Creating an interdisciplinary energy lexicon: Working with terminology differences in support of better energy policy

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Abstract

Language shapes the practices and processes of energy research and policy. It is thus challenging that each disciplinary community has its own taken-for-granted terminology, which can be difficult for 'outsiders' to understand. Much of the interdisciplinary literature has focused on the challenges experienced in relation to this, with very little done on solutions. Moreover, most attempts to provide an overview of such (energy-related) definitions have still been undertaken within disciplinary silos and have tended to be narrow in scope (e.g. glossaries for one particular research/policy community), and have thereby failed to provide an adequate platform for cross-cutting policy debate and interdisciplinary exchange. This paper therefore aims to investigate how an interdisciplinary lexicon might be practically produced for energy researchers across the Social Sciences and Humanities (SSH), as part of providing a basis for interdisciplinary collaboration and a transparent platform for subsequent policy discussions. Specifically, the core of this paper (1) identifies a set of guiding principles that may assist in the creation of a lexicon and (2) proposes a method for creating an energy-SSH lexicon. All this is discussed in the context of a new EU Platform (SHAPE-ENERGY: Social sciences & Humanities for Advancing Policy in European ENERGY), which is following this proposed method in creating its own interdisciplinary energy lexicon. We will conclude by reflecting on how a lexicon such as the one that we propose – e.g. one that is reflexive, participatory, solutions-focussed, noted as being the start (not the end) of dialogue, and accounts for difference, etc. – could be used more broadly in other interdisciplinary and multi-stakeholder contexts.

Introduction

> Most interdisciplinary conferences and projects I am acquainted with end up opting for theoretical language rooted in one of the disciplines. And, whoever controls the discourse controls the character of the work.
>
> (Janz, 1994, p. 140)

> varying vocabularies [exist] between disciplines for the same or similar concepts
>
> (Knapp, 2012, p. 208)

Numerous energy-related challenges face the future Europe, some of which are explicitly noted by the European Commission (2015a) in its formulation of EU Energy and Climate Policy: security of supply; competitiveness; and sustainability. In finding ways to better understand these challenges, as well as the ways in which we may mitigate or adapt to such challenges, it has long been agreed that energy policy will benefit from the plurality offered by interdisciplinary research, particularly in the context of dealing with long-term, complex and ever-evolving societal challenges of the future (Hannon, Rhodes and Skea, 2012; Nature, 2015; Powell, Monahan and Foulds, 2015; Schmidt and Weigt, 2015). Moreover, recently there has been an increasing number of calls for energy policy and innovation

to learn more from the 'energy-related social sciences and humanities'[1] (energy-SSH) (Foulds and Christensen, 2016; Sovacool et al., 2015; Spreng, 2014; Sovacool, 2014). In response to this emerging consensus, the European Commission has begun to put in place measures that allow energy-SSH communities to engage in more interdisciplinary collaboration, as part of producing a more appropriate (and better informed) evidence base for European energy policy. Examples include recent changes to the European Strategic Energy Technology Plan that reorient various EU policies and strategies towards more energy-SSH informed priorities (European Commission, 2014), which has consequently led to the EU Horizon 2020 Energy Work Programme 2016–17 explicitly providing funding on energy-SSH (European Commission, 2015b).

A significant amount of work has been published on the experiences of conducting interdisciplinary research, be in it energy-related circles (e.g. Mallaband et al., 2017; Schuitema and Sintov, 2017; Winskel, 2014) or beyond (e.g. Bruce, Lyall, Tait and Williams, 2004; Evans and Randalls, 2008; Pohl, 2005). A common theme that has emerged from such studies is that different research communities have different languages. By language, we are referring to word choices, metaphors, analogies, sentence structuring conventions, etc., and we would certainly not limit it to the spoken and written domains (e.g. body language, tone of voice). These language differences can act as a real barrier to effective collaboration and meaningful research (Bracken and Oughton, 2006). Essentially, different languages can mean that researchers "speak past each other" (Dixon and Sharp, 2007, p. 222) and thereby work on different terms of reference; language is intrinsic to how disciplines "ask different types of questions as well as seek different types of answers" (Dixon and Sharp, 2007, p. 222). Consequently, given how language is a key part of conceptualising the problem at hand, researchers may not simply be approaching a same problem in different ways, but they may actually be being pulled towards different problems altogether. The institutionalised framing that language provides shapes the point of departure for research and hence the terms on which researchers are able (and willing) to collaborate with others.

We argue that much has been done on reporting these challenges, but not enough has been done to constructively create solutions to such challenges. Indeed, we would argue that too much has been said for too long on how different disciplines are associated with particular languages, research framings and institutional rules; the debate is over and researchers now need to consider practical ways that language differences can be addressed. Producing 'glossaries' is one typical approach of large-scale energy projects, initiatives and/or programmes to try to ensure that their broad multi-disciplinary and multi-sectoral readership all have a common point of reference (e.g. energy-pedia, 2017; Great River Energy, 2017; International Energy Agency, 2017; Institute for Energy and Environmental Research, 2017; US Office of Energy Efficiency and Renewable Energy, 2017). Indeed, recent discussions with policymakers about how to best communicate energy scenario findings from modelling work have led to the recommendation that it "may also be worthwhile to develop a short glossary of terms" (McDowall, Trutnevyte, Tomei and Keppo, 2014, p. 84). Nevertheless we would argue that, implicitly, such attempts simplistically position disciplinary terminologies (intentionally or not) as being fairly static and agreeable. Moreover, such glossaries that have been written have tended to be more top-down, e.g. imposed by one particular institution that may in actual fact only represent one particular field or community of practice. We therefore argue that more needs to be done to provide materials which support the debate and discussion around various 'lexicons', which are inherently more practical and day-to-day in their nature, as opposed to issuing (in a relatively top-down way) an accompanying reference guide for interpretation. A lexicon is the list of a working vocabulary of a particular community. In this case our focus is the wide-ranging set of energy-SSH communities – it is nevertheless also worth highlighting that such a need has been highlighted by numerous other disciplines (An et al., 2007; Proctor et al., 2009).

This paper thus aims to investigate *how* a common lexicon might be practically produced, as part of providing meaningful foundations for interdisciplinary collaboration across the energy-SSH communities, as well as enabling links into the more traditionally dominant energy research areas of Science, Technology, Engineering and Mathematics (STEM). In furthering this overarching aim, we break the core of this paper into two objectives: (1) identifying a set of guiding principles that may assist in the creation of a lexicon; and (2) proposing a method for creating an energy-SSH lexicon. We are not aware of any other attempts to do something similar to this. These objectives will be in the context of a new EU Horizon project (SHAPE-ENERGY), within which the present authors are creating such a lexicon. Whilst the SHAPE-ENERGY approach to creating to a lexicon inherently links to the purpose of embedding more energy-SSH insights in European energy policy, we argue that there is considerable transferability to other interdisciplinary research projects with different foci.

This paper begins with background context that covers current best practice examples of reflecting on language difference in large energy research projects, in addition to an overview of the SHAPE-ENERGY project. Following this we outline, on the basis of the literature, a set of principles that we argue should be at the forefront of one's mind when seeking to create a lexicon and/or seeking other ways to directly tackle energy-SSH languages differences. Based on these principles, we then detail our method for creating a common energy-related lexicon for working across multiple disciplines and stakeholder groups. We finish by reflecting on the ways in which this lexicon and/or method could be used, and with what implications.

Background context

This section is dedicated to providing more detailed background on: (1) existing literature that has reflected on the language differences, in particular relating to energy-SSH terminologies, in large (and intentionally interdisciplinary) energy research; and (2) the EU Horizon 2020 funded SHAPE-ENERGY project, within which we are creating a common lexicon as a basis for interdisciplinary energy-SSH academic collaboration and

1. This includes energy-related research across the full range of social sciences and humanities, including: Business, Communication Studies, Demography, Development, Economics, Education, Environmental Social Science, Gender, History, Human Geography, Law, Philosophy, Planning, Politics, Psychology, Science and Technology Studies, Sociology, Social Anthropology, Social Policy, and Theology.

multi-stakeholder discussion for the future of European energy policy. These are now discussed in turn.

EXPERIENCE OF LANGUAGE DIFFERENCES IN LARGE ENERGY RESEARCH INITIATIVES

Whilst it is impossible to accurately quantify the impact of language-based misunderstandings and differences within projects, it is evidently an issue. In demonstrating this, we now draw heavily on insights from two research initiatives, which were originally mainly technical in nature, but (as time has gone on) have sought more insight from energy-SSH disciplines: (1) the £2.1 m EPSRC-funded 'Transitions Pathways' and £2.6 m EPSRC-funded 'Realising Transitions Pathways' projects, which ran over 2008–2012 and 2012–2016 respectively; and (2) the 'UK Energy Research Council' (UKERC) programme, which has run since 2004, with its latest phase (2014–2019) representing £13.5 m from UK Research Councils.

The Transitions Pathways consortium reflected on their interdisciplinary experiences at two different moments in the project (Hargreaves and Burgess, 2009; Longhurst and Chilvers, 2012). In discussing interdisciplinary challenges, their interviews found that it was the more technically-minded researchers who emphasised the "various language difficulties" (Hargreaves and Burgess, 2009, p. 17), whilst the social scientists emphasised conceptual, ontological, philosophical and framing related issues (which underlie those said language difficulties). This raises interesting questions about why exactly one may be interested in creating a common lexicon, e.g. is it to simply find a shared vocabulary or to find a shared point of departure (from which a language can then manifest itself)? In addition, the consortium's social scientists interestingly argued that the construction of a common vocabulary provided an opportunity to discuss energy-SSH concepts with other consortium members, meaning that they influenced the (shared) project direction and foci more than they had expected (Longhurst and Chilvers, 2012). It was also noted that the energy-SSH terms that gained the most traction across the consortium were the ones that had the least disciplinary/theoretical baggage. Essentially, those terms that emerged through conversation and collaboration had more purchase than those that were imposed by a particular disciplinary agenda (Longhurst and Chilvers, 2012). In managing all these issues, one engineer actually wrote themselves "a little dictionary" (Longhurst and Chilvers, 2012, p. 19) to help them translate energy-SSH terms.

The focus of UKERC has to date been as (1) a centre for interdisciplinary whole-systems energy research and (2) a networking point for UK energy researchers. As a focal point for much of the UK's energy research expertise, it frequently represents the UK in various international research and policy initiatives, such as the European Energy Research Alliance (UKERC, 2017a). Its core group has contributed to numerous reflections on their experiences of interdisciplinary working (e.g. Lyall, Bruce, Marsden and Meagher, 2011; Winskel, 2014; Winskel, Ketsopoulou and Churchouse, 2015). In particular though, we draw here on Winskel et al.'s (2015) report that was written as part of influencing UKERC's third phase research strategy (2014-2019), which involved group discussions, online surveys and interviews with UKERC colleagues. Winskel et al. (2015, p.80) note that reflexivity – including consideration of "the multiple forms that interdisciplinarity happens (or should happen) in UKERC" – has only recently become more of a priority, which links to their point that UKERC was originally much more oriented towards the "positivist physical sciences and economics". This could well be a reason for why Winskel and colleagues barely discuss the role and impact of language differences in their main discussion and list of final recommendations, despite it frequently being raised in their literature review and within the group discussions, online surveys and interviews. Indeed, these data collected highlighted:

- how accessible language is a frequent barrier to effective collaboration;
- it takes time to overcome such barriers, hence other project pressures can prevent researchers finding ways to learn 'the language';
- sometimes few researchers have the motivation to learn other disciplinary (or co-create new) languages, perhaps because they are exasperated;
- there is real merit in exploring ways that language/outputs can be translated to policymakers, to ensure that one's research has impact on energy policy.

We would consequently suggest that, despite the evident commonality of experience of these challenges, there is a clear gap in literature on how to deliver explicit, practical conclusions of use in addressing them.

THE SHAPE-ENERGY PROJECT

The 'Social sciences and Humanities for Advancing Policy in European Energy' (SHAPE-ENERGY) project is a €2 m investment through the EU Horizon 2020 programme, specifically: LCE-32-2016 (European Commission, 2015b, pp. 126–127). SHAPE-ENERGY is a new European platform for energy-SSH, running for two years from 1 February 2017. It aims to develop Europe's expertise in using and applying energy-SSH through a range of interdisciplinary, collaborative EU-wide activities (e.g. multi-stakeholder city-focussed workshops; PhD summer schools; secondments to Horizon 2020 energy projects; funding for think pieces and a research design challenge; sandpits; online debates; conferences). These activities will feed into the production of a strategic Research and Innovation Agenda concerning the future of European energy policy.

As part of its 'Scoping' work package, the SHAPE-ENERGY project is producing a lexicon for practical use during the project itself, as well as for wider dissemination across all relevant energy-SSH research, policy and industry communities. Developing a lexicon early on in the project was regarded as critical as it is hoped that it will provide a point of reference for interdisciplinary discussions throughout the project's lifetime. Moreover, a key premise of the SHAPE-ENERGY project is that disciplines disagree and hence it is not always possible to integrate different disciplinary ways of thinking, thus consequently we hope to construct the lexicon in a way that it illustrates such difference. Lastly – as we go onto make clear – it is not really the final lexicon itself that is of the most significance, but instead it is the process and discussion surrounding the production of the lexicon. Ultimately, the dynamic interactions between different researchers and different epistemic communities matter in overcoming language difficulties.

Guiding principles for constructing a common energy lexicon

This section outlines a set of guiding principles to be used in constructing SHAPE-ENERGY's common energy lexicon. These principles are informed by the existing literature on developing lexicons, dictionaries, glossaries, communication strategies, and other tools to facilitate working within or across disciplines or sectors (including in areas away from energy). These eight principles essentially lay out what we want the lexicon to 'do', in some cases emulating previous work, and in some cases deliberately contrasting from it. The principles are presented in roughly chronological order, in terms of how one would approach constructing a lexicon, and consequently the ordering of the following principles do not represent any sort of prioritisation.

PRINCIPLE #1: BE CLEAR ON WHAT EXACTLY YOU IMAGINE A LEXICON TO BE

It is critical that one is clear on what one sees a lexicon as being, in order to be sure that it is indeed something that one wants to create. Here we note that there is no agreed definition on what a lexicon is and how exactly that contrasts with other language reference tools. Take 'term lists', for instance, which "include most dictionaries, vocabularies, terminology lists, glossaries, and lexicons" (Medelyan, Witten, Divoli and Broekstra, 2013, p. 3), there is no consensus about what specifically distinguishes each of these. It may thus be useful for the reader to reflect on our definition: that the lexicon should deal with the "dialect" (Wear, 1999, p. 299) of disciplinary "linguistic repertoires" (Hulme, 2009, p.230). Bracken and Oughton (2006, p. 376) suggest that "dialects represent the difference between everyday use of a word and expert use, and the ways in which different disciplines use the same word to mean different things". Thus, our lexicon did not aim to look at broader language differences (i.e. how words are brought together in a structured way), but instead focussed on the specific differences in how terminologies are used. We therefore do not capture how various terms may, for example, be brought together in creative ways (see a recent Special Issue on metaphors for more on this – Inayatullaha et al. (2016)). We propose however that interdisciplinary lexicons can go further than online dictionaries (glossaries, etc.) so they are not solely a passive point of reference (Müller-Spitzer, Koplenig and Töpel, 2011). Instead, we argue that lexicons should be context-specific and tied to the ambitions of the project.

PRINCIPLE #2: BE SOLUTIONS-FOCUSSED

A typical suggestion for making a success of interdisciplinary research is that it is 'problem-focussed' (Klein, 2000). We similarly acknowledge that 'problems' – by which we predominantly mean specific local/national/international policy goals or social/environmental challenges – can provide tangible foci that help to prevent discussions getting lost down (often overly abstract) disciplinary perspectives; it can be helpful to have a central reference point for all involved. As found by Büscher (2016; p. 110), when considering interdisciplinary research, it can be helpful to "reach an understanding about shared referential problems, to which different lines of research contribute with their respective theories and methods". Nevertheless, given that any lexicon should have a purpose for being created, we suggest that it is that purpose that feeds into an overarching focus on *solutions* rather than problems. The lexicon essentially represents the means, not the ends, and hence it seems appropriate to ensure the lexicon is constructed on the basis of what one would want it to address. In this way, it is important to reflect on the purpose for developing a shared lexicon, whether it be for a project, event, industry programme, etc. This reflection on the exact framing of the lexicon may also assist in choosing which words to include.

PRINCIPLE #3: DEDICATE TIME TO THE LEXICON AS EARLY AS POSSIBLE

If a lexicon is of interest, then it makes sense to dedicate time and resources to producing it as soon as possible during an interdisciplinary collaboration. Indeed, the literature is clear that language differences can significantly slow progress in an interdisciplinary research project (Naiman, 1999). Relatedly, we would suggest (based on our own experiences) that when time has not been dedicated to tackling disciplinary language differences head on, emerging difficulties mean that action needs to be taken later on anyway, and hence precious project time had usually been lost. Another key reason for being proactive in constructing a lexicon is because it will (as per Principle #2) encourage further reflection on the purpose of their interdisciplinary collaboration. In stark contrast to glossaries that are usually produced at the end of a project to ensure that everything can be suitably translated by non-experts, lexicons could be a key component of stakeholders coming together as part of a shared point of departure (terminology-related and beyond) from the start.

PRINCIPLE #4: EMBRACE DISCIPLINARY DIFFERENCE

Many attempts to construct lexicons aim for universal definitions since "the ability to specify clearly the referent set may help researchers establish the broader principles or theories involved … and/or resolve disagreements" (Gedeon, 2008, p. 12). Indeed, much of the interdisciplinary climate change literature regarding language has, for example, sought to establish one commonly agreed lexicon (e.g. Bowman et al., 2009). Nevertheless, we argue that this does not support greater understandings of what and why such differences exist in the first place. Moreover, we would say that sometimes 'disagreement' cannot always be resolved due to, for instance, contrasting ontologies and epistemologies. Consequently there may be a wide variety of 'universal definitions' proposed by different authors, with none more 'correct' than the others. Relatedly, an interviewee from Longhurst and Chilvers (2012, p. 19) reflected on how the word, empirical, "means something like an approximation [in engineering] … and it's not considered to be very good work whereas for us [as a social scientist] … that's the core of what we do [i.e. observations]". Bracken and Oughton (2006, p. 376) underwent a similar reflection regarding how social and physical scientists define and use the word, "dynamic". In these ways, embracing and highlighting difference may enable fuller consideration of the various "essential elements of truth that most [definitions] contain" (Gedeon, 2008, p. 6). It is through giving different groups a more equal voice that we argue a lexicon should allow (where appropriate) explicit presentation of differences within and between disciplines/sectors. As such, a lexicon has the potential to be a 'boundary object' which can act as

a "means of translation" (Star and Griesemer, 1989, p. 393), between different social worlds – including research, policy and industry.

PRINCIPLE #5: BE PARTICIPATORY AND REFLEXIVE

Given that disciplinary differences exist, we agree with Sterling's (2008) argument that research processes need to do more to 'open up' (rather than 'close down') discourses of choice[2]. It is vital that those leading on the construction of a lexicon are 'reflexive' (England, 1994) regarding how they themselves are imposing their own (disciplinary) values, experiences and institutionalised forms of knowledge onto what is being produced. Relatedly, it is essential that the process for producing the lexicon is participatory, which should include early (and active) involvement of a range of stakeholders (with intentionally a range of voices). Involving stakeholders too late could mean that those leading on the construction of the lexicon may have already narrowed down its aims and scope; this is typically reflected in approaches that seek 'consultation' on a lexicon, as opposed to actively 'co-producing' it. Finally, not only does making the process more participatory mean that the final lexicon will be pluralistic, but it will also help more to learn about the interdisciplinary issues that the lexicon relates to. Indeed, the very doing of interdisciplinary activity (e.g. working together to identify key terminology and comparing differences in how one may define it) can drive social learning (Hargreaves and Burgess, 2009).

PRINCIPLE #6: PAY ATTENTION TO TONE, AS WELL AS CONTENT

As highlighted earlier, language is certainly not only about the words or phrases one chooses to use. Those involved in mediation or facilitation work are well aware that "most conversations take place at several levels" (Randall and Brown, 2015, p. 167) and that focus on content alone can be misleading. Since "using language is never neutral, but always active" (Hulme, 2009, p. 230), different framings of issues from energy security to climate change can be powerful (Ereaut and Segnit, 2006) and influence policy direction. We always have an 'agenda' when communicating, something we are trying to achieve, whether that be to build support for a certain decision, extract key information from others, or demonstrate our own credentials – or indeed all of these at once. This agenda may be more or less explicit to others or ourselves. We argue that by paying attention to the underlying tone of discussion when constructing a lexicon (e.g. through observational or reflexive research methods, which may be highly qualitative) important additional dimensions may be brought to light.

PRINCIPLE #7: ACKNOWLEDGE THAT THE LEXICON CAN ONLY EVER BE A 'WORK-IN-PROGRESS'

Disciplinary languages are continually evolving. Further, interdisciplinary research is too multi-modal and emergent to provide clear direction on how these evolving languages may be brought together. On this basis, we argue that lexicons should be explicitly presented as 'unfinished' or, rather, that they can never be 'finished'. We therefore are not attempting to be 'holistic', 'comprehensive' or 'complete' in our attempts. This links to a more constructivist perspective that argues language is a manifestation (or performance) of the world and evolving contexts, rather than a static definable and direct reflection of that world (a more positivistic perspective) (Khagram et al., 2010). Our approach is then in contrast to some approaches, perhaps most notably the large body of work concerned with computer-assisted "methods of creating [structured representations of knowledge] automatically from document collections" (Medelyan et al., 2013, p. 1).

PRINCIPLE #8: ENSURE THAT THE LEXICON ENABLES FLEXIBLE AND VARIED USE

It is inevitable that some may be more interested in using a lexicon than others. For instance, some may wish to 'dip in and out' as part of looking at one particular word or point of comparison, whereas others may be more interested in considering the lexicon from a 'meta' viewpoint. It could also be used by one individual researcher as a 'quick' reference tool, or as the basis for longer discussions with others. Furthermore, some may have more time to spend on (and inclination for) producing the lexicon. It is therefore important that what we put forward in this paper (e.g. as a set of principles and method) is used flexibly, and that what is subsequently produced is a lexicon that also enables multiple uses. As such, the final version of the published lexicon needs to be clearly structured and navigable by all audiences (e.g. an interactive pdf). Moreover, if it is to be successful, then it will need to have a convenient structure to allow for flexibility across its potentially high range of uses.

Creating the SHAPE-ENERGY lexicon

The SHAPE-ENERGY scoping workshop, held on 24th February 2017 in Cambridge (UK), brought together leading academics across a very wide range of (primarily SSH) disciplines, interested in contributing toward interdisciplinary perspectives on the future of low carbon energy in Europe. Thus, 25 high profile scholars representing over 20 disciplines (and 12 European countries) attended to discuss the foundations of a European strategic research agenda. Attendees were leaders of various energy-SSH – as well as some specific SSH and STEM – communities, including journal editors, academic network directors, and PIs of large energy projects, as well as members of the SHAPE-ENERGY consortium. As part of the workshop's purpose in shaping the direction of the rest of the project, one task was the early development of the lexicon (as per Principle #3).

In the development of any shared lexicon, there will inevitably be decisions to be made about *which* disciplinary/sectoral differences to include. Our lexicon was particularly focussed on the specific (albeit broad) range of social science and humanities disciplines. Thus, setting the context for the lexicon's development as an academic workshop enabled particular emphasis to be placed on the discussions of differences across those disciplines (as per Principle #4). This was regarded as central in supporting better presentation to external communities (e.g. policy, industry) of these differences, in order to further develop shared understandings, and counteract the difficulties of 'social sciences and humanities' being presumed to be one homogeneous entity.

2. For Sterling (2008), this concerned the social appraisal of technology, but for us here it concerns the various discourses that could shape what goes into the lexicon (e.g. word choice, word definition).

(1) IDENTIFICATION OF TERMS

In creating the lexicon, we first reflected on our lexicon's core aims (as per Principle #2). These are:

- to provide a foundation for the interdisciplinary, multi-stakeholder activities run throughout the rest of the SHAPE-ENERGY project; and
- ultimately, to provide a means for stronger dialogue among European energy-research stakeholders, to advise on the future of energy research, innovation and policy in Europe (e.g. via Horizon 2020).

It was important that the entries in the lexicon were not predefined by the SHAPE-ENERGY team – indeed this would have replicated some of the very issues we were hoping to address (cf. Principle #5). Thus, scoping workshop attendees and representatives of the European Commission strategy unit were asked, prior to the workshop, to contribute around five keywords or phrases particularly associated with *cutting-edge energy research* in their field. These terms could represent ideas which were gaining in popularity/usage in that area, or terms which had been resilient to changing agendas (i.e. used over many decades). In order to focus the content of the lexicon, it was suggested that words where 'energy' could be inserted before or after might be particularly appropriate (although this was not a requirement). The most common 20 words/phrases were then selected for consideration in the lexicon exercise at the workshop (see Table 1); in making the final decisions consideration was also given to the most frequently used terms in the European SET-PLAN (European Commission, 2015c) and 2016–2017 Horizon 2020 Energy Work Programme (European Commission, 2015b).

(2) PROPOSAL OF DEFINITIONS

At the workshop, participants were then given 20 minutes to individually reflect on these 20 terms and contribute their own (written) definitions, e.g. how they might use the terms in conversation, as well as which disciplines each term might be associated with, and which might be most interesting to discuss. Participants were then split into groups of 4–6 persons, to reflect further on that written exercise. Participants were free to shape the discussion as they wished, however possible guiding questions were: How did their definitions differ? Do different groups use these phrases differently, or never use certain terms? Are other terms used for related concepts? As identified through our review work (Principle #6), it is important to recognise that "common ground is a dynamic construct … mutually constructed by interlocutors throughout the communicative process" (Kecskes and Zhang, 2009, p. 331). Thus these conversations allowed further incorporation of the dynamic nature of developing shared understanding, and were recorded.

(3) DATA ANALYSIS AND CONSTRUCTION OF THE LEXICON

Overall, the process described above resulted in three streams of data: (1) written submissions from workshop participants both prior to the workshop (identification of key terms), and on the day (proposed definitions and comments); (2) recorded participant discussions about their definitions, as well as other workshop sessions where differences of language arose; and (3) field notes of the workshop organisers (this paper's co-authors).

In the coming months, our analysis of these three streams of data will be completed. The analysis of (1) will seek to identify common ground, as well as difference, regarding the types of terms suggested as well as proposed definitions. During an iterative, thematic analysis of (2) and (3), we will pay particular attention to:

- where 'language' arose as a talking point;
- where differences in interpretation seemed to provide stumbling blocks to conversation, or meant the conversation took a different direction.

We will construct our draft lexicon from these analyses. In this draft lexicon, each of the 20 terms will be presented, accompanied by a number of (potentially contrasting) perspectives related to that term, including direct quotes. In the next section we give one preliminary example, to illustrate how such contrasting perspectives or themes may arise.

(4) ILLUSTRATIVE EXAMPLE: EXPLORING THE PHRASE 'ENERGY TRANSITION'

The phrase 'energy transition' was by far the most commonly submitted, being suggested by close to 50 % of participants prior to the workshop. As such (in Figure 1), we detail four contrasting definitions written by the workshop participants, each of which highlights a distinct theme that was reflected across a number of submissions. Firstly, some definitions emphasised that an 'energy transition' is often understood to involve moving toward a low(er) carbon future (rather than some other kind of future), thus those definitions focussed on the intended or perceived outcome of such a transition. In contrast, other definitions focussed less on 'what' the transition would lead to and hinted more at 'how' such a transition might occur, with direct consequences for how one might study it. For example, several invoked 'systems' in one way or another, with whole systems approaches representing a certain sector of academic research. Another definition explicitly mentions bottom-up (and middle-out) approaches, which again are treated more centrally by certain research communities. Finally, a number of submissions seemed to find the term inherently problematic and responded with questions of their own including, for instance, what 'end point' will be achieved by the energy transition, and at what time?

Table 1. Final keywords and phrases included in the SHAPE-ENERGY lexicon exercise on 24th Feb 2017.

energy behaviour	energy citizen(ship)	energy consumer	energy culture(s)	energy efficiency
energy future(s)	energy governance	energy justice	energy model	energy policy
energy poverty	energy practice(s)	energy security	energy social science	energy storage
energy transition	engagement	low-carbon energy	smart	sociotechnical

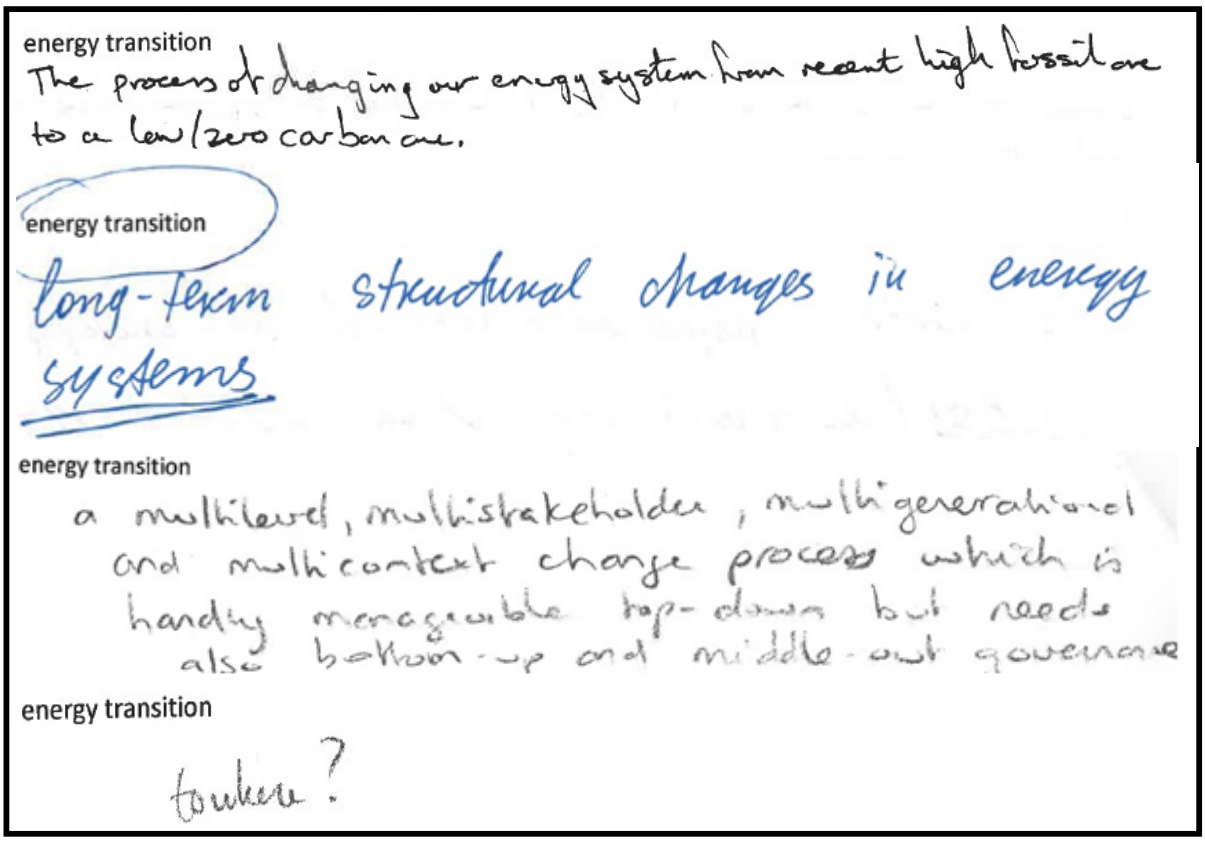

Figure 1. Four participants' responses to the phrase 'energy transition' at the 24th Feb 2017 workshop.

In this variety, one can therefore begin to see how different disciplines/sectors/researchers might prioritise or focus on different aspects of a social phenomenon, ask different types of questions, and regard different methods as being more or less appropriate. In a similar way, each entry of the lexicon will be illustrated by the core themes which emerged from the submissions at the workshop. The lexicon will also deliberately allow space for additional definitions/annotations to be added by future users (as well as additional key terms). In this way, it will also form a workbook which can be used e.g. at the start of projects, or at stakeholder events (cf. Principle #7).

The draft lexicon will be sent to workshop participants and SHAPE-ENERGY consortium members for final input (aligning with Principle #8), to help refine the range and presentation of definitions. As well as providing a reference point for the rest of the SHAPE-ENERGY project, the lexicon will be used as a resource to stimulate discussion at other SHAPE-ENERGY activities and as a point of reflection for the partners' participant observation diaries (which will be analysed as part of evaluating interdisciplinary project dynamics). In particular, this initial focus has been on exploration of disciplinary difference, but a key future use will be as a research-policy interface tool.

Conclusions

> External success is shown by a project whose results are presented in both academic and non-academic circles, which can be discussed in plain language.
>
> (Mallaband et al., 2017, p. 15)

This paper aimed to investigate how a common lexicon might be practically produced, as part of providing meaningful foundations for interdisciplinary energy-SSH collaboration and subsequent policy-academia interactions. This is in response to the literature commonly stating language differences to be a problem in interdisciplinary and multi-stakeholder collaborations, yet there being few practical suggestions on how such a problem could actually be addressed. Furthermore, more needs to be done to transparently provide resources (e.g. to policymakers and other 'users' of academic evidence) that represent energy-SSH as being inherently heterogeneous. We therefore identified, based on the literature, eight guiding principles to produce a lexicon for interdisciplinary energy research. From these principles, we developed a practical method for construction of an energy lexicon, which was employed at a workshop with academic leaders across a wide range of SSH fields (as part of the new EU Horizon 2020 funded SHAPE-ENERGY project). In this concluding section, we now reflect further on ways in which this lexicon, and the method of its production, could be used in other interdisciplinary and/or multi-stakeholder contexts, and with what implications.

We developed the energy lexicon in a workshop environment, and we suggest (parts of) this process could be repeated by interdisciplinary research teams (including across all Horizon 2020 funded energy projects), either as part of internal team meetings, or with key external stakeholders. Although we were keen to include a number of energy terms in our lexicon, and thus opted for a multi-step process to identify the terms in the first place, similar exercises could be undertaken with one particularly pertinent word or phrase only, or simply a pres-

entation/discussion of the lexicon's guiding principles and the rationale behind these (which groups can feel free to disagree with). Indeed, it is likely that providing a time and space for engaging in the process of reflection on terminology difference will be the most important contribution of this type of work: each context would give rise to a unique lexicon (and discussion) of use to the particular purpose of that group. The SHAPE-ENERGY lexicon provides one tool to aid such discussion, and will be made publicly available for the first time at the eceee summer study. We welcome reflections on the presentation of tool as well as from any on-the-ground uses.

Ultimately, the SHAPE-ENERGY project aims to support the energy-SSH community in building interdisciplinary capacity and in engaging with the European energy policy and innovation agenda. Thus, policy and policymakers fed into the construction of lexicon in key ways, in particular in identification of key terms to consider, which drew on the EU SET-Plan and Horizon 2020 Energy work programme (2016–17), as well as communication with representatives of the European Commission strategy unit. The eceee summer study panel to which this paper was submitted posed a number of questions aimed at the research, industry, and policy communities, related to participation and communication in the policy process. Pertinent themes included: the initiation of new discourses; the role and focus of policy makers in communications; and participation in policy and communication; to name a few. In reflecting upon how the lexicon could support development of good practice in these areas, we outline three contributions:

1. **Practical, participatory materials:** Policymakers may not be terribly interested in the nuances of language that academics may spend a great deal of time debating. We thus aimed to develop a procedure that could be used over different timescales. For example using one entry in the lexicon, to only examine one key definition, could help communicate (some of) the multitude of disciplinary differences and allow members of a working group to quickly reflect on what they agree/disagree on. The lexicon's short executive summary and explanation of guiding principles will also provide a quick, accessible overview to non-academics who may be more interested in the outputs of the discussions rather than the discussions themselves.

2. **Better examination of evidence-based policy:** Policymakers seek evidence and commission evidence-gathering exercises. Increasingly, this has involved an advocacy for interdisciplinary working, whereby different academic communities are expected to work with one another. Relatedly, this paper and its constituent work has brought together energy-SSH academics to unpick terminology-related differences that underlie how that very evidence is constructed and communicated. Through making these inherent academic differences (which are embedded in policy evidence bases) more transparent to the policymakers themselves, this work aims to support the examination of the growing interdisciplinary evidence base that the EU is funding, and that is feeding into energy policy.

3. **Supporting energy-SSH researchers in communicating their multiple points of departure:** One source of frustration amongst the energy-SSH research community relates to promotion of understanding of "what [researchers] can, and cannot, contribute" (Rochlin, 2014, p.183). It may be that the questions energy-SSH researchers are asked to answer (by other communities) are somewhat different from the questions they would choose to examine, and this can lead to tensions. By examining not only the energy-related words and phrases that they use, but crucially, what underlies these and with what aims (essentially, what interdisciplinary energy-SSH research is capable of doing etc.) this work aims to aid clearer communication of (the wide range of) possible energy-SSH contributions to policy.

It is important to note that, however comprehensive and participatory an energy lexicon may be, this is not a magic bullet solution for 'successful' interdisciplinary or cross-sector working. It is well known that better information provision does not on its own engender change (Burgess, Harrison and Filius, 1998), and thus better understanding of the differences which exist does not guarantee more productive working between groups. However, by confronting difference head-on, we hope this will help us as a research community to better understand the conceptual limits of interdisciplinary research (i.e. what is practically possible and achievable) and ultimately help to provide fertile ground for energy policies that are more sensitive to the differences that exist across the spectrum of energy-SSH disciplines.

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