



Differing cultures of energy security: An international comparison of public perceptions



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ARTICLE INFO

Article history:

Received 25 July 2014

Received in revised form

11 July 2015

Accepted 12 October 2015

Available online 5 December 2015

Keywords:

Energy and environmental attitudes

Public values

Security of supply

ABSTRACT

This study reviews how energy-users perceive the importance of energy security dimensions. It asks: how does the sense of energy security vary with culture? Its primary source of data is a summary of survey distributed in eight languages to almost 2500 respondents in Brazil, China, Denmark, Germany, India, Kazakhstan, Japan, Papua New Guinea, Saudi Arabia, Singapore, and the United States. It utilizes an “energy literacy test” in Denmark as a secondary data tool. The survey results are used to test nine hypotheses about national, economic, political, professional, and epistemic cultures. The study concludes by affirming the complexity of energy security as a cultural topic; by emphasizing how answers among respondents tended to converge more than diverge; and by calling for further research.

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Contents

1. Introduction	811
2. Research concepts and methods	812
3. Results and discussion	816
3.1. H1–H3: National Energy Cultures	816
3.2. H4–H5: Economic Energy Cultures	818
3.3. H6: Political Energy Cultures	819
3.4. H7–H8: Professional Energy Cultures	820
3.5. H9: Epistemic Cultures	820
4. Conclusions and policy implications	821
Acknowledgments	821
References	821

1. Introduction

Energy security—defined as equitably providing available, affordable, reliable, efficient, environmentally benign, proactively governed and socially acceptable energy services to end-users [65]—invariably fuses traditional conceptions of national security with emerging concepts of human rights and energy justice, sustainable

development, and individual security. But how do energy consumers, households, and businesses perceive these issues? How do demographic attributes such as occupation or information affect perceptions of energy issues? Furthermore, how might geographic location, market structure, and politics influence conceptions of energy security?

This study attempts to answer these questions by drawing from earlier work [62] which explored how an assortment of energy-users perceived energy fuels, technologies, issues, dimensions, and challenges. This study instead asks: how do perceptions of energy security vary by culture? The primary source of data for this study is a survey distributed in eight languages (English, Danish,

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Mandarin, Portuguese, Russian, Arabic, German, and Japanese) to 2495 respondents in 11 countries. The survey results are used to test nine hypotheses about energy security cultures drawn from the academic literature spanning the disciplines of political science, energy studies, geography, science and technology studies, sociology, and anthropology.

Though we see much value for energy analysts in our study, we also see utility for non-energy-specialists studying topics as diffuse as public attitudes towards the environment, scientific communication, technological innovation, knowledge about science, and climate change. Why? First, and most broadly, by investigating the stated preferences of almost 2,500 energy-users, our study enables us to get “behind” how they perceive energy challenges. Second, by including a diverse group of stakeholders—with surveys directed not only at business leaders but households, supporters of civil society, regulators, and members of the academy—our study offers both perspectives from usually ignored actors in the energy system. Third, Carlisle et al. [8] suggest that people will be more likely to accept scientific claims which support their views than claims which contradict them. When it comes to views on energy systems, however, we often don’t know what those are. This study identifies such preferences so that attempts at energy communication and awareness raising can improve their efficacy.

2. Research concepts and methods

This section of the study introduces, briefly, two central overarching concepts—that of energy security, and that of culture—before describing its primary method of data collection, a survey, and its secondary method, an energy literacy test.

Energy security, though a contested and complex term [14,15,73], has technical, social, environmental, political, geological, and economic dimensions. Instead of defining it only in terms of security over access to fuel, this study puts forth a wider conceptualization enveloping technology, resources, trade, behavior, institutions, the environment, and education. Similar arguments in favor of the broad nature of energy security are presented in Kruyt et al. [36], Jacobson [29], Vivoda [75], Jansen, Seebregts [32], and Sovacool [57].

To transform the concept of energy security into more codified dimensions, the author conducted a meta-survey of 90 peer reviewed articles (discussed in greater detail in Ref. [56]) and interviewed more than sixty prominent experts in the field (a “modified Delphi method” discussed in greater detail in [59–61]). Key energy security dimensions were further refined at an international workshop which featured almost forty participants broken into six focus groups. Ultimately, the results of this collective research—the literature review, interviews, and focus groups—suggested that energy security was best captured by 16 distinct dimensions:

- Securing a supply of conventional fuels such as coal, oil, natural gas, and uranium.
- Bolstering trade in energy fuels, commodities, and technologies.
- Maximizing production and minimizing depletion of domestically available fuels.
- Providing predictable and clear price signals.
- Enabling affordably priced energy services.
- Providing equitable access to those energy services.
- Diversifying and decentralizing energy infrastructure.
- Promoting energy efficiency and lowering energy intensity.
- Researching and developing new energy technologies.
- Ensuring transparency and participation in project siting and decision-making.
- Offering energy education and information.
- Preserving land and forests.

- Enhancing the availability and quality of water, a key input into energy supply chains.
- Minimizing air pollution.
- Building resilience and adaptive capacity to climate change (called “adaptation”).
- Reducing greenhouse gas emissions (called “mitigation”).

As readers will see below, each of these 16 dimensions was converted into a separate question asked in our survey.

Moving to the concept of culture, as Strauss et al. (2013:10) note [70], “production, distribution, and consumption of energy almost never follow a simple logic of neoclassical economic efficiency; rather, people tend to switch frames of reference among technical, economic, and cultural logics when considering their uses of energy.” These frames of reference can refer to a type of “culture,” similar to that of an engineering culture or research culture [11–13]. The concept of culture has often taken specific forms, such as the “national culture” of a country, the “market culture” of an economy, the “organizational culture” of a business firm, and the “medical culture” of the healthcare profession [1].

This study applies this particular notion of culture to energy security, and proposes that at least five different cultures exist. Geographic cultures vary spatially or nationally, this is perhaps the most common way of viewing culture [2]. Economic cultures, at least in the realm of energy, will differ based on equitable access and affordability of energy services [3]. Political cultures will range across the spectrum from full open democracy to closed authoritarian regime [21]. Professional cultures will exist based on occupational training or organizational employment [53], and epistemic cultures relate to overall knowledge about energy facts [35].

To test what influence, if any, culture played with perceptions of energy security, the study’s primary tool of data collection was a survey. Our structured questionnaire consisted mainly of multiple choice questions that the author has used previously to assess national energy security issues [34,4,5,58,62,6,63,74]. The survey asked participants to rate the 16 dimensions of energy security identified above according to a five point Likert [37] scale:

1. Extremely unimportant.
2. Somewhat unimportant.
3. Neither important nor unimportant.
4. Somewhat important.
5. Extremely important.

As Table 1 reveals, the survey was distributed physically and through an online survey hosting website to 11 countries. These countries were selected because they represent a mix of urban and rural populations, developed and developing economies, import- and export-dependent energy trading flows, post-communist and capitalist societies, liberalized and state-owned energy markets, and different geographic sizes. We have major energy exporters Kazakhstan, Saudi Arabia, and the United States along with importers Brazil, China, Germany, and India and transit countries such as Singapore. We have countries struggling with energy access problems, such as China, India, and Papua New Guinea, alongside those with high levels of energy access, such as Japan, the United States, and Singapore. We have five industrialized countries and six either middle income or lower income countries. We have representative democracies such as the United States, socialist democracies such as Denmark and Germany, monarchies such as Saudi Arabia, and communist regimes such as China.

In aggregate, 2495 surveys were partially or fully completed across these 11 countries. We used the survey to test nine hypotheses, drawn mostly from the academic literature, shown in Table 2.

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