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Introduction

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Value Change in Energy Systems

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Abstract

The ongoing energy transition toward more sustainable energy systems implies a change in the values for which such systems are designed. The energy transition however is not just about sustainability but also about values like energy security and affordability, and we witness the emergence of new values like energy justice and energy democracy. How can we understand such value changes and how can or should they affect the design of future energy systems? This introduction to the special section on value change in energy systems introduces the main themes and questions. It discusses different understandings of values and value change, explains why the topic is important and how it can be methodologically studied.

Keywords

value, energy system, value change, energy transition, sustainability, energy justice

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Introduction

Reduction of greenhouse gases in the atmosphere, also known as mitigation, is a vital requirement for combatting climate change and ensuring that global temperature does not rise to unacceptable levels (above 1.5°Celsius as compared to the preindustrial level). This has been reiterated in a large number of policy documents and (international) climate negotiations, perhaps most prominently in the Conference of Parties (COP26) in Glasgow. Mitigation requires a transition of current, strongly fossil-based energy systems toward more sustainable ones, with substantially less emissions. This so-called energy transition has economic, technological, and institutional dimensions, but it relates to values as well (Demski et al. 2015; Jenkins et al. 2020). At the most fundamental level, it is aimed at achieving the value of sustainability, a value that has only emerged in the scientific and policy discourse on energy policy since the 1980s (de Wildt et al. 2021).

Other values play a role in the energy transition as well, including security and reliability, social justice and fairness, autonomy and power, safety, privacy, and esthetics and landscape embedding (Demski et al. 2015). These values are not static but can change over time, for example, because a value may become more important or it may lose relevance (van de Poel 2021). A value that seems to have gained importance, due to a transition to more decentralized energy generation and the advancement of community energy systems, is energy autarky (e.g., Müller et al. 2011). Another shape that value change can take is the emergence of new values. For example, energy justice and energy democracy have emerged as new values in the last decade in relation to the energy transition (Jenkins et al. 2016; Szulecki 2018).

Values and value change are relevant for better understanding the dynamics of the energy transition. In addition, they may be important as normative reference points in this transition. They are so because the energy transition is ultimately not just about more "sustainability," but it also requires attention for other values, which may potentially conflict with sustainability, such as energy security, affordability, and (energy) justice. Moreover, we may have good reasons to take future value changes into account in designing energy systems.

Anticipating future value change seems particularly important because energy systems have large technological and institutional momentum (cf. Hughes 1983), that is, they are very hard and costly to change once in place. The huge efforts required for the current energy transition are perhaps the best proof of that momentum; existing fossil-based energy systems are still

very much locked in. This would also seem to imply that in drafting new energy systems and institutions, we better make sure that they can deal with potential future value change. Some of the new values that these future systems might need to meet are already emerging, like energy justice (Jenkins et al. 2016) and energy democracy (Szulecki 2018). Other value changes may still be unknown and hard to anticipate at the moment.

Until now, there has only been limited attention for value change in the academic literature. There is scholarship on techno-moral change (e.g., Swierstra, Stemerding, and Boenink 2009), moral revolutions (e.g., Baker 2019; Appiah 2010), and moral and normative uncertainty (MacAskill, Bykvist, and Ord 2020; Taebi, Kwakkel, and Kermisch 2020; Nickel 2020) but none of these have specifically focused on changing values, and certainly not with an emphasis on energy systems. That is not to say that current studies on energy systems are irrelevant or cannot be interpreted in terms of value change. Rather, it would seem worthwhile to address the topic more explicitly and systematically. The current special section is an attempt to make a start with filling this gap.

What Are Values?

There is not a commonly accepted definition of value. In the social science literature, the term "value" is often used in a very general sense to refer to any kinds of "selective orientation" (Williams 1968). There are, however, also influential more specific definitions, like the one proposed by Schwartz and Bilsky (1987): "[v]alues are (a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are ordered by relative importance." One important feature of values that is not yet captured in this definition but which have been emphasized by others is that values are often shared and characteristic for a certain group or can be conceived of as "cultural resources or collectively imagined forms of the social good" (Demski et al. 2015). Yet another important notion of value, more prominent in in anthropology and ethnography, is that of values as "lived experiences" (cf. Dantec, Poole, and Wyche 2009). Here, values are not (primarily) conceived as abstract or general concepts (or beliefs) but rather as embedded in everyday experiences and people's lives.

In the philosophical literature, we find subjective and objective notions of value. Subjective notions typically understand values in terms of human desires and other attitudes (Oddie 2015). Objective notions see values as part of reality (e.g., moral realism); values may, for example, be understood

as nonnatural properties or states-of-affairs that supervene on descriptive, natural properties (Dancy 1993). A distinction also often made in philosophy is that been intrinsic and instrumental (or extrinsic) values: intrinsic values are valuable for their own sake or in themselves, while instrumental are valuable because of the (instrumental) contribution they make to another value (cf. Zimmerman and Bradley 2019).

Another distinction that is important is between descriptive and normative uses of the term "value." Descriptive studies may investigate how values change over time, for example, the values of a group or the values in a certain domain like energy policy (cf. de Wildt et al. 2021). Such studies may also try to explain why certain values have changed (value or value change as explanandum). Oftentimes, studies in the social sciences also use "value" as explanans for individual or group behavior or social and technological change. Differences in values may, for example, explain different paths that the energy transition takes in different countries.

A normative use of "value" can be found in the ethics of technology but also in many value-sensitive design (VSD) studies that aim at pro-actively addressing values of moral importance in technological and institutional design. In recent years, various kinds of energy systems have been studied from a VSD perspective, including offshore energy parks (Oosterlaken 2015; Künneke et al. 2015), smart grids and smart meters (Van de Kaa et al. 2020), nuclear energy (Taebi and Kloosterman 2015), shale gas (Dignum et al. 2016), and biofuels (van de Poel 2017).

What Is Value Change and Why Is It Important?

van de Poel (2021) has proposed a taxonomy for value change in technology that distinguishes between five types of value change, that is, (1) the emergence of new values, (2) changes in what values are relevant for the design of a technology, (3) changes in the relative importance of (existing) values, (4) new conceptualizations (or interpretations) of values, and (5) changes in how values are specified and embodied in technology. As this taxonomy suggests, value change may take place at different levels and vary in degree.

When focusing more specifically on energy systems, value change may be studied at different levels and from different angles, including, but not necessarily limited to, (1) changes in values among energy consumers and the general public, (2) changes in values of energy producers and grid operators, (3) changes in values implied by different energy technologies, and (4) changes in values implied by different institutional and

organizational arrangements for the production, distribution, and consumption of energy.

Such taxonomies may be helpful but they do not answer the question how specific value changes should be understood and what drives value change. Melnyk (2021) in her contribution, for example, discusses whether the value change that we witness in debates about climate change and the energy transition should be understood as a change from value A to value B or rather as a reinterpretation of existing values.

There may be different drivers of value change. One potential driver is the occurrence of new moral problems, which may give rise to new moral values to address these problems. Sustainability may, for example, be seen as a response to environmental problems and the need to balance environmental values with economic development. Related to this, values may change as a result of social contestation and public debates about technologies or sociotechnical trajectories (cf. Dignum et al. 2016). Another driver of value change may be technological convergence. Niet et al. (2021), in their contribution, describe how digital energy platforms are a convergence of digital and energy technologies, which makes values from both technological domains relevant for their design and governance.

One of the reasons why value change is important is because value change may lead to a mismatch between the values embodied in current energy systems and the values we consider currently important as society or for moral reasons. This mismatch often leads to huge controversies that in turn could lead to a failure of energy projects (Cuppen et al. 2020). Addressing or even avoiding such mismatches first of all requires a better understanding of value change and probably also new methods for studying value change. Such a new method is proposed in the contribution by de Wildt et al. (2021).

Introduction to the Contributions

Melnyk sets out to offer an interpretation of the value change(s) that occur in the energy transition. She argues that such value change should not be interpreted as the change from one value (or set of values) to another but rather in terms of a reinterpretation of existing values. Building on the debate between Berlin and Dworkin on the plurality of values, she argues that the value change in the energy transition should not be understood as a shift from economic values (held by an older generation) to sustainability values (held by the new generation) but rather as a reinterpretation of what values like economic prosperity and sustainability mean and entail.

The contribution of *Niet* et al. (2021) focuses on the implications for the design of future energy technologies of value change; their focus is specifically on digital energy platforms. They make an inventory of what values are likely to be important for the design of such systems, taking into account that digital energy platforms are a merger of digital and energy technologies. They argue that different instances of value change occur on such platforms. That is, sustainability has been prioritized, security has been broadened to include cybersecurity, and control over (digital) technology has become relevant for such platforms. They further identify three main value tensions for such digital energy platforms, relating to self-determination, level playing field, and public control.

The last contribution makes a methodological contribution to the issue how to study value change. *De Wildt* et al. (2021) understand values as long-lasting beliefs about what is good or desirable and propose a quantitative approach for studying value change. The proposed approach uses so-called probabilistic topic models and allows tracing changes explicit as well as latent values in large text corpses. They show how their approach can be used to study different types of value change.

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