Energy Research & Social Science 44 (2018) 385–398

Contents lists available at ScienceDirect

Energy Research & Social Science

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

Original research article

Beyond technocracy: Forms of rationality and uncertainty in organizational behaviour and energy efficiency decision making in Canada

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ARTICLE INFO

Keywords:
Energy efficiency
Uncertainty
Organizational behaviour
Decision making
Risk

ABSTRACT

Through a social science approach rooted in grounded theory, this research paper provides a form of an uncertainty theory in organizations, exploring how alternate forms of rationality and approaches to dealing with uncertainty result in variation in energy efficiency related actions and outcomes. Through data analysis, structural conditions are identified, frames for considering energy efficiency are uncovered, and two approaches for dealing with uncertainty are interpreted. Hospitals that approach uncertainty by 'Demanding Certainty' make use of one of two frames: 'Temporal Silos' or' Alternate priorities'. These hospitals communicate by presenting, selling and confirming, resulting in risk avoiding organizations where individuals absorb associated risks, and long-term energy efficiency implementation stalls. Hospitals that approach uncertainty by 'Managing Complexity' envision energy efficiency as complementary to patient care and driving long-term resiliency. These hospitals communicate through negotiation and collaboration, expanding thinking beyond short term budgetary intervals, driving resiliency and bridging operational silos. Organizations, and not individuals, absorb risks associated with energy efficiency, and implementation of initiatives occur over longer time horizons.

1. Introduction

According to the Intergovernmental Panel on Climate Change [1], limiting the impacts of climate change will require substantial and sustained reductions of greenhouse gas emissions. While 30–40% of all primary energy use occurs in buildings [2], accounting for nearly one quarter of total greenhouse gas pollution in the Province of Ontario [3], hospitals account for a proportionally higher amount as they operate around the clock and have extra requirements for clean air, disease control, imaging equipment and waste management [4]. In 2015, hospital greenhouse gas emissions in Ontario were 0.73 megatonnes (MT) [5], equal to 4.7% of the 15.5 MT of emissions in the Ontario non-residential buildings sector [57] and nearly 1/200th, of the overall 166 MT of greenhouse gas emissions in Ontario [57]. While investment in energy efficiency can lead to significant cost savings, and is often regarded as the fastest and most cost-effective method to achieve global greenhouse gas emission targets [6] and promotes environmental protection and better public health [7], there is evidence that Ontario hospitals fail to invest in energy efficiency even though it is profitable to do so [8]. This phenomenon is referred to as the “energy efficiency gap” [9].

Research on energy efficiency in buildings has been widespread, however it has been dominated by technocratic, engineering and economic based approaches. Behavioural, organizational and institutional perspectives have also been applied to explore energy behavour (see [10]). According to a neoclassical perspective, failures to adopt profitable energy efficiency projects are due to market failures, imperfections or market barriers [9,11]. This approach has been criticized for its inability to explain multiple actor behavior [12,13] and for the systematic constraints and biases that influence individual decision-making [58]. The behavioural perspective suggests individuals don’t behave completely rationally, rather they exhibit bounded rationality (Simon, 1955). Constraints on time and cognition, including the ability to process information, limit decision making power. The behavioural perspective draws on two broad approaches: behavioural economics and psychology-based theories. Sorrell et al. [14] are a key contributor in extending understanding of this perspective, introducing information costs, opportunism, bounded rationality, transaction costs, biases, errors and decision heuristics as hindering individual decision making regarding energy efficiency implementation.

DeCanio [15] provided impetus to scholars exploring the energy efficiency gap to go beyond individual decision making, as he showed statistically that data from the US Environmental Protection Agency’s voluntary pollution prevention programs could not be explained by standard economic models. He found that both economic and organizational factors accounted for the variation in observed lighting upgrade investment returns. As an economist, he argued that individuals were self-interested and could be incentivized, however that collective behavior within organizations resulted in behavior and outcome that were often suboptimal. Some explanations he provided included the

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https://doi.org/10.1016/j.erss.2018.05.007
Received 1 November 2017; Received in revised form 9 May 2018; Accepted 10 May 2018

interplay of individual motivations, rules and conventions governing interactions, hierarchies, and rules of procedures. He implored investigation of how organizational characteristics and inter-organizational dynamics impact decision-making within organizations, and to provide more comprehensive theories of behavior of firms pertaining to energy efficiency practices. In summarizing an organizational perspective to energy efficiency, Crittenden [10] outlines the following organizational-level factors in the literature that limit the uptake of profitable energy efficiency projects, including: organizational structure [12], degree of collaboration across organizations [16,17], visibility of energy use [59], routines and capability (Cooremans, 2011; 60].

While the behavioural and organizational perspectives progress understanding of energy behavior and decision making, they continue to be based on binary notions of rationality. Friedland and Alford [61] conceptualize rationality as a relative concept, which depends upon where individuals and organizations are located, or locate themselves, within a number of cultural or institutional orders. This causes actors to act rationally according to the belief system to which they ascribe – perhaps the market order, perhaps the family order, the religious order or the community order. Biggart and Lutzenhiser [18] explain that social norms and community structure can impact who is responsible for decision making, and the bases on which they are made. In critiquing classical perspectives of self-interested individual behavior, Dobbin ([62] p.2), in a book laying out the key features of economic sociology, endorses this view explaining that the rationalized lenses through which individuals view the world are largely shaped by social institutions, as much through regulation and policy as norms provided by professional associations or educational institutions, and beliefs and values socially constructed and promulgated through culture and religion. So, whereas economic approaches ignore the influence of social context, sociological approaches counter that individuals behave according to scripts, schemas, conventions, or logics, tied to their roles, which are both influenced and influence cultural practices and shared expectations [63]. As such, there is a need to broaden the perspectives, to incorporate a social science approach capturing societal influences on organizational structures, organizational culture and decision making surrounding the energy efficiency gap [19–21].

Non-rationalist or social science approaches have been dominated by positivist traditions and researchers have called for more constructivist approaches [22] to understand how energy use and energy choices are made in organizations and multi-organization systems and why particular outcomes come about. This includes improving understanding of how resource allocation, training, culture, power dynamics and multiple forms of rationality shape energy use in organizations [23].

Recently, Andrews and Johnson [24] provide their own summary of the literature to date on energy behavior in organizations and state, rather simply, that research on energy behavior within an organizational context is underwhelming. They call for greater consideration of this topic at three levels of analysis: individuals in organizational contexts, the behavior and social characteristics of organizations themselves and the institutional structures, rules, and networks that influence their activity. They argue that each of these levels provide rich and dynamic sources of research on mechanisms that can drive or constrain energy efficiency. Under-developed topics include sector-specific studies on barriers to energy innovation and integrated studies exploring the determinants of organizational energy behavior at the individual, organizational and institutional levels.

This study extends understandings of energy efficiency by making use of a social scientist approach, using qualitative research methods, to explore and extend understandings of energy behavior within an organizational and institutional context. Through the use of a grounded theory methodological approach theoretical insights surrounding energy efficiency practices in Ontario hospitals are developed. While the grounded theory approach does not rely on prior theories, the investigation was approached as an organizational scientist, exploring "the complexities of the relationships between the units at different levels of analysis that comprise organizations" ([25], p.74–75). This includes understanding how organizational settings and organizational members mutually influence one another, how broader structure influences action, and how action influences structure. In this manner, the study did not exclusively explore context, nor did it exclusively study behavior, instead it studied "behavior in context" ([25], p. 82). This was achieved by making use of an inductive approach, through an interpretivist and constructivist epistemological and ontological orientation to explore the dynamics of energy efficiency practices in Ontario hospitals.

The following three research questions guide the methodology:

1 What structural conditions surround the implementation of energy efficiency practices in Ontario hospitals?
2 How do organizational responses to structural conditions surrounding energy efficiency differ?
3 Why are energy efficiency practices in Ontario hospitals heterogeneous? That is why are some hospitals more successful at reducing energy use and associated greenhouse emissions than others?

2. Energy conservation practices in Ontario hospitals

Investigating the energy management practices of Ontario's hospitals offers an ideal setting to pursue investigation. While hospitals in Ontario are located in diverse communities, from very urban to very rural, and can range in size from very small to very large, they are influenced by similar normative and cultural-cognitive pressures and are accountable to the same federal and provincial regulations that determine their funding and guide their non-profit structure.

For most hospitals in Ontario, there are no regulatory requirements on hospitals to reduce energy use or GHG emissions. In 2013, through Ontario Regulation 397/11, the first mandatory reporting requirements were introduced. All public agencies in Ontario are required to report their annual energy use and GHG emissions for each of their sites, to the Ministry of Energy, beginning with the calendar year 2011. In addition, public agencies were required to develop five-year energy conservation and demand management (CDM) plans by July 1, 2014, made publicly available on their websites and in hard copy. The CDM plans provide information on the agency's energy consumption and GHG emissions, along with a plan for how they will conserve energy. Plans must be updated every five years.

Reviewing 108 CDM plans available on hospital websites, 18 hospitals proposed at least one million dollars' worth of energy conservation measures with payback periods between 3 to 16 years, while 25 hospitals proposed total measures of up to one million dollars. Alternatively, 65 hospitals proposed no energy conservation measures at all despite this being a required element of the plan [26]. Twelve of these hospitals submitted five year plans with limited to no discussion of conservation-related aspirations. The Green Hospital Scorecard provides a high-level snapshot of energy and environmental performance with participation from 55 hospitals, or approximately 40% of all Ontario hospitals. Case studies in the scorecard report suggest some of these hospitals are placing an importance on energy and resource conservation and implementing energy saving retrofits [27]. While for other hospitals, lack of capital and staff resources have hindered conservation efforts [64,8].

The box plot diagrams below summarize three metrics of Ontario hospital sites: their 2015 Energy Intensity, 2015 GHG Emissions and the percentage change in their Energy Intensity from 2011 to 2015. Changes in energy intensity vary, with an average increase of 1.9% for all hospital sites from 2015 to 2011, and a median change of −6.1%. The interquartile range is 30.3% with the central 50% of hospital sites between −17.8% and 12.5%. The 2015 average energy intensity for all sites is 14.4 eWh/HDD/sqft, with an interquartile range of 7.7. The interquartile range of GHG emissions is 2754 tonnes, with the central 50% of hospital sites emitting between 305 and 3059 tonnes of CO2e. There is a large outlier, Victoria Hospital of the London Health Sciences Centre which has an on-site cogeneration-based power plant.