



Original research article

## Culture, values, lifestyles, and power in energy futures: A critical peer-to-peer vision for renewable energy



Juho Ruotsalainen\*, Joni Karjalainen, Michael Child, Sirkka Heinonen

Finland Futures Research Centre, Korkeavuorenkatu 25 A 2, 00130 Helsinki, Finland

### ARTICLE INFO

#### Keywords:

Renewable energy  
Futures research  
Societal transformation  
Peer-to-peer

### ABSTRACT

Energy is not solely a techno-economic question, but has implications for the whole of society – its culture, values, lifestyles, and power structures. Changes in energy systems affect societies over decades, and long-term social and cultural processes in turn affect energy systems. Thus, energy systems should be studied from socio-cultural and futures-oriented perspectives. The purpose of this article is to describe the relationship between energy transitions and social change, and to offer one plausible socio-cultural vision of the era of renewable energy. The article addresses one of the emerging topical areas of energy research – that of rhetoric and sociotechnical imaginaries of energy transitions – surrounding emerging energy systems. Through a literature review, the article first deals with how energy transitions and societal change are related, and then maps out connections between energy and communication technology transitions. It proposes a decentralised peer-to-peer society as an emancipatory and transformative socio-cultural vision of the era of renewable energy systems. Opening up energy futures allows possible and desirable societal futures to be pursued. However, future visions need not be utopian. In order to deal with the possible contradictions of a peer-to-peer future, a critical stance is taken by using the concept of postnormality.

### 1. Introduction

Every human culture is dependent on its sources of energy – ancient Greek and Roman societies depended on the energy of slaves, and modern industrial societies are dependent on fossil fuels [1]. Despite its fundamental role in human societies, energy has occupied a relatively marginal place in sociological and historical research, and in social sciences in general [2,3]. Especially the relation between energy transitions and social change has been neglected. Social sciences have had a role in the analysis of public opinion and examination of the acceptability of new energy technologies and systems, but wider societal investigation – such as examining the relationship between energy transitions and cultural, social and lifestyle-related changes – is often omitted [4,5,2].

Analyses of societal changes related to new energy systems tend to be historical (see e.g. [6]), or assume a fairly narrow scope, such as conceptualizing the automobile as an emblem of mobility, individualism, and progress [7]. Relatively little is known about social consequences that transpire from energy projects and how energy contributes to specific human development outcomes [8,9]. In energy policy analyses, energy transitions have been viewed narrowly as a change in fuels and associated technologies. These narrow views

exclude other transitions, such as the switch from centralised to decentralised energy production, turning energy consumers to energy producers, and the widespread availability of energy resources to all social classes [4,8,9]. Some research takes socio-cultural aspects into account in anticipating societal energy futures, but the focus is still on the futures of energy systems, not on the futures of societies per se [9–11].

In other words, there is a research gap in envisioning societal futures for the current transition towards renewable energy. This article responds to such a call. Assuming a perspective of futures research [12], it examines the relationship between energy transitions and social change and offers a societal vision, as a possible future, of the era of renewable energy. As an essay, the article is a conceptual, theoretical and anticipatory analysis based on literature from different fields. Therefore, it does not display a specific method or empirical data. As a loose analytical framework, the article draws insights from science and technology studies (Section 2.1), which see human and technological development as inseparably intertwined [13].

By providing an energy vision, the article addresses one of the emerging topical areas that could deepen and broaden energy research, proposed by Sovacool [3] – that of the rhetoric of energy transitions as sociotechnical imaginaries surrounding emerging energy systems. How

\* Corresponding author.

E-mail address: [juho.ruotsalainen@utu.fi](mailto:juho.ruotsalainen@utu.fi) (J. Ruotsalainen).

people imagine energy technologies and their futures are critical social facets of energy transitions, as they play significantly to the desirability and acceptability of new energy systems [7]. Decisions about energy are a mix of rational reasoning, communal hope, future visions, business ambition, and national pride. Energy visions seek to give a broad, holistic meaning and purpose to energy transitions by providing a narrative about how a future society will be powerfully and positively different from the present [7]. Mapping out possibilities for a future society, and especially for one based on renewable energy, is currently important as the global energy sector is argued to be at a historic crossroads, with differing imaginations of the world and of the place of humanity in it [14].

### 1.1. Outlining the vision

The future society anticipated by this article is in large part organised around peer-to-peer models, enabled by more decentralised renewable energy – mainly solar photovoltaics (PV), wind, and energy storage, supplemented by other emerging technologies, e.g. geothermal energy (see Ref. [15]). Peer-to-peer refers to individuals and groups who act and self-organise outside traditional organisations, or establish peer-networks within traditional organisations [16,17]. A decentralised energy system, in turn, can be based both on independent energy prosumers (consumers who are also producers) [18], utilities with decentralised energy harvesting, and public authorities who ensure functionality and reliability. The vision presented in this article does not imply a total upheaval of the energy sector, as utilities would still have a central role alongside prosumers. However, the more energy producers there are, the more efficiently the potentials of renewable energy sources are harvested, and thus the role of prosumers is assumed to grow.

The vision relies on four assumptions and requirements regarding the energy system: 1) the energy system will be more distributed, and consumers will become energy producers as well (prosumers), 2) the average marginal costs of energy will fall [19], and consequently so will the costs of production and living, 3) the amount of available energy will increase [15], and 4) an efficient circular economy [20] will emerge so that the system is sustainable and does not violate material constraints.

In addition to the renewable-based, distributed, and prosumeristic energy system, the article regards current production and especially communication technologies as central to the organisation and culture of societies. As prices decline, different technologies are becoming increasingly affordable for citizens [21]. These affordable technologies create a “habitat” that sustains a grassroots, peer-to-peer organisation of society (on energy ‘habitats’ see Refs. [8,9]; on media ‘habitats’ see Ref. [22]). Furthermore, if renewable energy enables highly developed automation and artificial intelligences (AI), the role of work in society can change. Toffler [23] anticipated already in the 1980’s a future where people work half of the time as paid labour and the other half for themselves and their peers. If more and more tasks are automated, enabled by robots that are powered by renewable energy, this seems an increasingly plausible future.

Based on these assumptions and requirements, the article proposes the following societal vision of the era of renewable energy. This possible future is set in the year 2050, which was chosen because it is often the farthest year (before 2100) in energy and climate scenarios and roadmaps (see e.g. Ref. [24]). The year 2050 is also far enough in the future for many of the social, cultural and technological changes described in this article to have taken place. For instance, according to Frey and Osborne [25], 40% of all jobs in the US are at risk of being lost to computers in the next two decades. The purpose of the vision is not to make an exact forecast, but to offer one desirable future for discussion and debate about energy transitions and their implications:

*Humanity has been able to meet the demand of 130 000 TWh of*

*renewable energy per year. The goal has been achieved through ubiquitous and distributed harvesting and storage of renewable energy, especially solar and wind. On top of energy production, energy efficiency has increased significantly. With the new surplus energy, production is mostly automated and artificial intelligence is embedded everywhere, making society function very efficiently. Thanks to a significant increase in productivity, working hours are halved, and the resulting free time is used for hobbies and other voluntary, productive activities. With effective peer-to-peer communication, citizens are able to self-organise as prosumers. People use their free time for their own and community projects, producing use value for the rest of society as well.*

At the core of the vision is peer-to-peer society, which can be conceived as desirable for many because of its emancipatory nature. The core principles of peer-to-peer society are manifested in the French Revolution and its goals of liberty, equality and fraternity [26]. Under different socio-material conditions, the ideals of peer-to-peer were in use already in the early 20th century to promote the electrification of the United States [27]. A more current argument for the desirability of a peer-to-peer society can be found from internet culture. Its values of prosumerism, openness, interactivity, new communality, and individualism [28,29] may become established and prevail in society at large. Individual freedom and social equality are, for many social theorists, the foundations of human organisation [30,31,32]. The vision seeks to place renewable energy systems in a wider cultural context that make them more socially and culturally embedded. Finally, besides desirability the vision has to be plausible; otherwise, it would be useless.

In the following sections the article argues how such a future could come to be. The second and the third sections outline the relationship of energy with social change and communications technologies. The vision for renewable energy and a peer-to-peer society is then opened up and elaborated upon theoretically in sections four through six elements: lowering marginal costs of production, constraints on peer-to-peer society related to high shares of renewable energy generation, motivations to engage in peer-to-peer, the possible future role of companies, the significance to both economic development and decision-making, and the critical notion of postnormality. These are followed by conclusions.

## 2. Energy transitions and social change

The more energy humans are able to harness, the more complex societies are enabled. Human history can be seen as the mastery of new sources of energy [33], whereas societal collapse is often associated with an inability to harvest energy in an efficient manner [34]. Increase in the energy input of society correlates with a higher level of organisation and complexity in social structure, which can in general terms be called “development” or “progress” [35,36]. Societal complexity can be defined as differentiation in social structure (i.e. more parts and more types of parts in a system), variation in organisation, ranges of behaviour, and higher subsystem integration in social structures [37,35,38].

It is often assumed that the transition towards renewable energy systems requires reducing energy consumption, and that the energy abundance provided by oil has come to an end [39]. This paper takes an opposite stance: that a 100% renewable energy system can meet increasing energy demands [15,40], and possibly lead to a world of sustainable abundance [1]. If humanity could capture 0.1% of the solar energy irradiating the Earth, there would be roughly six times the energy consumed today [41]. If the promise of abundance in renewables is realised, higher levels of organisation and complexity of societies can be achieved, and society would thus be transformed further.

However, energy technologies do not determine social and societal development. In order to get a balanced perspective on the social transformations related to the renewable energy transition, concepts related to science and technology studies (STS), and the connections

Download English Version:

<https://daneshyari.com/en/article/6463805>

Download Persian Version:

<https://daneshyari.com/article/6463805>

[Daneshyari.com](https://daneshyari.com)