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# The reality of cross-disciplinary energy research in the United Kingdom: A social science perspective

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ABSTRACT

Cross-disciplinary research is essential in understanding and reducing energy usage, however the reality of this collaboration comes with many challenges. This paper provides an insight into the integration of social science in energy research, drawing on the expertise and first hand experiences of a range of social science researchers (predominantly Early Career Researchers (ECRs)) working on UK cross-disciplinary projects in energy demand. These researchers, participants in a workshop dedicated to understanding the integration of social science in energy research, identified four groups of challenges to successful integration: Differing expectations of the role of social scientists; Working within academia; Feeling like a valued member of the team; and Communicating and comprehension between disciplines. Suggestions of how to negotiate those challenges included: Management and planning; Increasing contact; Sharing experience; and Understanding team roles. The paper offers a definition of 'success' in cross-disciplinary energy research from the perspective of social science ECRs, comprising external, internal and personal components. Using the logics of interdisciplinarity, this paper suggests that integration of the social sciences in the projects discussed may be partial at best and highlights a need to recognise the challenges ECRs face, in order to achieve full integration and equality of disciplines.



## 1. Introduction

Energy research needs the social sciences [42]. In a previous issue of this journal, Sovacool et al. [44] call for greater integration of the social sciences in energy research to try and overcome their current status as 'social outcast'. They suggest this should be done through: the collection of more social science data, 'problem-centred' research, and the inclusion of diverse perspectives. One example of this side-lining of the social sciences[3] is evident within energy demand research, with a study on 'smart home' technologies finding that 61% of 150 papers reviewed were led by engineering and technical sciences, with just 20% classified as social science papers [50], suggesting an imbalance in perspectives published in this area. The need to integrate the social sciences has also been recognised outside the UK (e.g. [47,49]) and is an on-going topic of debate in this journal, including discussion of how social science can and cannot contribute to climate change and energy research [34,36,22]; and the limitations associated with technical framing and bringing social sciences into projects at a later stage [28,39].

Energy demand research, which forms the empirical basis of this paper, covers areas including energy efficiency measures,

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[3] When using the term 'social sciences' this paper is referring to work conducted by sociologists, psychologists, human geographers, anthropologists, as well as those in user centred design, and in science and technology studies, amongst others. The paper chooses not to include the work of economists (which may be considered a part of social sciences) as whilst economics has much to contribute to our understanding of the human dimensions of energy, and a role to play in the integration of social science, its past dominance in energy research has been criticised and discussed at length elsewhere [18,23,36,43,45].

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behaviour change interventions, and adoption of smart energy technologies, and is an area ripe for social science contribution. More recently, opportunities for integrating the social sciences have opened up in this field, for example through the EPSRC-funded TEDDINET[4] projects in the UK, the EU Energy Efficiency Projects funded under the Horizon 2020 and COST[5] initiatives, and the USGCRP[6] in the United States. It may be said that such projects are doing what Sovacool et al. [44] suggest needs to be done in order to better integrate the social sciences into energy research. However, working across disciplines in energy research and fostering effective collaboration is not a trivial task [39] and there is a growing appetite amongst researchers of all disciplines to understand how best to facilitate this integration [26,51,10,14]. The theory of integration, and its practice in reality, are two very different things; issues which are introduced below.

### 1.1. Aims of the paper

This paper contributes to key debates within *Energy Research and Social Science* as it considers the ways in which the social sciences and social scientists can be better integrated into energy research [42–44]. By sharing the experiences of social science Early Career Researchers (ECRs) working on cross-disciplinary energy demand projects, it highlights the challenges to integration but also identifies the ways in which these challenges may be successfully negotiated. This cohort of researchers provides a unique perspective on the realities of integrating social sciences into energy research, given their position at the 'coalface' of research. The paper also proposes a new definition for 'success' in cross-disciplinary research, considering what this may look like and what this means for ECRs. Thus adding to an emerging literature on the reality of cross-disciplinary research, specifically from the perspective of ECR social scientists and the wider social sciences, and takes this further through a focus on the logics or ambitions driving integration of the social sciences. Whilst the paper focuses on energy demand and the views of social science ECRs in the UK, it aims for wider application, especially given that "real world problems do not come in disciplinary shaped boxes" [19]. Worldwide, government funding agencies have called for more information on interdisciplinary research; including what it is, whether their countries should invest in it, and whether it is being conducted effectively [29]. This paper thus has implications for cross-disciplinary teams, both internationally and in other fields of energy research, that bring together researchers from a range of disciplines to tackle the interaction of social and technical issues of energy production or consumption.

## 2. Literature review

### 2.1. Approaches to interdisciplinarity

Different disciplines and researchers representing them can be brought together to collaborate on projects in various ways; through 'multidisciplinarity', 'interdisciplinarity' or 'transdisciplinarity'. These forms of cross-disciplinarity may be characterised as follows: multi-disciplinarity involves putting two or more disciplinary perspectives side by side but is often seen as compartmentalised, with individual disciplines still acting alone. Interdisciplinarity indicates an attempt to integrate and synthesise the perspectives of different disciplines to provide a holistic understanding of the problem [2], though the term has become a little diluted in its application [38]. Transdisciplinarity goes beyond integration purely of academic disciplines, and involves both relevant stakeholders and the public [51]. In this paper the term 'cross-disciplinarity' has been used as an all encompassing term for these three concepts, partly because the focus of this paper is not about the terms themselves, and also because the data presented here emerged from a workshop which brought together different types of cross-disciplinarity.

In reality these forms of cross-disciplinarity represent a continuum, reflecting differences in how disciplines are brought together at various stages in the research, the power a discipline has to set the research agenda, and their control over methodologies. The social sciences have much to offer a cross-disciplinary project: unique epistemological and ontological viewpoints which can inform the focus of energy research; unique theories and ideas which can guide research questions and practices; and unique methodological approaches and tools with which to collect, analyse, and present data. Unfortunately not all of these potential social science offerings are either sought or realised in cross-disciplinary projects. Theorising the balance and equality between different disciplines integrated through cross-disciplinary research, Barry et al. [2] outline three 'logics of interdisciplinarity': 'logic of innovation', 'logic of accountability' and 'ontological logic' (Table 1). This approach helps to expose the drivers behind the integration of certain disciplines in cross-disciplinary research, and seeks to highlight imbalances in the ways in which they might be brought into and influence a piece of research. Table 1 provides an overview of the approach, including the three logics, a description of how they would be demonstrated within a cross-disciplinary collaboration, the consequence of this type of collaboration and its relevance to social science.

There is an ideal standard inferred by these logics, which suggests that only cross-disciplinary practice based on an ontological logic fully realises and captures the true potential contribution of all disciplines involved, including their philosophies, methods and modes of analysis. Integration based on a logic of innovation or logic of accountability alone only promotes *partial integration* of the social sciences.

This approach (logics of interdisciplinary), which seeks to understand and explain cross-disciplinary motivation and practice is used below to explore the reality of cross-disciplinary energy demand research in the UK. This paper does not seek to critique the approach proposed by Barry et al. [2]; rather to use the 'logics' to expose the ways in which the social sciences, and individual social scientists, are integrated into these projects. This serves to provide a more nuanced understanding of the basis on which integration occurs and whether this truly captures the full potential of the social sciences.

### 2.2. Integration in practice: findings and gaps

The reality of cross-disciplinary research is the focus of a variety of fields of scholarship including management studies (e.g. [17,30]), organisational studies (e.g. [37,35]) and team science (e.g. [15,27]). This paper does not aim to review that literature here, but rather highlights some key contributions which may help to understand integration within the field of energy demand research.

Discussing general cross-disciplinary research, De Boer et al. [12] (p.54) highlight several strategies to make such projects more successful: competencies of project leaders, clear working plans, communication, physical proximity, hiring at least one person with interdisciplinary experience and 'reserving separate time, manpower and funds for coordination'. Also at a generic level, Bruce et al. [8] identify key qualities that managers and researchers on interdisciplinary projects should possess, for example: curiosity, open mindedness, good communication skills and good team work

[4] TEDDINET is a UK-based EPSRC-funded network. For more information visit www.teddinet.org.
[5] European Cooperation in Science and Technology.
[6] United States Global Change Research Program.