needs to be based upon an understanding of context-specific causality, which demands the use of qualitative methodologies and research programs employing mixed methods and relational approaches that work with dynamic and social categories rather than assume static and homogenous social groups [9,95,109,125].

Qualitative methods can unpack the relational dynamic within households, not as isolated units, but as embedded in wider social networks. Hargreaves and Middlemiss [102] argue that social relations on different levels (family/friends, communities/local governments/energy suppliers, identities) shape energy demand. The authors show how multiple identities and relations form access to and practices around energy services in Pakistan. Bartiaux et al. [126] apply a social class analysis of vertical and horizontal diffusion to understand how social relations and status affect adoption of new energy saving technologies, but find that the invisibility of many technologies reduce the social motivation to adopt these. Other studies hightlight how the networks and practices extend beyond the household, to women's roles outside the domestic sphere. Applying an entrepreneurial lens, Osunmuyiwa and Ahlborg [1] bring to light women's entrepreneurial activities as energy providers and users, and the way energy services intersect with cultural and economic barriers to women's economic independence in the context of Tanzania.

While statistical studies have been the target of critique, the framing of the socially motivated user also offers a tradition of rich and context sensitive qualitative case studies. In fruitful exchange with other fields, practice theory provides an entry point to energy use as embedded daily practice full of meaning [63,107,127]. A perceived strength is the "attention to both agency and structure, which makes room for (combining) both bottom-up and top-down dynamics of change, and which recognizes the mutual influencing and co-shaping of human actors on the one hand and objects and technological infrastructures on the other." [64: 815]. For example, Greene [128] uses a combined social practice and transitions studies approach, to explore through life stories how different individuals in Ireland have experienced the increased dependency on resource-intensive technologies in everyday practices during their own lifetime. Other scholars use daily practices as object of analysis to explore vulnerabilities emerging across domains, such as at the water-energy-food nexus [129]. A parallel and overlapping body of

work is anthropological studies of daily energy use and decision making power [94,130] and the energy culture framework [131,132] developed with the aim of understanding material conditions, attitudes, perceptions and norms, and actual daily practices that influence opportunities for behavioural change. Seeking to not only study, but initiate, change and reduce energy use in households, the ENERGISE project, undertaken in eight European countries [133] and informed by social practice theory, adopted a 'living lab' approach to heating and laundry practices, identifying how norms and routines differ across households and communities within countries.

In summary, the first two dominant frames are critiqued for narrow ideals, mistaken homogenisation, reductionist analyses and lack of contextualisation around who energy users are, due to methodological approaches that render diversity invisible and impose static and oversimplified categories. The third frame based in sociology has also received critique for depoliticised understandings of the socially motivated user, a critique that has resulted in theoretical and methodological advances.

The key contribution from critical theory scholars is that they offer alternative framings that are explicitly normative and political in their orientation to explain and address inequalities. Despite the relatively small number of critical theory-informed analyses of energy use and users, we find that with all these contributions taken together, a key conceptual shift has occurred that has also impacted mainstream energy studies, namely to discuss inequalities in the plural rather than singular modes of thinking. We are also witnessing work based on relational, socio-material and dynamic understandings of subjectivities—as opposed to the common use of static categories—that draw on advances in feminist and intersectional analyses of social hierarchies and relationships of power. These are increasingly adopted also in user-centred analyses.

3.2. Users and their envisioned roles in transitions

The second question guiding this review is how and why energy users are conceptualised as playing a role in global-scale energy transitions. How do studies that adopt the dominant frames answer that question, and what alternative answers are provided by critical theorists?

In the economistic frame, supply-side actors drive transitions and customers adopt new technologies marketed to them. Users, in their roles as consumers, are largely passive, with the exception that the ideal user is interested in technology and readily adopts new technologies and provide feedback how to make these more user-friendly. The behavioural frame considers social and psychological motivations and barriers beyond the financial and recommends tailored marketing strategies, e.g. providing the right information and price signals to different groups of consumers to save energy and invest into greener technologies [134–137]. These two frames are criticized for assuming a narrow, passive and quite static role for users. The third, sociological frame places much more emphasis on the agency of users, differentiating between early adopters, the majority and laggards, but also identifying active roles where users drive transitions [32,138].

3.2.1. Recognising how transitions may empower or undermine the agency of diverse users

In the context of high-income Western economies, the critique leveraged against especially the economistic and behaviouralist framings targets the masculinist ideal of the tech-savvy consumer as providing the energy transition in the home. This ideal for "smart" energy users overlooks the messy and gendered activities of household work. The larger part of household practices that relate to washing, food preparation, cleaning and caring in many cultures have been (and still are) predominantly performed by women [139–141]. As some critiques highlight, the gendered domestic work contains further layers of social hierarchies, especially class and racial hierarchies, that are being reproduced in visions of the smart home [142,143]. Mechlenborg and Gram-Hanssen [144] argue that not considering the gender dimensions of everyday practices of new technologies may debar the implementation and domestication of sustainable consumption goals. This is because proposed changes to user practices, such as time-shifting, may predominately affect activities performed by women. A multi-case study of residential smart grids in the Netherlands show impact on household management, where residential smart grid pilots negatively affected experienced control, comfort, safety and trust among household members [145]. Illustrating an alternative approach, a design research study presented innovative prototypes for energy interfaces, where household management—instead of energy management—was the point of departure in the co-design process as part of a norm-critical process [146].

Expanding this critique, the commonly used term "flexibility"—in relation to the demand side—effectively frames an ideal electricity user whose living circumstances enable them to be flexible, with other users with less "flexibility capital" are disadvantaged in such a system [6,147,148]. Johnson [149] identifies a companion to the tech-savvy man—the "flexibility woman" who delivers the flexibility asked of domestic energy users by electricity suppliers. This critique questions the idea that domestic users happily provide the flexibility of the smart home, documenting in the context of the UK how women in the traditional role as bearing main responsibility for domestic chores are forced to adapt, adjust, and shift domestic energy use to reduce energy costs in the new pricing schemes (time of use tariff and a critical peak rebate scheme) that are increasingly imposed on domestic energy users.

At the community level, scholars document how top-down implementation that assigns the passive role of consumer to local communities meets with fierce resistance across many countries. Studies find that many communities react to renewable energy projects and oppose these especially when concerns around justice and social inclusion are not met [150,151]. Lennon et al. [152] document citizens' perceptions across five European countries and find a strong sense of frustration with being locked out from decision making processes and a desire for real agency in the energy transition. Similarly, indigenous communities in remote locations reject the passive role assigned to them by external actors in renewable energy programs across Canada [153].

In low-income economies, a long-standing feminist critique questions assumptions underlying energy policies, programs and projects that assume that women are "beneficiaries" of renewable energy schemes, but ignore them as the agents and allies, who will enable the transition [1,109,154]. Frames that fail to problematize gendered division of work often reproduce the patriarchal norm that women's natural role is in the household, providing for the family [see for example 155]. Well-intentioned programs that target energy poor women commonly seek to address energy poverty by giving women improved cookstoves, thereby reflecting institutionalised gendered norms that women are the ones to cook for the family [156]. An alternative approach would be to treat it as an open question who in the family does the cooking, to be answered before a household is enrolled. Further, many women engage in income earning activities that, if supported, could more effectively address energy poverty as compared to receiving improved cookstoves. On the other hand, it should not be assumed that women will automatically opt to engage in income earning activities if their time poverty is reduced by labour saving equipment. Women in South Africa said they were not interested because they were tired, harassed and wanted to rest [157] while women in Sri Lanka said they wanted to use gained time for resting, socialising and watching TV [158].

What is specific to critical theory analyses, as compared to studies based in the mainstream depoliticised frames, is the explicit focus on oppression and emancipation. The resulting perspective is one of energy system change as deeply political, shaped by power relations, multidimensional, involving behavioural and cultural change, where adoption of new technologies and acquiring new skills always comes with a tension between empowerment and dominance for users [4,14,15,159–161]. A central aspect of this literature is the explicit recognition that the ways in which users are imagined by actors to (not)

play a role in transitions can dispossess them of agency [30,162,163], with alternative narratives marginalized because they are promoted by groups who are marginalized themselves [90]. Scholars allege that this passive role and narratives that place agency in centralised and technocratic institutions are explicitly promoted by incumbent actors, with the intention of extracting continued profit at the expense of marginalized communities and people [161,164]. As Campbell et al. [39] point out, the donor logic takes for granted that the "community" is a given and clearly delineated category, ignoring the spatial and relational fluidity and flexibility of social networks. Commonly, the mini-, micro- or nanogrid is assumed to provide community energy and ends up defining the spatial boundary of the alleged community. In contrast, the authors map communities of interest and practice in relationship to energy projects and find a rich web of relations and pathways for change [39].

3.2.2. *Recognising the complexity, dynamism and unpredictability of user behaviour*

Critical scholars also evidence how user behaviours are not at all static, but complex and dynamic—something that statistical analyses commonly fail to capture. One argument is that attempts to recreate, operationalise or indeed map certain expressions of energy users should also attend to the fact that in some instances practices may be both stable and shifting. Here, studies employing time-use survey methodologies have shown interplay between rival practices emerging and disappearing as they may be competing among each-other, but also continued gender divisions in terms of time devoted to domestic practices such as food preparation, cleaning etc. [140,165]. Another temporal aspect of user agency in energy transitions is that the demands placed on users shift in character across transitions phases, which the literature has attempted to map [32,33,166] as well as complicate by highlighting the multiplicity and varied forms of participation and resistance [167–169].

A second insight is that users may change behaviour in non-linear ways in response to short term shocks and long-term pressures, which became evident during the Covid-19 pandemic. During the first year of the pandemic, energy use changed dramatically. Balest and Stawinoga [170,9], register "a strong and quick change in almost all energy practices" in Italian households during the first COVID-19 lockdown in Italy. Another shock came at the end of the pandemic with dramatically higher energy prices for users in European countries, following Russia's war on Ukraine. With the existing gendered inequalities, female-headed households in the EU are less resilient to absorb shocks and crisis like the pandemic and the spike in energy prices. Inflation was added to the existing financial burden of female-headed households making them more vulnerable to energy poverty [171]. The energy crises led to significant reductions in household energy use across multiple countries [172], illustrating that societal shocks shift energy use behaviours in significant ways with a dramatic effect for those households that are already marginalized and vulnerable.

Evolving demands on user behaviour interact with diversity in consequential ways. In particular, care-intensive households including those with young children, elderly members, or members with disabilities face distinctive and intensifying challenges as flexibility becomes a central expectation of energy users [149]. The rhythms and obligations of care work are not easily reorganised around grid needs, which can compound existing inequalities in who can adjust, on what terms, and at what cost. In summary, emerging and shifting roles point to the value of understanding energy users through dynamic and contingent categories. They reveal the need to adopt a flexible stance to conceptualizing energy users that is sensitive to the ways in which various roles may evolve, connect, merge, collapse or shift within evolving contexts [166,167]. It follows that efforts to map energy users are unfolding and that the work of allocating categories will remain "an exercise in hitting a moving target" [173,5].

3.2.3. *From prosumers as smart individuals and frontrunners to democracy activists and energy communities*

Not only are user practices changing over time, but there are also 'new' types of users emerging that are impacting the transition in different ways. The group of prosumers among households and local-level collectives is growing from the group of actors engaged in decentralized generation, storage and distribution in stand alone and local grid systems [174], to new groups in the public who are prosumers connected to the centralised grid [33,175]. The literature on prosumers put forward quite different imaginaries and visions for this group that signal divergent political and ethical standpoints, which is also true among prosumers themselves [176]. Part of the literature treats the prosumer phenomenon as an aspect of the "smart grid" and the innovators and users enrolling as technological frontrunners and ordinary people who see a chance to reduce their energy costs and emissions by installing solar panels [177,178]. A different part of the literature views prosumers through an explicitly political lens, as actors showing the ambition to store, distribute and use community-level generated renewable energy as a means of community empowerment and transformative politics.

As we move from the particular interest in this "new" user type, to a broader focus on decentralized energy, the prosumer role is secondary and the key concepts are "energy democracy", "energy citizenship", "energy communities", "energy justice" and "just transitions", many of which are contested concepts that are open to different interpretations by both practitioners and scholars [179–184]. Most work on individuals or collectives that operate/promote distributed generation and distribution do so using one or multiple of the terms energy citizenship, energy communities, energy democracy and energy justice.

The term energy democracy and the scholarly discussion thereof has its base in social movements and activism, which is reflected in framings using social movement theory [175,185,186] or political theory more broadly [179]. Centring human actors and collectives, this work is thus strongly anthropocentric in focus. Critical theory approaches are present in these discussions and balance overly optimistic accounts with attention to the power relationships, norms and institutions that reproduce technocratic imaginaries, social hierarchies, exclusion and inequity within these heterogenous communities [3,39,111,187–189]. For example, MacEwen and Evensen [188] critique both the activist movement and scholars for failing to recognize the gendered dimensions of the transition to energy democracy. Studies from Germany [104,190] demonstrate the gender gap in participation in renewable energy citizen associations, highlighting the interplay of institutional and cultural factors and in particular the gender wealth gap and gendered occupational segregation as key contextual factors. While critical scholars have questioned optimistic accounts, they also highlight the potential for disturbing the established regimes of power and achieving simultaneously the goals of racial justice, gender justice and energy justice, both by operating decentralized energy system, but also by intervening into spaces where energy planning take place and actually influence decision-making in both small-scale and industrialised energy systems [1,106,161,191].

Reflecting on how the various framings matter, we can see that these place emphasis on *different power relationships*: between the individual user in relation to the utility, the neighbours or other prosumers in a sharing or trading networks [33,192]; between the collective seeking to take control over its own energy use and its relationship to incumbent actors that set the rules [185,189]; as a social movement/civil society organisation in opposition to fossil fuel and nuclear industry [182]; as part of a wider social struggle for emancipation where energy infrastructure is one aspect [161,191]; or relationships within the movement/collective and challenges of governance and decision-making [187,188]. Examples of going beyond the anthropocentric framing is Lennon's discussion on decolonizing energy, a discussion that brings Black and Native American voices to leverage ontological and epistemological critiques [161]; Siamanta's vision for community renewable

energy ecologies [3]; Mookerjea's [193] proposition for "subaltern counter-environments" and "molecular media" as utopian regenerative praxis to decolonize energy democracy; and studies using new materialist and relational framings that places networks and assemblages in focus without losing sight of power relations and users of these systems [160,194].

3.2.4. Highlighting overlooked justice dimensions in the policy realm

Building on the preceding discussion of community-level action, this section examines how justice-oriented framings (energy justice, just transitions) broaden the focus to inclusion, power imbalances and social difference. While the energy democracy frame typically forefronts local-level collectives who engage and shape energy systems and transitions bottom-up, studies that forefronts the policy-realm and how it conditions sectoral change top-down are commonly conceptualised either in terms of energy justice or just transitions. This debate tends to focus on people's ability to participate in and influence energy decision-making, and effects on individuals and groups. Introduced via the field of environmental justice, the energy justice concept has found its way into energy studies in multiple variants[5] [181,195–199]. Most influential is probably the so called "three-tenet" framework which conceptualizes justice along the dimensions of recognitional justice (concerned with the appropriate identification and acknowledgement of stakeholders, which can include collectives of users if they organise legally), procedural justice (focused on fairness and transparency of decision-making), and distributional justice (how are benefits and ills distributed across groups in society).

The 'just transitions' term has a somewhat different origin. It originates in the labour union movements of the 1970–80s in the US that sought to protect the rights of workers when environmental protection laws came along [200,201]. With the environmental justice movements, it started to be associated with fairness and equity for groups beyond workers. While not explicitly focused on users, the notion has broadened in recent years and now captures a range of justice concerns, beyond job losses in male dominated fossil fuel industries.

Critical scholars have engaged with both energy democracy and just transitions and proposed modifications or alternative framings which we now exemplify. The three dominant user framings—the rational, the behaviourally predictable and the socially motivated user—align with justice conceptions that are grounded in Western philosophy and scholarship on law, and thus depart from the individual as rights holder. Highlighting the risk of uncritically exporting Western frameworks without sufficient attention to context, Lacey-Barnacle et al. [202] see potential to draw on other philosophical traditions. Further, scholars adopt feminist and decolonial theory lenses to expand the view of a "just transition" to imply a transitional process that seeks fairness and equity with regards to concerns such as wealth, energy, gender, race, human rights and climate inequalities [12,156,193,203].

Feminist scholars have explored energy justice through a gender and equity lens, focusing on women's leadership in the energy transition [191] as well as the way gender inequalities intersect (see section 3.1.4) with other contextually-specific socio-economic factors [204]. Feenstra and Özerol [205] reconceptualise the three-tenet framework by integrating it with gender approaches in energy policy, and argue that the gender dimension is interlinked with the spatial aspect of energy justice and that both are needed to contextualise the understanding of inequalities. In contrast to a "social inclusion" framing, that runs the risk of becoming gender neutral, their framework brings gendered power assymetries to the fore across all three tenets.

Seeking to address the hidden costs of our daily energy use, Hall [196: 433] draws on debates on ethical consumption to highlight the "ethics of energy consumption" and suggest that a "renewed sense of scale regarding the global inequalities of energy use" can support demands for giving consumers more insight into effects along the entire commodity chain. Sovacool, Turnheim [206] explores the political ecology and economy of decarbonisation to highlight injustices, dispossession and vulnerabilities across the whole system. Drawing on cosmopolitan[6] justice, Healy et al. [207,219] proposes the concept embodied energy injustice to"explicitly consider hidden and distant injustices (upstream or downstream) arising from the extraction, processing, transportation and disposal of energy resources. These interlinked chains of injustices are routinely overlooked or omitted from energy policy decision-making because they (a) typically fall outside the formal remit or jurisdiction […], (b) occur in different geographical jurisdictions, or distant locales, disconnected from sites of combustion and consumption, (c) occur on different timescales, and (d) are often hidden or removed from centers of political power". The authors explicit focus on transboundary injustices and the failure of legal systems and policy to address "place-based injusties as part of an unjust global order" [207,230]. From different theoretical angles, these studies question that underlying global inequities can be left unadressed.

In contrast to the Western liberal and individualist framing, Groves et al. (2021) mobilise two relational approaches—the capabilities approach and care ethics—which expands the discussion from one of rights to obligations. This is to better capture the complex situations of daily energy use in social webs and unequal power relations [see also 102,208,209]. While the rights-based approaches "emphasise the importance of considerations relating to individual liberty and worth, such as autonomy and dignity", the "ethics of care emphasises the importance of unequal vulnerabilities, along with unequal distributions of power and related distributions of responsibility for the well-being of others" [84,249]. Similarly, scholars place care work at the centre of their discussion of what justice along the value chain means, work that is commonly gendered but necessary for providing welfare while also being low-carbon, thus highlighting how energy use here and now affects people and ecologies elsewhere and in the future [111,154].

3.3. The effects of user framings for energy policy and practice

The third question that informs this review is the question of what effects dominant user framings have for energy policy and practice, or simply put, why it matters? Critical scholars argue that the dominance of especially the first two framings matter as they inform current energy policy to a large extent. Given that the dominant economistic and behaviouralist paradigms are founded on at least partly inaccurate assumptions around who users are, how they behave, why they behave the way they do and the role they play in transitions, the evidence base for policy is thin at best, and misleading and harmful at worst.

A first point of critique is that policy makers treat policies as neutral, assuming there are no significant differences between women and men as user groups, suggesting that they use and benefit equally from current energy systems [10,205]. Lack of representation and lack of data are important reasons for the persistence[7] of the neutrality of energy policy and why gender differences and women's needs are invisible in policy-making [23,96]. Even when disaggregated data exist, the question of how to interpret it and what it means in terms of policy action is not

[5] Heffron and McCauley (2017: 660) identifies three main approaches: the three tenets framework, a principles based approach and systems based approach. To this they add"restorative justice" that aims to "repair the harm done to people (and/or society/nature)" to push policy actors to think about the costs involved in rectifying harms done, which may lead to decisions to avoid those harms.

[6] Cosmopolitan justice acknowledges a common humanity and therefore a responsibility to consider global justice implications.

[7] Other factors that contribute to gender blindness in policymaking include a lack of women's representation in policy-making institutions, the dominance of men in utilities and large-scale energy using sectors (industries), and a low representation of women in STEM education.

straightforward. If, on the production side, actors use the data available without applying a critical analysis, this is more likely to continue the status quo than to lead to broad changes in user practices. Illustrating this difficulty, Smetschka, Wiedenhofer [210] examine the carbon footprint of the daily activities of women and men in Austria via a time-use survey. Their study confirms the existence of traditional gendered divisions of tasks and demonstrates that women as a group tend to dedicate more hours to caring and household, and therefore their CO2 emission are perceived as higher. If policy-makers focus on the high numbers and draw the conclusion that women's energy behaviours need to change, they miss the reflection around the factors behind the numbers. A related risk is that essentialist assumptions around gender roles may also miss the slow but significant change in norms and visions around the home. Focusing on the United States, Kimmel and Messner [211] document how new forms of western domesticity have increased the fluidity by which masculinities are performed within the home, giving men "access to homemaking, self-expression and meaning" [212, p. 640].

Further research has demonstrated the influence of multi-dimensional social hierarchies and relations, beyond gender, resulting in the insight that socially blind policy neglects the differential impacts they have on varied socio-economic and cultural groups, in addition to gendered effects [96,140,213,214]. This social blindness can render policies ineffective or counter effective [215]. For example, Bartiaux et al. [126] find that technology subsidy programs in Belgium and Portugal primarily benefit the rich and proposes modifications to policy that would strengthen vertical and horizontal diffusion and reduce environmental injustice [see also 100,216,217]. Skjølsvold et al. [218] find that technical solutions provided by producers and policy actors are not received in households in the way that they were intended, and thus do not produce expected outcomes in terms of efficiency and uptake. In India, a government program aimed to enhance energy access for women in marginalized households to ease women's workload and reduce adverse health effects. The main focus was on distributing efficient cookstoves and LPG gas to the beneficiaries, yet the program largely failed to meet its objectives as technology adoption failed, due to unaffordability. The resource investment may not have been lost had the program been designed based on the socioeconomic reality of its beneficiaries [116,156].

To summarize, the contribution from critical theory-based scholarship is the insight that effective policy and practice needs a rich and context-sensitive base of evidence that pays close attention to energy users and the multi-dimensional factors that shape people's energy use practices. There is need for a balance between group-level analysis and more fine-grained studies, and ambitious programs that use complementary data sets and mixed methods. We cannot understand the statistics without qualitative and socially perceptive analysis that captures user agency and intersecting relations of power. For qualitative and quantitative approaches alike, intersectionality suggests a *care for context* that can be realized through explorative studies, multi-phase and longer research commitments together with ensuring strong contextual knowledge in the research team enable better research designs and solid bases of evidence.

3.4. Future research directions to repoliticise the role of users

Having outlined the state of the art of the critique of dominant conceptualisations of *energy users*—who they are and what roles they play—in energy research we wish to point out broader advances in critical theory that can enrich and advance user-centred energy studies. We will highlight those fields/bodies of work that are missing yet can mitigate some of the fields current gaps: studies departing from decolonial, indigenous and feminist critiques of Western ontology and epistemology; studies mobilizing relational and open frames to explore work and meaning, norms and practices in households and social networks that fall outside the dominant heteronormative family model; and how these critiques open up questions of spatial and temporal politics.

3.4.1. Critical perspectives on Western narratives and knowledge politics

In the current discussion on energy users in transitions, most analyses depart from a Western, modernist narrative around progress and development. The ecomodern view that we can technologically innovate our way to sustainability firmly locates global agency at the centres of high-tech research, finance and political power that uphold the current energy regimes. In this narrative, users play a marginal role in the transition although tech-savvy users are presumed to ave. greater capacity to contribute to low-carbon transitions. Low-income communities and segments of the population without access to electricity, smart phones, or possession of digital skills are bereft of agency—essentially cast as victims or left out of the story.

Key resources that work against this narrative include, first, the post/decolonial critique of how scholars—including feminist and socialist—fail to acknowledge experiences of coloured people and the exploitation of the "other", as marginalized communities in the West, and as labour and places for resource extraction and environmental destruction in global value and commodity chains [219–221]. These critiques were crucial for unpacking "women" as a homogenous group and advanced the understanding of intersectionality. They have also spotlighted the victimization of "the third world woman" as oppressed by patriarchal norms, in contrast to liberated white Western women [219,222]. This tendency of *victimization* is reflected in the gender-oriented analyses in our energy user sample. Victimization robs the subject of agency and reinforces stereotypes. In this case, it reproduces women as homemakers with no role in the public sphere of emerging energy transitions [121,223].

Second, decolonial, indigenous and feminist scholars have profoundly critiqued the ontology and epistemology of Western science that establishes value hierarchies based on gender, race, class (and many more categories of difference), and between Science and other knowledge systems, as well as dichotomies between society and nature, mind and matter, reason and emotion [224–230]. Some energy scholars mobilise these perspectives to address the knowledge politics and epistemic injustices present in both scholarship, policy and practice on energy transitions [16,17,106,111,154,161,193], but the examples are few. We are also seeing emerging critiques targeting sustainability transitions as field of study and policy [18,180,231–234].

Here, we wish to make a distinction. While our database searches indicate that there exists work *on* indigenous groups—especially in relation to conflicts around land acquisition and dispossession—it is less common with work *from* an indigenous perspective [229,233,235,236]. This is the same tendency as we see for work *on* gender, *on* poor rural communities or vulnerable groups in low-income countries. The shift towards working *from* a lens deeply informed by these people's experiences, worldviews and knowledges is something different, and an important research frontier.

3.4.2. Critical theory that opens up the everyday beyond predominant norms

A key finding from our review is that the norm of heteronormativity underpins almost all energy use research. It is methodologically challenging to collect data on social minorities. Yet, researchers also reproduce dominant norms through standardized categories and biased interpretation. The pre-defined category the "household" as a traditional heteronormative family unit is a good example of how statistical studies may ignore empirical diversity of household constellations that transcend cultural, geographical and religious boundaries [237], but also render invisible other ways of living—and thus some people. A research frontier in user-centred energy research is thus to explore dynamic and diverse household constellations both qualitatively and statistically.

Another frontier is exemplified by the study of Mechlenborg and Gram-Hanssen [212] who scrutinize masculinities as a core lens through which they explore domestic energy use. Work on masculinities is very

rare in the user-centred literature, but resources exist, albeit without the explicit focus on users, in work on dominant energy sector norms [238]. In particular, scholars explore norms and masculities among energy workers in extractive industries such as coal, gas and oil, hydropower developments, as well as in the nuclear industry [239–242]. One example of this is the Canadian context, where debates about energy extraction and pipeline construction have been very masculinist in orientation and language [239]. Such norms manifest in a particular view of technology and resource management often connected to historical views of resource use, as well as entangled in colonial and industrial modern narratives of control, large-scale innovations and technological, rather than social solutions [243–245]. Resistance to sustainability transitions is also often motivated by expressing such norms [246–248]. This body of work provides a theoretical starting point for further user-centred studies, and it is an open question if and how the norms of "industrial/breadwinner" and "ecomodern" masculinities play a role among users across geographical contexts, and if there are other types of masculinities emerging.

Lastly, scholars are rethinking the role of labour in energy provision. Women's labour to provide for households energy is a central theme in the literature from low-income countries. Recently, advances in conceptualisations of care work are placing caring work and care for other living beings and for nature at the centre of ethics, values and strategies necessary for an inclusive and sustainable energy transition [84,116,154,249]. Here, "energy care work" extends the concept beyond the care for home and people, to care for wider ecologies, and infrastructures necessary for public service provision. Linking care work with epistemic justice—alongside care ethics and the capabilities approach—provides a relational, power-sensitive framework for future user-centred studies. Coupled with innovative methodologies, this framework opens avenues to explore everyday energy practices and their multiple layers of meaning, and how these vary across different social contexts and groups.

3.4.3. Critical theory in relation to spatial and temporal politics

As indicated by this review, research on users in energy transitions that forefront power relationship, injustice or exploitation commonly apply intersectional lenses. However, there is need to deepen the critical theory understanding of the spatio-temporal politics of transitions. Terms like "acceleration" and the "urgency versus justice" are prominent in the literature [38], but only partly explored with focus on energy users. Explicitly grounded in decolonial and intersectional perspectives, Kumar et al. provide an in-depth discussion and draw attention to four user-related areas of concern: "carbon colonialism, democracy and distributional justice, reframing of public good as private commodity and its marketisation, and gender and racial justice" [250: abstract]. The scope for further work is large, as critical theory invites us to think through the topic of acceleration and urgency, both as phenomena we can observe, shaped by and reshaping power relations across geographies and political levels, and as narrative. We need to ask: the acceleration of what, by whom and with consequences for whom, where and when? Who benefits and loses from the differentiated pace? How do the narratives of acceleration and urgency affect diverse users across place and time? While these types of questions are not so commonly asked in the sustainability transitions field [18], they are central to the field of political ecology.

At a deeper level, critical theory, and especially indigenous and decolonial scholars, reminds us to question the underpinning assumption that the climate crisis is "new" and recognize it as based in a long history of enslavery, killing and exploitation of people and nature that has presented an existential threat to many communities for hundreds of years. In recognition of the roots of oppression, critical theory insists that we do not separate the social and environmental crises, believing that we can solve one first. Rather, it is the connection between multiple oppressions and axes of power relations that we need to see and address [251–253].

4. Conclusion

This review has sought to provide an overview of work that places energy users at the centre of analyses of energy sector transformation, and to highlight the state of the art in explicit and theoretically anchored analyses of power relations. To this end, it adopts a critical theory lens, foregrounding in particular feminist, decolonial, indigenous and intersectional scholarship, and situating these in wider debates. As argued by Patterson et al. [254], the political feasibility of decarbonisation must contend with a vulnerable, volatile and uncertain future. Inclusivity and social justice that seek to align decarbonisation with other pressing issues are key to ensure a feasible pathway towards decarbonisation. Far from a rational process that carefully weights costs, benefits, tradeoffs and risks, the research here reviewed shows that energy transitions are political struggles shaped by, and reshaping, relations of power, where local level users are seen as playing crucial roles in challenging the status quo.

The review has identified three dominant understandings of users, based in neoliberal economic theory, behavioural science and sociology, but these are challenged by other perspectives on users that depart from a normative agenda of empancipation or justice. When contrasted, the diverging framings illustrate how differently the "politics" emerge and how any frame brings certain actors and relationships to the fore and drop other from view. While framings that explicitly attend to power relations are still marginal in size relative to the wider contributions within social science and interdisciplinary energy research, the past two decades have brought significant advances and we are now at a place where 'users' are understood as an umbrella term hiding huge diversity—here evidenced to fundamentally challenge fictious ideals and homogeneity. Further, disciplinary boundaries are trespassed, fruitful interventions are taking place and the push for change comes from all directions.

From the perspective of the author team, the value of undertaking this exercise of deconstructing understandings of energy users in research is threefold: firstly, the review confirms that research with strong conceptual anchoring in critical theory challenges dominant framings and holds crucial insights into social power dynamics and their messy, fragmented and multi-layered relationship to technology, people, institutions and nature. Despite the limited scope, it offers a resource for further exploration of how energy use, social hierarchies and energy politics co-emerge, and gathers evidence of how user representations come to matter in policy and practice.

Secondly, the review has highlighted a remaining weakness in that even when critical theories are deployed, they often take a siloed approach (focusing for example on either households or macro-level, or remains strongly anthropocentric while overlooking broader ecologies in which people are embedded). This misses out on the entanglement of processes and practices that shape the users' contribution and place in the proposed transition. Here, the collective review process has enabled a broad and encompassing discussion across conceptual, methodological and empirical questions but also identified important knowledge gaps that need addressing.

Thirdly, the review has help clarify how and why critical theory scholars argue that energy user research is "depoliticised" to a high extent. This relational contrasting of user understandings and their resulting policy recommendations should provoke intra- and inter-field discussion and hopefully the curiosity or researchers, communities and journals to challenge their own established frames of reference in a process of transformative change of both knowledge making and energy sector practice.

What does this framing mean for pathways to desirable energy futures? The critical theorist's analytical task is to analyze all forms of oppression so as to identify actors and strategies that can work against oppression and for emancipation. This leads to the question: Desirable for whom? The question recognizes the dilema inherent to renewable energy pathways as these largely (re)produce exploitative political

economies, historical injustice and, in many places, violent conflict. Yet, critical theory seeks to address oppression, rather than dismiss the idea of change. This means continuous hard work to move towards open, reflexive and responsive political systems that allow for alternative, less exploitative configurations, more reciprocal relationships and ways of providing for societal energy needs that minimise harm and sustain life. This review has sought to bring marginalized ideas into the centre, making alternative framings visible. As raw power exercise is becoming more visible in energy politics, there is need to create space for other voices and bring attention to how communities operate in response to challenges but also proactively create other systems.

CRediT authorship contribution statement

Helene Ahlborg: Writing – original draft, Methodology, Funding acquisition, Conceptualization. **Olufolahan Osunmuyiwa:** Writing – original draft, Methodology, Conceptualization. **Joy S. Clancy:** Writing – review & editing, Conceptualization. **Niall P. Dunphy:** Writing – review & editing, Conceptualization. **Marielle Feenstra:** Writing – review & editing, Conceptualization. **Sylvère Hategekimana:** Writing – review & editing. **Beatrix Hausner:** Writing – review & editing, Conceptualization. **Kate Hooper:** Writing – review & editing, Conceptualization. **Martin Hultman:** Writing – review & editing, Conceptualization. **Breffní Lennon:** Writing – review & editing. **Kavya Michael:** Writing – review & editing, Methodology, Conceptualization. **Alexandra Revez:** Writing – review & editing, Conceptualization. **Sam Unsworth:** Writing – review & editing, Conceptualization. **Anna Åberg:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.erss.2026.104814.

Data availability

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

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