Title: Towards energy care ethics: Exploring the ethical significance of relationality within energy systems in transition

Keywords: energy ethics ; care ethics ; Q-methodology ; low-carbon transition ; Denmark ; UK

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Abstract: Social science energy research is asking important questions about the social, political, and economic implications of energy transitions, and the consequent changing roles and relationships in the energy system. This has given rise to ethically driven research agendas, with an increasing focus on the need to better understand how people relate in their daily lives, both to mundane dilemmas around energy use, and to bigger questions around energy systems and energy system change.

Based on insights from empirical Q-methodological research in Denmark and the UK, this article illustrates relational understandings of energy systems and a language of dependence, necessity and needs as important elements in how people make sense of the energy transition and their place in it. This challenges dominant frameworks and discourses of energy and energy transitions rooted in individualism and a language of individual responsibility, rational choice and/or individual rights and justice. In this article, we argue that a recognition of relationality and (inter)dependence as basic conditions of existence, and as basis for ethical reasoning in everyday engagements with energy in transition, is key to reflecting ways of relating to energy ethicalities in the everyday. This speaks strongly to recent advances of relational theories of energy systems and transitions, but calls for a recognition not only of inter-connections and relations, but of their ethical significance. To this end, we engage a feminist theory of care and care ethics in a proposition to 'think energy with care'.

1. Introduction

Energy ethics is a growing area of energy social science research. Over the past decade, a language of fairness and rights has become established in energy and society literature; energy is increasingly viewed from a perspective of social justice, giving rise to the concept of energy justice [1,2] as the main contemporary framework for understanding ethical issues pertaining to energy [3]. Building on the concepts of energy and fuel poverty and the social movements around environmental and climate justice, energy justice is proposed as a cross-cutting social science research agenda [4], a conceptual, analytical and decision-making tool for philosophers, researchers, and policymakers [5], and a framework for addressing the three (conflicting) dimensions of the energy trilemma [6]. This is a now well-developed body of literature, associated with a clear conceptual framework, which sets out a rights-based understanding of distributional, procedural and recognition justice in the context of (frequently large-scale, centralised) energy development.

But while energy justice has proven effective as a tool for analysing institutional processes and policy decision-making, and in framing policy discourse around justice concerns, it is less suitable in (and was also not developed for) addressing ethicality at the level of individuals and

everyday energy encounters. Instead, emerging anthropological work on energy ethics deserves greater attention for exploring everyday ethicalities around energy. A growing body of research into the anthropology of energy, presents an alternative account of energy ethics, as documented in two recent special issues of Energy Social Science Research [7] and the Royal Journal of Anthropology [8], respectively. A similar understanding of energy ethics as arising out of everyday engagements with energy and energy transitions and how energy interacts with everyday judgements about what is deemed to be good or valuable underpins our discussions in this article.

Drawing on insights from empirical Q-methodological research, this article illustrates relational understandings of energy systems and a language of dependence, necessity and needs as important elements in how people make sense of the energy transition and their place in it. This challenges the dominance of frameworks and discourses of energy and energy transitions deeply marked by individualism, relying on a language of individual responsibility, rational choice and/or individual rights and justice. Instead, this article argues that a language of (inter)dependence, necessity and needs may better reflect people's own ethical sensibilities. We argue that a recognition of relationality and (inter)dependence as basic conditions of existence, and as basis for ethical reasoning in everyday engagements with energy in transition, is key to reflecting ways of relating to energy ethicalities in the everyday.

This speaks strongly to recent advances of relational theories of energy systems and transitions, including relational accounts of participation [9–13], energy democracy [14] and visions of energy futures [15], but calls for a recognition not only of inter-connections and relations, but of their ethical significance. To this end, we engage a feminist theory of care and care ethics [16–19] and explore the potential of care ethics to contribute to our understandings of ethics in energy transitions.

Notions of care are beginning to emerge within energy social science discourse, with exciting work around energy biographies [20], smart homes [21] and energy poverty [22] beginning to raise questions around care and relationships of care in the context of (low-carbon) energy practices. This article builds on these early engagements of energy social science literature with care, but proposes a more comprehensive engagement with care ethics to draw attention to the ethical significance of relational existence within energy webs.

2. Literature review: conceptualising care ethics

Care is an unfamiliar term in energy literature – academic and otherwise – and may at first glance seem out of place. But as Maria Puig de la Bellacasa [19] asserts, "exhibiting [matters of care] appears even more necessary when caring seems to be out of place, or not there". Care ethics recognise relationality and (inter)dependence as basic conditions of existence, and as a basis for ethical reasoning in everyday engagements. Exploring care within the context of energy presents an alternative way of rethinking energy ethicalities in the everyday. Crucially, by 'thinking energy with care' we consider the potential of care ethics for enriching energy scholarship and energy discourse more broadly. This section sets the conceptual basis for the paper, first exploring scholarship around care ethics, before moving on to discuss the extent of engagement with care within energy studies literature.

2.1 Care Ethics

Care ethical literature originates in feminist writing within psychology [23], philosophy [16,24,25] and political science [26–30]. This work draws attention to the critical role of care work in society, paid and unpaid, formal and informal, and particularly to the gendered and undervalued practices of caring. While much work on care has explored specific instances of care work [31], literature on care has also given rise to broader theorising of care as "a generic doing of ontological significance" [19] and caring relations as the basis for a comprehensive ethics with social and political implications.

The value of care ethics for energy literatures lies in its relational ontology, its attention to interdependence and its conception of caring responsibilities. In its relational ontology, care ethics offers an alternative to traditional moral and political theories, challenging the common ontological assumption of the autonomous rights-bearing individual at the heart of much contemporary theory (and politics) – including energy justice [1] and energy citizenship [32,33].

In its rights-based approach, energy justice contrasts with common responsibilizing discourses around energy citizenship [32,33], and more generally around citizen-consumers, behaviour change and individual responsibility [34–36]. Instead, the concepts of energy equity and justice are centrally concerned with access to affordable energy and the absence of harm from energy extraction and production activities as basic human rights [2]. Thus, energy justice presents energy users and communities primarily as rights bearers, vis a vis political authorities and corporations as agents and the responsible parties [37]. A lack of theorising of responsibility in relation to energy justice has been critiqued [38,39]. Damgaard et al. [39] for example argue that an energy justice concept needs to embrace notions of rights, responsibility and agency as relevant for all actors in, and at all levels of, an energy system; especially if an energy transition will lead to more decentralised energy systems with citizens/consumers as more actively engaged agents. In rights-based discourses such as energy justice, obligation features as the respect for the rights of others [40]. In contrast, an energy care ethics takes its starting point in the lived experience of dependence and relation in energy webs, and the commitments and responsibilities arising therefrom.

From a care ethical perspective, dependence, not freedom or autonomy, is the defining condition of existence; dependence on others, dependence on the care of others. In contrast to conventional moral philosophies defining ethicality based on the goodness of an outcome (consequentialism, including Rawlsian and utilitarian perspectives), or based on a set of pre-defined, universal rules (deontology, including Kantian perspectives), care ethicists understand ethicality as arising out of the lived experience of relatedness and the responsibilities of care implied within these relations. In the words of Nel Noddings [17], "relation [is] taken as ontologically basic and the caring relation as ethically basic". For instance, Tronto and Fisher [26] define care as:

> "a species activity that includes everything that we do to maintain, continue, and repair our 'world' so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life-sustaining web".

This definition of care has subsequently informed accounts of caring democracy, and contemporary debates of care [19]. Sevenhuijsen [29] and Tronto [18], for example, developed a

political approach to care, placing care within conceptions of democratic citizenship and democratic politics to consider the requirements for and distribution of care in society. As Tronto [18] asserted, "once we recognize the extent of caring as a part of human life, it becomes impossible to think politically about freedom, equality, and justice for all unless we also make provisions for all of the types of caring". Such debates highlight that care exists in "everything that we do'' to live in the world "as well as possible", drawing attention to its relational and emergent properties. Moreover, Maria Puig de la Bellacasa's [19,41] insightful work on care in more-than-human worlds challenges the 'our' and the 'we' in Tronto and Fisher's [26] definition, moving debate on, and way, from an originally anthropocentric ethic of care. Puig de la Bellacasa [19] explores care as distributed across manifold agencies, materialities and practicalities. Fundamentally, care ethics presents a vision of social life as relations between interdependent persons, persons 'being-in-common' [42], equal in our dependence on care[1].

Importantly, a care ethical approach encourages recognition of diverse perspectives as valid caring concerns. This does not mean that any perspective or any practice is good or caring or that all perspectives or practices are equally appropriate. Rather, it recognises the diversity of forms and expressions of care and the non-innocent nature of care and caring (a recognition that care is not by definition good, easy or unproblematic, but must be critically evaluated [16]). For discussions in the energy field, this offers a different, and arguably more productive, basis for debate and engagement, moving away from binaries frequently animating narratives around energy transitions (active/passive [33,43], engaged/disengaged [44,45], acceptance/opposition [13,46], implicitly mapping on to notions of us versus them, good versus bad, right against wrong). The complexities of energy systems, the magnitude of energy system change, the entanglement of energy processes and practices with all other aspects of life, require nuanced and sensitive understandings of diverse experiences, reasonings and perspectives, rather than black-and-white, oppositional discourse. Care ethical principles of plurality, communication, trust and respect for difference [29] are thus useful when rethinking notions of energy engagements and in advancing relational energy ethics shifting focus to a recognition of, respect for, but also critical reflection on the diverse and nuanced experiences, perceptions and caring concerns associated with being within energy webs in transition.

Care ethics has been subject to critique on a number of points. In particular, given the primacy afforded to 'thick', or near, relations and associated responsibilities, care ethics has been critiqued as inadequate in a global context. This is a key point of contention between proponents of justice theory and care ethicists. Where principles of justice are understood as impartial, universal legal principles, an ethics of care is inherently partial, it is contextual, embedded, and – arguably, to an extent – geographically (and socially) situated [47]. Much debate has focused on the possibility – or impossibility – of care as a guiding principle for an international politics and global (environmental) ethics [28,48–51]. Care ethicists generally acknowledge that geographically close relations of responsibility are likely to take priority over geographically distant responsibilities of care, but argue that this does not exclude the possibility of caring responsibilities across space [16,28,50]. Similar discussions exist in relation to temporally distant relations of care, with work in Responsible Research and Innovation [52–56], climate change,

[1] Notably, this does not suggest that all persons have the same needs for care. It is an assertion that caring needs are integral to every human life and as such, we are all recipients of care, even if the need for care varies between persons and over time [18].

sustainability and intergenerational ethics [57–59] arguing effectively for the ability of care ethics to provide an ethical framework for considering temporally distant relations of responsibility for care.

Another point of critique has centred on a risk of care ethics promoting an understanding of care and care work as 'natural' and feminine, and thereby hindering the empowerment of women, allowing for continued exploitation of carers and leaving women in a position of servitude [60–63]. Such critiques, however, focus largely on early work advancing 'maternalistic' notions of care, including, for example, Sara Ruddick's [24] seminal essay on mothering and moral thought and Carol Gilligan's [23] ground-breaking study of how girls develop moral maturity as an alternative perspective for interpreting moral problems. While these early works have been and continue to be important sources of inspiration for research on care and care ethical thinking, the literature has developed significantly, and critiques of early maternalistic, essentialist tendencies have little bearing on later developments in care ethical writing [16,64].

As notions of care begin to emerge in energy social science research, as discussed below, it is critical to learn from the development of these debates around care more generally, in order to address the ethical and political complexities surrounding care. We now turn to explore how energy research, to date, has engaged ideas relating to care ethics.

2.2 Care in energy research

While notions of care are beginning to emerge in energy social science research, this has yet to engage comprehensively with a theory of care. Meanwhile, the theory of care ethics has been explored more comprehensively in related fields, including ethical consumption [65–68], Responsible Research and Innovation [52–56], climate change, sustainability and intergenerational ethics [57–59], and engineering and maintenance and repair studies [69–73]. We focus in this paper on its nascent and future application in energy research.

Recent empirical accounts around smart homes [21] and energy poverty [22] begin to engage the notion of care. In their analysis of energy biographies, Henwood et al. [20], for example, employ notions of relational entanglements, dependency and care to frame practices of energy use and demand reduction within family life. Here, care is explicitly associated with energy practices within the context of family relationships, stressing relations of care between family members. Similarly, in their examination of how social relations influence energy demand, Hargreaves and Middlemiss [21] locate care within intimate interpersonal relations. They question current discourses targeting people as isolated individuals and call for the cultivation of new forms of social relations, based on multi-directional influence between 'energy citizens', agencies and communities (ibid 2020). While thus recognising the complex webs of social relations within which energy practices play out, Hargreaves and Middlemiss' [21] notion of care is not explored beyond intimate, inter-personal relations of families and friends. Yet feminist ethics of care stress the importance of considering care as a practice not confined to domestic life or intimate relations, hence care ethics offer significant potential for energy social science research, as a way to explore relations of care in energy systems more broadly.

In the context of energy poverty, Longhurst and Hargreaves [22] discuss relationships of care as a form of emotional engagement central to understanding the lived experience of energy poverty. This supports the care ethical emphasis on emotions and affect as valid – and important

– forms of knowledge [74]. Relations of care, and other forms of emotional and subjective experience, should be understood, Longhurst and Hargreaves [22] argue, not just as consequences of energy poverty but as inherent to both the problem of and solutions to energy poverty. Accordingly, notions of care within energy research ought to be associated with a recognition not only of the social relations within which energy practices are embedded, but also of their significance as emotional engagements, challenging the primacy of rationalist framings of behaviour, choice and forms of engagement [22,75,76].

These examples outline initial, promising, engagements with ideas relating to care in energy studies, contributing to ongoing advances in relational thinking around energy systems. Taking this a step further, we explore the potential of a care ethical approach to improve our understanding not only of inter-connections and relations within energy systems, but of their ethical significance. This is a consideration which remains largely absent from relational approaches associated with science and technology studies, which focus primarily on tracing routes and networks, seeking to account for inter-connections and relationships[19,77]. Exploring the ethical significance of relationality in energy systems, through the lens of care ethics, is thus a key contribution of this paper.

3. Methods

Inspired by insights from exploratory empirical research conducted in Denmark and the UK between 2018 and 2019, this article considers the potential of care ethics to contribute to our understandings of and discussions around energy ethics.

The research project, on which these discussions are based, aimed to bring notions of energy citizenship into conversation with scholarship on energy ethics. To this end, a Q-study was conducted to explore citizens' accounts of attitudes, values and priorities around energy from the perspective of their lived reality within a society transitioning to a more sustainable energy system. Our focus on care ethics emerged during interpretation of the four factors (viewpoints), identified through Q-factor analysis (see section 3.4 below), and it is the potential of care ethics to aid our understanding of the ethicalities at play in energy transitions, that is the focus of this paper.

The following sections briefly introduce Q-methodology and the Q-study underpinning our discussions.

3.1 Q Methodology

Q-methodology [78,79] is a method for the study of subjectivity well-suited to exploring perceptions around complex, contested topics such as sustainability and energy transitions. Q-methodology seeks to uncover patterns of subjectivity around a given subject. This is based on the sorting by research participants of a set of stimuli (e.g. opinion statements) to construct a representation, based on those stimuli, of their own subjective views on the topic.

A Q-study consists of three main stages as illustrated in Figure 1 below: 1) the development of the concourse (the full range of subjective viewpoints existing around the topic of interest) and refinement to determine the Q-set (a smaller set of representative statements presented to participants for sorting), 2) the Q-sort (sorting and ranking of the Q-set statements by participants), and 3) Q-factor analysis and factor interpretation.

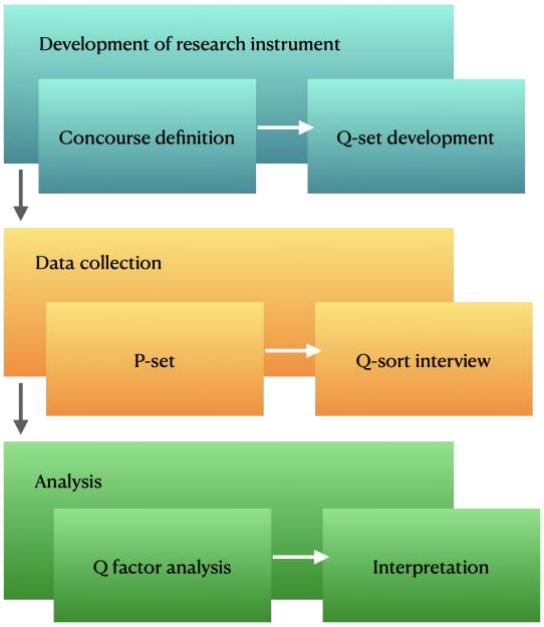

Figure 1. Procedures of Q-methodology

While traditional factor analysis is a quantitative method of analysis, Q-factor analysis provides a richness of description more associated with qualitative than quantitative research [80]. Each factor is represented by an array, an arrangement of rankings for the Q-set statements, of the same form as the Q-sort. Based on the results of the Q-factor analysis and, importantly, additional qualitative data typically collected during the Q-sort interview, the researcher is able to further interpret the views represented by each factor.

3.2 Q-study design

This Q-study relied on a mixed approach to concourse development. Statements were collected from Danish and British online newspapers (particularly debate sections and user comments) and social media, supplemented by statements from pilot interviews and a review of previous research, resulting in a concourse of approximately four hundred opinion statements. Highly similar statements were refined to a single representative statement, and Chilvers' and Longhurst's [9] four-dimensional framework was then used to categorize the concourse for

subsequent Q-set sampling[2]. From this, a Q-set of thirty-one statements was derived (Appendix 1), with balanced representation of statements from Danish and British sources.

3.3 Data collection

Research was conducted in Denmark and the UK, to gain insight into citizens' perspectives within different national contexts of energy transitions within Europe. Both Denmark and the UK are working towards targets for carbon emission reductions and increasing renewable energy production, and the implications for and engagement of individuals in this process are, in various ways, high on their respective agendas. But while both nations have declared their commitment to fight climate change and transition to a low-carbon energy system, they are at different stages of transition, and historical developments of the energy systems differ substantially, both in technological and social respects.

The rationale underpinning site selection in the UK and Denmark was to engage participants with varying socio-economic backgrounds as well as diverse experiences of energy and the low-carbon transition. Both countries are characterised by geographically uneven renewable energy development. This, together with socio-economic factors drove the selection of two local authorities in each country for participant recruitment. In Denmark, research was conducted in Fredensborg Municipality in Northern Zealand (an area of relatively high levels of income and education with no wind energy development or large-scale solar energy generation) and Ringkøbing-Skjern Municipality (an area with high density of wind energy development as well as large-scale solar, and with average income and level of education below the national average). In the UK, research was conducted in the Borough of Tunbridge Wells in the south east of England (a relatively prosperous area where large scale renewable energy generation is largely absent) and in Fife in the south east of Scotland (an area with a high proportion of deprivation, where energy generation has played a significant role, with a history of coal mining and an increasing focus, today, on renewable energy generation).

Participants were thus recruited from municipalities with differing socio-economic and energy profiles, and from diverse areas within each municipality, according to the principle of maximum variation, recommended for Q-methodological research. As this research did not aim to investigate perceptions amongst any well-delineated group, a strategy of leafletting and door-knocking was pursued; based on ethnographic principles of observation (following Davies [81]) a mixture of demographic characteristics in the sample was pursued[3].

Thirty-nine participants participated in face-to-face interviews, in which the Q-sort exercise was the primary focus. During these interviews, participants were encouraged to 'think out loud', allowing for the collection of rich qualitative data alongside the Q-sorts by providing opportunity for participants to reflect and comment on the statements as well as associations and considerations these inspired, and on their thought process throughout. Detailed notes on these comments as well as answers to the debriefing questions were recorded in a fieldwork notebook,

[2] Notably, this categorisation serves not as an analytical framework, but as an initial guide to ensure full coverage in the research instrument (the Q-set) of relevant forms of expressions.
[3] Research has shown gender, age, education and income to have explanatory power in relation to attitudes towards energy and the environment [85,94,95].

providing rich, qualitative data closely linked to the Q-sort exercise, to aid the subsequent analysis and interpretation of findings.

3.4 Q-factor analysis and factor interpretation

Q-factor analysis was conducted in the software package PQMethod [82]. Analysis was performed on the full dataset of Danish and British participants, followed by country-level analysis to explore potential national particularities. In this paper, we focus on outcomes of the analysis of the full dataset. In an iterative process of factor extraction and triangulation with associated qualitative data, a four-factor solution was found to best represent the data, representing four types of views identified amongst participants in the study. These four factors are summaries in table 1. However, in this paper, we consider common themes across the four perspectives and discuss the implications for our understanding of energy ethics in the everyday, exploring the potential of care ethics to contribute to these discussions.

3.5 Limitations

While inclusion of participants representing various socio-demographic categories was sought, representation of different categories in the sample was not equal. The majority of participants were owner occupiers. This could be a reflection of a greater interest in and/or awareness of energy on the part of homeowners compared to tenants [83,84], and/or a greater prevalence of owner-occupied homes in the sampled neighbourhoods (some areas with high levels of rented properties were target specifically, but this was based on aggregated statistics, and thus there is no way of knowing what proportion of leafletted homes was rented accommodation). A dominance of participants aged 45 and above could be related to the former point. Almost all participants were parents, which could have implications for their views on climate change and, by extension, energy issues [85,86]. It would be interesting for future research to further explore how care ethics may resonate differently across diverse groups, including different national and cultural contexts.

The bias in the sample have implications for the generalisability of the results, however, generalisability is not the purpose of this research (or indeed of Q-methodological research in general). While variability in the sample was sought, in line with Q-methodological emphasis on maximum variation sampling, this study is not representative of the wider population, and may reflect an element of self-selection bias leading to an overrepresentation of individuals with some pre-existing interest in energy, sustainability and/or climate change. Nonetheless, this study successfully engaged individuals with varying levels of prior engagement with energy, as indicated by participants' responses to a set of questions included at the end of the Q-sorting exercise.

The following section presents findings from the Q-study, focusing specifically on common themes identified across the four perspectives found amongst participants. Building on these themes, we discuss, in section 5, the potential of care ethics to inform further energy ethical scholarship.

4. Thematic analysis: A shared sense of relationality

Four viewpoints were identified amongst participants, as summarised in table 1. Across these perspectives, the themes of relationality and responsibility emerged as common to all participants in this study, and it is these themes on which we focus in this paper. Analysis of the ethical vocabularies with which participants expressed their views suggested an ethical reasoning rooted in notions of relationality and (inter) dependence. This was particularly pronounced in discussions of responsibility as shared and dispersed, and in response to issues of rights and fairness as better conceived of in terms of needs and necessity. Accordingly, we first report participant's relational understandings of responsibility (section 4.1) before moving on to explore how participants associated a sense of responsibility with needs, necessity and dependence (section 4.2). Quotes are referenced in this section using pseudonyms for research participants, including indication of gender (m/f[4]), country (DK/UK) and the factor(s) with which a given participant was associated[5].

Table 1: Factor summaries (To show how interpretation of each perspective relates to its factor array, references to key statements (as presented in appendix 1) and their rankings by the respective factors are given in parenthesis)

Factor 1: Politically oriented	Tackling climate change is viewed as a matter of societal priority (#26; +4) and matters of energy and carbon emissions are seen as primarily collective political issues requiring political and government action. Responsibility for change in the energy system is seen as lying first and foremost with government (#29; +4), and government action – for example via provision of subsidies for renewable energy development (#23; -3) and regulation on energy efficiency (#22; +3) – is given foremost importance. The primary role of the individual is seen in relation to government, with voting as the most important form of individual engagement with the energy transition (#6; +3). With the emphasis on the individual as, first and foremost, citizen in a (democratic) society, the individuals' role of energy user or consumer is considered of secondary importance. This gives rise to an ambivalent attitude towards personal responsibility (#4; -2). Personal responsibility is not dismissed, but participants emphasised the greater responsibility of other actors,
Factor 2: Market oriented	This perspective represents a view of market forces and market relations as central to the energy transition. An energy transition driven by economic interests is embraced (#18; +2) (#8; +2), and the one policy instrument endorsed is energy taxation, seen to ensure that the consumer pays for the costs of their consumption of energy (#24; +4). A view of energy as a commodity was expressed in various ways by all participants associated with this perspective, frequently emphasising price and financial incentives as the primary driver of behaviour and action (#8; +3). The market orientation of this perspective manifests in a preference for voluntary forms of action, both with regards to individual consumers, energy companies and nations.

[4] All participants in this study identified as either male or female.

[5] While some participants loaded purely on a single factor, others presented 'mixed cases', loading on several factors, as is common in Q-methodological studies. Mixed cases indicate that an individual's viewpoint is characteristic of aspects of several of the identified factors.

Factor 3: Community oriented	Similar to the politically oriented perspective, the community oriented perspective considers action on climate change to be of utmost importance (#26; +4), but this perspective differs in its views on how and by whom this should be achieved. Social wellbeing takes centre-stage, with great importance attached to the issue of affordability of energy (#17; +4). This is based on a perception of energy as a fundamental necessity, which also underpins a view that energy systems ought to be underpinned by democratic values and practices (#31; +2), in order to ensure equal and affordable access to energy. Simultaneously, the community oriented perspective also stresses personal responsibility as critical in transitioning to a more sustainable energy system. Reducing carbon emissions is emphasised as a decidedly personal responsibility (#4; -4), as opposed to government responsibility (#29; -1), and the importance of individual action is stressed (#14; -4). From this perspective, personal responsibility and individual forms of action are seen as rooted in a local context and accompanied by collective forms of engagement. This is evident in the uniquely positive view of local energy development (#12; +2) (#28; +3) and enthusiasm for active involvement in local energy initiatives (#21; +3).
Factor 4: Critical realistic	This perspective represents a critical view of current energy practices and authorities and does not immediately appear to be associated with or favouring any particular type of relation. Instead, this perspective draws attention to the imperfections or even failures or breakdowns of relations in the energy system, leading to a position of critique and distrust. The system critical perspective is highly critical of the impact of energy development on local communities (#15; +3) (#28; -2) (#12; -4) and questions the meaning of local ownership and the motivations behind 'locally owned' projects. A scepticism from this perspective towards the existing system and institutions manifests in a general scepticism around the relevance of government regulation for energy transitions (#22; -1) (#24; -1) (#6; -2), and in particular in a sceptical view of subsidies as motivating profiteering behaviour in the renewable energy sector (#23; +3)

4.1 Relational understandings of responsibility

Reflections on the notion of responsibility in relation to climate change and energy transitions were extensive and nuanced. There was a common sense of responsibility as relational, shared and dispersed. Participants repeatedly emphasised that responsibility for acting on climate change and reducing energy use and carbon emissions lies with everyone, collectively; from individuals responsible for their own actions to governments responsible for establishing greener frameworks and regulations.

For example, an emphasis on government responsibility for enacting change was frequently qualified by the need for a political and regulatory framework enabling, and dependent on, other actors to act on *their* responsibilities. The following quotes are representative of how participants' framed the relations between government and personal responsibility. First is a view that personal responsibility is one piece of the puzzle, but that this will not be effective without government playing a major role:

> "Personal responsibility can slowly impact the situation. Government however can take the big steps – even if it's unpopular". *(Daniel: m, DK, F2 F3 F1)*

Second is a view of government responsibility in supporting and enabling action at an individual level, as illustrated by these reactions to a statement that "The government has the greatest responsibility. The big changes have to come from national governments":

> "The government needs to legislate to create opportunities [for individuals to act] rather than limitations" *(Felix: m, DK, F2 F1)*
>
> "Government needs to create the frameworks; supporting steps in the right direction – that has to be regulated" *(Chris:, m, UK, F1 F3)*

This speaks to a relational conception of responsibility associated with notions of responsiveness; with claims about responsibilities of different actors defined in relation to other actors and their respective responsibilities, and the interdependencies hereof.

Moreover, this relational notion of responsibility was particularly pronounced in participants' discussions of action and responsibility in an international context. 'Leading by example', 'pioneering change', 'being a window', were some of the phrases used by participants in response to a statement that "[The UK/Denmark] does not need to take the lead on climate change; first and foremost, we need policies that work for us", arguing instead:

> "Denmark has the technological ability, we need to spread and share that, we should be a 'window'." *(Eva: f, DK, F1 F3)*
>
> "We do need to lead; the UK is one of the countries that can pioneer change!" *(Nigel: m, UK, F3 F1)*
>
> "One shouldn't underestimate the importance of one of the richest and most developed countries; Denmark is looked up to all over the world." *(Kasper: m, DK, F1)*

As these quotes illustrate, an acceptance of responsibility for taking the lead was frequently qualified by the assumption that others will follow and respond. Here, again, we see a conception of responsibility based on notions of relatedness and responsiveness.

Furthermore, a relational conception of responsibility was expressed around practices of local decision making and public consultation. This implies responsibilities of authorities to conduct public consultations in ways that enable effective participation and to honour the outcome of this process. It also suggests local people have responsibilities to engage in these processes. In the words of two participants:

> "Yes, [local people should have more influence], but the problem is that a lot of people couldn't care less". *(Lisa: f, UK, F4)*
>
> "I am often disappointed by the lack of engagement. One may not be particularly keen, but one damn well has to [take part]". *(Rasmus: m, DK, F4 F1)*

However, for some participants, previous experiences of being unable to influence decisions undermined this relational responsibility. One participant recalled how the local council had held public consultations on planning regulations and zoning for future renewable energy developments. Consultation responses were considered, and the planning documents revised

accordingly. But the entire process was effectively invalidated when, to suit the needs of a particular energy project "they just make supplementary planning guidelines [not subject to public consultation] to overcome the limitations set out in the earlier, publicly approved plans" *(Brian: m, DK, F4)*. Other participants mentioned similar experiences. For example, a public consultation on a wind energy development had resulted in a reduction of the number of turbines to be built, based on an assessment of the maximum capacity of the area. The sense of a successful public consultation process leading to an acceptable compromise was later overshadowed when subsequent reassessments of said capacity led to the approval of several subsequent applications ultimately expanding the initial number of turbines. These experiences manifest themselves as a deep distrust in the system and its institutions, and in a perception of authorities not living up to their responsibility to facilitate local involvement in energy decisions.

In short, local engagement in energy decision-making depends on all actors living up to their respective responsibilities; from ensuring and enforcing proper procedures and ensuring that participation is accessible (both regarding written information materials and 'live' debates), to local residents taking an interest and actively participating.

4.2 Necessity, need and dependence: an ethical vocabulary

As well as being shared and dispersed, responsibility was frequently discussed in terms of necessity; an ethical obligation rooted in the idea that society and/or the planet depends on it. A sense of responsibility associated with necessity was particularly pronounced. The question was not so much whether individuals are responsible for carbon emission reductions, or whether it is right or fair to expect Denmark/the UK to take responsibility and lead in the transition to low-carbon energy systems, rather participants expressed the *necessity* that all actors have a part to play:

> "We have this planet on loan, and we must not burn it up." (Karin: f, DK, F1 F3 F4)
>
> "Everyone needs to understand we're using way more energy than the planet can deal with, so we drastically need to minimise energy use" (Colin: m, UK, F1 F3)
>
> "This world is going down the pan. People don't realise what's happening for the sake of satisfying people's greed. Something must be done". (Amy: f, UK, F3 F1)
>
> "We have to get people to understand that, regardless of technology, there are choices to be made. We have to discuss supposed truths such as growth. We need new ways of thinking … We have an ethical obligation to act." (Eva: f, DK, F1 F2)

This sense of (inter)dependence gives rise to ethical sensibilities rooted not in moral truisms but in a relational experience. This was reflected in participants' discussions of ethical considerations relying more on notions of needs and necessity than established principles of rights and fairness. It suggests that a language of rights and justice may not resonate closely with ethicalities of energy in transition as understood and experienced by citizens on the ground. From questions of siting to issues of affordability and participation, participants gave expression to ethical considerations not well captured by rights-based theories of justice. As explored below,

discrepancies appear in relation to the very language of rights and fairness and to the individualism inherent to such theories.

Out of all thirty-nine participants, just three invoked a language of 'rights': one considered energy to be "almost a basic human right", another emphasised the services to which energy are put – heating, lighting, cooking – as basic human rights. Yet for most participants, it was the notions of needs, necessity and dependence that were central to discussions emerging around affordability and access to energy. On the one hand, energy was stressed, by many, as a "basic need", a service upon which everyone in modern society depends and therefore should be able to afford. On the other hand, the notion of 'need' as giving rise to a right to energy was repeatedly problematised, as exemplified in the quotes below:

> "That depends how big the need is, what does 'need' even mean?" *(Eva: f, DK, F1 F2)*
>
> "What are 'basic needs'? We have an absurd view of 'needs' [in today's society]". *(Jesper: m, DK, F1)*
>
> "What is 'basic' and what are 'needs'? Then we'll have to start discussing what that means." *(Lisa: f, UK, F4)*
>
> "Most people understand 'basic needs' as more than what I would" *(Mads: m, DK, F2 F3)*

This questioning of the meaning of 'needs' raises important questions about the appropriateness of a universalist rights-based ethical vocabulary.

As with rights, a language of fairness was not found to resonate with how participants in this study perceived dilemmas and controversies over energy development. Fairness was discussed, in particular, in the context of the siting of renewable energy generation. Questions of fairness/unfairness regarding siting decisions were not considered relevant questions for debate due to the simple necessity of their location somewhere. "It may be inconvenient, but it is necessary" was heard in various formulations; "it's probably something we just have to live with" *(Felix, m, DK, F2 F1)*. The green transition "requires compromise; one has to see the bigger picture" *(Eva, f, DK, F1 F2)*. This does not appear as a general rejection of debate about energy decisions – including siting – and the ethicalities involved. Rather, a sense that such debates need to be broader and more nuanced.

Based on comments from participants in this study, questions of fairness are rife with contradictions. Is it unfair that rural communities often bear the burden of (renewable) energy generation? Maybe it is. But it may also be the most efficient (or even the only) option available. The question can also be flipped: is it fair that rural communities block developments which are in the (national/global) public interest? There is an acknowledged tension between energy generation as simultaneously experienced as an unjust burden and recognised as a 'necessary evil'; a tension which cannot be resolved with reference to fairness. Here, the language of care could provide a useful way of talking about the burdens and benefits of energy generation and siting decisions. Notably, an ethics of care does not erase tensions arising around energy, including siting of infrastructure. It draws attention to them. In the words of Nel Noddings [17],

"[some] conflicts cannot be resolved but only lived awarely and sensitively"; an ethics of care is attentive to the reality of dilemmas and ethical contradictions.

5. Discussion

5.1 Responsibilities for care in energy webs

A key contribution of care ethics to a discussion of everyday energy ethics, and of the ethicalities of energy transitions more broadly, is its conception of responsibility. The views expressed by participants in this study reflect a common sense of responsibility as a matter of recognising and meeting a *need* for action. The care ethical notion of responsibility rooted in mutual interdependence as the basic condition of existence shares this understanding of responsibility as relational, shared and arising out of the necessity of care. A relational notion of responsibility provides an important counter-narrative to neoliberal individualist responsibilization characterising contemporary political discourse, in general, and energy transition discourses specifically [87]. Individualised responsibility is evident whether considering the context of reducing energy use and carbon emissions[6], or the context of meeting basic energy needs[7]. In contrast, frameworks such as energy justice [1,2] and energy democracy [88,89] direct attention away from individual responsibility, and focus instead on individual rights and institutional responsibilities. But while neoliberal responsibilization will not achieve the kind of deep and rapid – not to mention just – transition necessary, we also cannot talk about transition *without* talking comprehensively about responsibility. Care ethics allows us to redeploy the notion of responsibility, unpack the multitude of caring responsibilities enacted within the energy web, and reframe responsibilities as personal-collective, shared and inherently political.

The care ethical notion of responsibility rooted in mutual interdependence as the basic condition of existence echoes the sense, shared by participants in this study, of responsibility as a matter of recognising and meeting a need. While this supports needs-based framings of energy, it goes beyond recent conceptualisations of 'energy as a need' [90], to consider how energy related activities interact with, fulfil, but also may violate diverse needs and dependencies throughout energy webs. From a care ethical perspective, needs, necessity, dependence, is not only attached to human dependence on energy, but is also the driving force behind energy transitions, as the source of responsibility for and commitment to the creation of more sustainable energy webs. The notion of responsibility in – and for – energy transitions is about recognising the necessity of action. Views on the most appropriate form of action and the most appropriate actors to take responsibility for it differ, however. For most participants, necessity

[6] As evident in discourses of behaviour change, ethical consumption and 'democracy through the wallet', encouraging domestic energy saving behaviour and 'green' energy consumer choices.

[7] Energy and fuel poverty discourses, for example, frequently emphasise solutions based on individual responsibility, from learning to read and understand energy bills, to adopting energy saving behaviours [96].

was tied to personal and government responsibility to address the need for action on climate change. But for some, necessity featured most strongly in a sense of necessity of large-scale energy generation in order to realise a low-carbon energy transition.

Notably, a notion of responsibility rooted in interdependence challenges the perception of individual responsibility based on voluntarism and choice. From a care ethical perspective, caring responsibilities are not seen as a matter of personal choice, as this simply masks a re-allocation of care work to others, who may not be in a position to choose. In the energy web, those 'others' may be a myriad of human and non-human others (an aspect worthy of future investigation), who/which are then required to, for instance: absorb the carbon emissions resulting from a high-carbon lifestyle; take action to balance the electricity grid; care for those suffering due to air pollution or pollution from extractive activities that supply that high-carbon lifestyle. While care is thus highly dispersed throughout energy webs, bringing to light the dependence on care, the consequences of our decisions about how to care (or not) for whom, what and how, and engaging in debate about the allocation of responsibilities is all the more relevant.

5.2 Towards a 'Personal-collective' responsibility

While participants in this Q-study generally agreed with the sentiment that a personal commitment to reduce energy use in the home seems negligible in the big picture and somewhat pointless, this was not accepted as justification *not* to make a personal effort, or as grounds for dismissing personal responsibility. Instead, making a personal effort was afforded meaning as motivated by a commitment to a collective purpose, and personal responsibility was widely accepted as *part* of the picture. Similarly, Partridge et al. [91] report an awareness amongst participants in the UK and the US of their own implication in energy systems, combined with criticism of a perceived lack of shared responsibility and political will. An energy transition discourse needs to be able to speak to this sense of shared responsibility, to embrace a sense of personal responsibility while also acknowledging the limitations thereof and the absurdity of putting the onus solely on individual consumers and households. As Tronto [18] argues, "the problem with personal responsibility is when it seems to be the only form of responsibility that is important in democratic life".

The realisation of a care-full energy transition can never be achieved through tweaks in ethical consumption and behaviour change, but likewise, a care-full energy transition can never be achieved by government or industry alone and without citizens' responsiveness. Tronto [18] introduced the notion of 'caring with' as central to an understanding of care in democratic societies, addressing a distinctly collective form of care contrasting the privatised-personalised ethics dominating contemporary politics, which "invites people to retreat into their own families and implicitly suggests that there is no one else to help out, little "caring with" to be done" [18]. 'Caring with' implies a responsibility of everyone to care about and for the energy web in which they are entangled.

A sense of 'caring with' was reflected across viewpoints in this study, in an insistence that "we all … do our bit". Furthermore, participants' discussions of a responsibility to engage in opportunities for participation in local decision-making around energy offer a particularly good example of this notion of 'caring with'. This is also supported by the large body of work in Science and Technology Studies around public participation in energy decision making [92]. Many participants felt ambivalent about involvement by local people in local energy decisions and

planning and about ideas of democratic principles to underpin energy development; considering, in principle, that local people should have involvement in decisions around energy development, but concerned that, in practice, participatory processes do not work and/or people do not care enough to take part. The question, then, is whether to move away from such principles and processes of engagement, or whether, as several participants argued, we need to encourage a culture of more meaningful engagement, of 'caring with'. Here, the argument about reciprocity is critical: in order to encourage engagement – 'caring with' – processes and institutions for engagement must be experienced as accessible, enabling meaningful interaction, and leading to meaningful outcomes, that are respected and upheld.

The notion of reciprocity extends beyond direct interactions; crucially, practices of 'caring with' rest on relations of mutual responsibility between citizens, the democratic state and wider society. Citizens in caring democracies, Tronto [18] asserts, "should be able to expect more from the state and civil society in guaranteeing that their caring needs, and those of their loved ones, will be met". There are two elements to this: 1) the meeting of needs, and 2) expectations to the role of the state and civil society, both of which were recurring themes across participants' discussions.

First, the importance of meeting needs is illustrated in numerous discussions by participants stressing a need for public welfare to take priority over financial profits in the energy sector, and more generally in a language of needs, as previously discussed. Moreover, this is attached to expectations of government and energy companies to ensure that those needs are met, or at least not deprioritised. In the context of energy transitions, that expectation of governments goes beyond responsibility to meet the care needs of (human) citizens, and includes also a responsibility for the transition to more sustainable energy webs; a responsibility for meeting a wide range of human *and* more-than-human needs in the energy web. For example, participants perceived ethical issues around energy transitions as being primarily about situating the energy debate within the bigger picture of climate change, the environment and care for "the planet", as the following participant comments exemplify:

> "Caring for the planet and for the environment, that is the primary ethical issue." *(Kasper: m, DK, F1)*
>
> "Ethically, it has to do with the planet." *(Oskar: m, DK, F1 F3 F4)*
>
> "We have this planet on loan, and we must not burn it up." *(Karin: f, DK, F1 F3 F4)*

Likewise, participants' needs-based conceptions of responsibilities (see section 4.1) frequently included reference to "the planet", the need to act to address planetary or environmental needs. While this does not imply the existence of any a fully-fledged more-than-human care ethics amongst participants in this research, there is resonance between the ways in which participants thus spoke about the ethics of energy transitions, and a more-than-human energy care ethics. A more-than-human energy care ethics offers a language with which to question and discuss conventional, as one participant put it, "supposed truths", and provides a language for "new ways of thinking", as she called for.

Second, participants repeatedly emphasised responsibility for the energy transition, the reduction of energy use and carbon emissions, as lying *also* with governments and energy

companies, and called for regulation to create the *framework* for individual enactment of their corresponding responsibilities. Similarly, in the context of environmental politics, Dobson and Saiz [93] stress that individual pro-environmental action depends on enabling government action. Without such mutuality, any notion of individual responsibility remains one-sided, if not meaningless.

6. Conclusion

Drawing on findings from empirical Q-methodological research, we have discussed the importance of understanding relationality as underpinning everyday experience in energy webs. Relational understandings of energy systems and a language of interconnectedness, of dependence, necessity and needs have been shown to better reflect people's ethical sensibilities around energy and the low-carbon transition, than a language of fairness and rights. Thus, we need deeper reflections on these relational ethicalities around energy.

We have explored a sense of relationality reflected in people's sense of responsibility, and ethical sensibilities more broadly. Not in the sense of systemic interconnections, through which our actions and behaviours are (causally) linked to actions and events elsewhere, but in the sense of complex interdependencies, giving rise to notions of responsibility as shared and emerging in response to necessity, but also as ambiguous and contradictory. A more-than-human energy care ethics offers a framework and alternative ethical vocabulary better able to give expression to relational, ambiguous experience around energy in transition.

In light of findings from this study, and other previous and recent advances of relational thinking around energy systems, it is thought-provoking that our frameworks and vocabulary for discussing matters of energy and energy transitions remain significantly marked by individualism, whether in the form of individual responsibilization or individual rights. An energy ethical vocabulary must be able to address normative demands and give expression to relational notions of responsibility, interdependence and necessity. To this end, we argue, an ethics of care has the potential to enrich our thinking around ethical interactions around energy in the everyday. Moreover, a wider engagement of energy social science scholarship with care ethics has the potential to enrich broader debates around energy transitions in ways sensitized to lived realities of energy in the everyday as well as the collective, relational existence within energy systems. There is also significant scope for future care ethical engagement to explore how an energy care ethics might converse with decolonial philosophies and an intersectional feminist framework.

A care ethical perspective challenges the narrative, dominant in industry and policy worlds, of the autonomous, rational consumer, and the narrow, exclusive framings in academic and policy discourses around energy citizenship. It presents an alternative narrative of (inter)dependent persons embedded in complex relations of care and replaces notions of individual responsibilization (and rights) with notions of mutual, distributed responsibilities, dependencies, reciprocity and responsiveness, changing the focus from individual consumption and responsibilities to the responsibilities of – and between – a whole range of (interdependent) actors. Such shift in narrative as well as new ethical vocabulary could inform communication strategies and messaging from all actors in the energy space, including political messaging,

communications to householders from energy suppliers and service providers, and messaging and campaigns by environmental movements. An energy care ethics could also help to nuance an often polarised public debate by shifting focus from binary notions of us versus them, support vs opposition, good versus bad, right against wrong, to a recognition of, respect for, but also critical reflection on the diverse and nuanced experiences, perceptions and caring concerns associated with being within energy webs in transition.

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Appendix 1

Q-set statements

Knowings	I would like to receive more reliable information about climate change.	1
	Decisions in the energy sector should be based on expert calculations rather than democratic values and participation.	2
	I don't really think about my energy use; I have so many other things to deal with.	5
	Security of supply is critical. We are dependent on constant access to energy in our everyday lives.	25
	Honestly, there has to be a financial benefit; at the end of the day, price is the main concern.	8
Doings /practice	There is no point in me choosing a green electricity provider or tariff; the electricity all customers receive in their homes is exactly the same anyways.	3
	Reducing carbon emissions is not a personal responsibility.	4
	Climate and energy politics greatly influence who I vote for.	6
	I would definitely participate in public consultations about local energy development.	7
	I would want to be involved in a sustainable energy project run by a community group to look at reducing energy use and using local renewable energy.	21
	It seems pointless for me in the UK to make a big effort to reduce my energy use, when people in other countries continue to use huge amounts of energy.	14
Doings /tech	A so-called "smart" energy system based on "smart meters" will not benefit me as a consumer; I would personally want full control over when I run my washing machine and dishwasher, for example.	13
	I prefer small renewable energy projects such as small wind turbines or solar panels on roofs; large technologies and large-scale projects are too imposing.	11
	Energy is not just a technological issue; there are also difficult ethical issues we have to consider.	9
	If we just gradually make use of new technologies as they are being developed, then there is no need to worry about climate change.	10
Organisings /logics	Locally owned renewable energy is good for local communities.	28
	Energy should be produced locally for local consumption.	12
	I want my local politicians to take responsibility for acting on climate change.	27
	The government has the greatest responsibility. The big changes have to come from national governments, such as investments in green infrastructure and regulation of industry.	29
	I would love to get my energy from a public supply company that I get to have a say in, maybe by attending local events or taking part in online forums.	30
	The green transition should lead to a more democratic energy system, where energy resources are more fairly distributed, democratically controlled, and managed to recognise the planet's limits.	31
Organisings /tech	There should be a requirement for all buildings to meet a minimum standard of energy efficiency.	22
	The government should provide less subsidies for renewable energy and invest that money more appropriately.	23
	Energy taxes are reasonable, they make sustainable energy development a common responsibility and mean that we as consumers pay for our damaging consumption.	24
	Local people should have more influence on energy planning and decisions.	20
Meanings	When we buy coal, oil and gas from other countries, we essentially outsource our climate responsibilities and force communities in the exporting countries to bear the risks and damage of extraction.	19
	It is unfair to expect rural communities to bear the burdens of renewable energy projects so that cities can have access to sustainable energy.	15
	It is fine that energy companies focus on making money. Making money isn't a bad thing. They are not charities and they employ thousands of people.	18
	Making the necessary investments in the fight against climate change is not a question of affordability but of our priorities as a society.	26
	The UK does not need to take the lead on climate change; first and foremost, we need policies that work for us.	16
	No household should be unable to afford a basic level of energy use to cover their needs.	17