Energy Research & Social Science 7 (2015) 1–11

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

Energy development and Native Americans: Values and beliefs about energy from the Navajo Nation

Len Necefer*, Gabrielle Wong-Parodi, Paulina Jaramillo, Mitchell J. Small

Department of Engineering and Public Policy, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, United States

ARTICLE INFO

Article history:
Received 12 September 2014
Received in revised form 26 February 2015
Accepted 26 February 2015
Available online 19 March 2015

Keywords:
Energy development
Cultural values
Energy poverty
Electrification

ABSTRACT

Technical tools and techno-centric methods used for energy resource management and policy planning and development can miss important social and cultural factors. This can in turn result in a failure to recognize potential barriers and opportunities for energy and resource development in culturally diverse communities. Given the complexity of socio-technical energy systems, multidisciplinary analysis approaches are needed to ensure that modeling exercises more accurately represent real phenomena and outcomes of value. This paper describes the results of a public elicitation effort to gather information about stakeholder views and concerns related to energy development in the Navajo Nation, the largest American Indian group in the United States. Our results show that the potential for economic gain from energy resource development does not alleviate concern about environmental impacts, despite high poverty and unemployment on the reservation. Participants placed significant importance on environmental preservation, not only for the viability of future generations, but also for transmission of culture and identity that supports stewardship of the environment. Future work will use the results of this project to develop a survey that can be more broadly deployed across the Navajo Nation, and to develop a decision-support tool that links techno-economic energy models with socio-cultural attributes.

1. Introduction

Assessing the implications and tradeoffs of different energy technologies, policies, and development pathways requires a deep understanding of their effects locally and globally. The effects of these decisions are often complex and require knowledge of both technical and societal outcomes. Given this complexity, multidisciplinary methods are required to ensure that technical decision tools used for energy resource management more accurately represent both energy systems and the societies they serve.

While technical tools can aid in understanding the tradeoffs between resources, technology, and prices, they are less able to incorporate human factors such as cultural, spiritual and ethical values in their formulation [1–3]. For example, optimization tools for energy resource management (e.g., MARKAL) generally rely on technical supply curves to model resource availability and end-use demand forecasts [4]. These technical datasets, however, ignore resource constraints that may exist as a result of cultural values. For example, while a supply curve includes resources that are economically recoverable, these resources may in fact be unavailable if they are located in lands that are considered sacred to the community that owns them. In addition, techno-centric approaches can miss cultural and social values that can influence individual choices about energy use such as resistance to certain types of technology and changing levels of energy consumption [2,3]. By determining how cultural values relate to energy use and impacts, we can better understand how these perspectives inform preferences about energy resources and thus hopefully develop technical tools more reflective of the decision makers and stakeholders they hope to inform.

Increasingly more attention is being paid to understanding the value of using culturally based knowledge in the evaluation and management of natural systems [5–8,50]. For example, culturally based environmental health indicators of freshwater systems, derived from Maori knowledge of the local environment, were found to provide cost-effective, accurate, and accessible methods of environmental monitoring for communities [9]. When coupled with scientific methods of environmental testing, such approaches can enable a broader, more complete worldview on environmental management. Indeed, indigenous people have developed holistic knowledge of the land and ecosystems in which they live that can contribute to environmentally sustainable development practices

* Corresponding author. Tel.: +1 401 935 8074.
E-mail address: lnecefer@andrew.cmu.edu (L. Necefer).

http://dx.doi.org/10.1016/j.erss.2015.02.007

[7,10,51]. This knowledge "can offer many modern societies many lessons in the management of resources in complex ... ecosystems" 11:12. While there has been significant work done to understand knowledge relating to management of environmental systems [12–14], there has been very little done in understanding how cultural knowledge and values can inform approaches to *energy* resource management.

As many tribal governments look toward developing technical tools for decision making regarding energy resources, it will be important for these tools to incorporate human factors and cultural values to ensure more effective decision making. The failure to acknowledge and incorporate these culturally informed values and beliefs in decision making has led to numerous instances in which well intentioned projects operated by non-indigenous entities and governments failed to be successful or sustainable, and even worse, caused long-lasting damages to communities [15,52,53]. For indigenous communities, improving decision-making means improving decision frameworks that reflect community values and create community ownership over natural resources. More broadly, research into indigenous knowledge with respect to energy systems has the potential to improve existing frameworks of energy resource management beyond the scope of indigenous communities. The incorporation of indigenous knowledge can offer societies different perspectives on the management of resources in complex ecosystems, often enabling more effective management decisions [11,51].

In this paper we aim to further human-centered research methods in supporting technical decision making by more accurately understanding how cultural values can inform the formation of technical decision tools for energy resource management through the design and implementation of a public/stakeholder elicitation protocol of members of the Navajo Nation. The elicitation focuses on understanding Navajo peoples' beliefs regarding technical dimensions of energy development, as well as their values regarding different economic, social, governance, environmental, and spiritual outcomes. This paper provides an analysis of community values, beliefs, and knowledge to aid in the development of technical energy resource management tools. The focus on the Navajo Nation has broader implications for other indigenous communities, and others within developing nations that similarly experience high levels of economic and energy poverty [54]. Given the Navajo Nation's significant energy resources, development of them has been proposed as a means of addressing both economic and energy poverty. However, these prescriptive approaches do not necessarily incorporate and embrace cultural values and beliefs; the exclusion of these values and beliefs from formal tools and methods for decision support make these approaches less relevant, effective, and meaningful [16–19].

1.1. Context of energy resource development on the Navajo Nation

Many American Indian tribes, including the Navajo, have experienced a tumultuous history of energy development on their lands. Determined and managed primarily by outsiders, many argue that this development has been unreflective of native cultural values, which maintain that ecological systems are sacred and foundational to the integrity of social systems [5,16–23]. Consequently, past energy development on the Navajo Nation has left a legacy of long-lasting ecological damage, adverse health effects, and profound feelings of helplessness and violation among tribal citizens due to the nature of the exploitation of their lands [21–23].

In recent years federal policy has changed to grant tribes greater autonomy over management of their natural resources. Measures have been taken to expedite the development of energy resources on American Indian lands with the dual objectives of economic development and self-determination [24]. For example, in 2005 the U.S. Congress passed the Indian Tribal Energy Development and Self-Determination Act, allowing tribal governments to lease and develop energy resources on tribal lands without final approval from the U.S. Department of the Interior [24]. Tribal governments, including the Navajo Tribal Council, increasingly view the development of their rich energy resources *by and for* the benefit of the tribes as an important expression of true self-determination [20]. These governments now face a conundrum in managing energy development: continue with the status quo development that is unreflective of cultural values but has provided some economic benefit for the tribal government, or advance a new energy development paradigm more reflective of cultural values while ensuring positive economic outcomes.

Previous work suggests that successful energy resource development on American Indian lands cannot be isolated from the cultural context in which it exists, and that communal concerns should come first (e.g., environmental protection, cultural integrity), while other metrics such as economic efficiency may come second [25]. Furthermore, history suggests that, if not supported by the public, energy projects on tribal lands can face many obstacles to their successful implementation and long-term viability. For example, the proposed 1500 MW Desert Rock Power Plant that promised to provide 600 long-term jobs and approximately $50 million in annual revenue for the Navajo Nation, failed dramatically due to strong local opposition [26]. Points of conflict included: pressure from the Navajo Nation Government on grazing-rights holders to sign over their land leases, increased air pollution from a third power plant in the region, and concerns about long-lasting impacts on land and water resources from coal mining [27,28]. Thus it is important to note that the "success" of energy development projects for American Indian nations is not only measured by employment and revenue. It is also equally measured by the fulfillment of political and social sovereignty, cultural protection, and protection of the environment [20].

A new energy development paradigm that includes community input to be reflective of cultural values could promote public acceptance and thus the long-term viability of energy projects on tribal lands resulting in much-needed economic development. This paradigm would also support tribes' goals of self-sufficiency, self-determination, and political sovereignty [17–19,29]. Finally, participatory processes of resource management have additional merits as the very process of identifying cultural values can reveal indigenous knowledge that may provide valuable insights into how to manage energy resources in more sustainable ways.

Developing a new paradigm of technical energy resource management decision tools that better reflects cultural values and other social constraints requires understanding the knowledge, interests, and values of the public on issues of energy and the environment. Toward this goal, this paper presents the results of interviews conducted with Navajo citizens, from a broad range of backgrounds, on their beliefs regarding the technical dimensions of energy development and their values in terms of economic, social, environmental, governance, and spiritual outcomes for their community and their land with respect to energy resource management decisions. To investigate Navajo views on energy development, we developed a semi-structured interview protocol, in English, covering five topics: (1) Navajo cultural values and issues of concern, (2) economy and energy projects, (3) environment and energy projects, (4) trust and energy projects, and (5) an energy project case study: the Desert Rock Power Plant. The semi-structured interview protocol ensures consistency between interviews allowing participants to be asked the same questions [30]. In addition, the semi-structured interview protocol has been demonstrated to be an effective method