

The SHAPE ENERGY Lexicon

interpreting energy-related social sciences
and humanities terminology



Authors

Chris Foulds*, Anglia Ruskin University (UK)
Rosie Robison**, Anglia Ruskin University (UK)

* chris.foulds@anglia.ac.uk

** rosie.robison@anglia.ac.uk

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Contents

Contents.....	2
Preface.....	3
A lexicon exercise: 20 words in 20 minutes.....	5
energy behaviour.....	9
energy citizen(ship).....	10
energy consumer.....	11
energy culture(s).....	12
energy efficiency.....	13
energy future(s).....	14
energy governance.....	15
energy justice.....	16
energy models.....	17
energy policy.....	18
energy poverty.....	19
energy practice(s).....	20
energy security.....	21
energy social science.....	22
energy storage.....	23
energy transition.....	24
energy engagement.....	25
low-carbon energy.....	26
smart.....	27
sociotechnical.....	28
Blank template page.....	29
Acknowledgements.....	30



Preface

Words help shape energy debates and thereby actively contribute to the direction of energy research and energy policy. Yet, words are used very differently across, and also within, different energy research communities, as well as different sectors (business, policy, media, etc.). This SHAPE ENERGY¹ Lexicon aims to explore and illustrate such differences, through comparing and contrasting definitions for 20 energy-related keywords and phrases, primarily drawn from the Social Sciences and Humanities.

The range of definitions found within this SHAPE ENERGY Lexicon were sourced from an interdisciplinary group of leading European energy scholars. The words themselves were suggested by these scholars prior to a workshop in Cambridge (UK) on 24 February 2017. At the workshop, after providing written definitions, contributions were discussed in small groups. Workshop participants included editors of energy-related journals, leads of large energy-related projects, and chairs of energy-related academic networks. The disciplinary expertise of participants included (at least): Architecture; Built Environment; Chemistry; Communication Studies; Economics; Engineering; Environmental Psychology; Environmental Sciences; Environmental Social Sciences; Ethics; Geography; International Relations; Law; Mathematics; Physics; Political Science; Psychosocial Studies; Science and Technology Studies; Social Anthropology; Sociology; and Sustainability Science. Participants were intentionally drawn from across Europe and thus we do note that the majority were not doing the exercise in their first language. A peer-reviewed conference paper by the authors of this Lexicon has fuller details on the methodological approach used, including the research underpinning it².

In constructing this Lexicon, our aim was not to undertake a comprehensive analysis of *all* the ways in which a particular term is, or has been, used. Rather, we aimed to develop a useful and detailed illustration of the diversity in the ways energy-related language may be interpreted, as well as build a tool which could be used in other workshop or project contexts, or indeed for teaching purposes. Although contributors were all energy scholars, some had never come across (or would never choose to use) certain terms; thus contributions also represent what a term 'triggers' for a non-expert. At the other end of the spectrum, participants who did have expert knowledge of a certain area would often point out the multiple meanings of a word. A key point to emphasise is that different understandings (including problem framings) can suggest very different possible solutions to energy challenges, and thus different foci and methods for research. As just two examples, 'energy futures' will, for some, emphasise the importance of visual research methods, and 'energy efficiency' may seem to be associated with technical solutions.

This SHAPE ENERGY Lexicon begins with an optional written (or, perhaps, reflective) exercise where readers can write or consider their own definitions, before reading the range of definitions that emerged from our workshop. When presenting each of the Lexicon's words, we have deliberately used quotations to illustrate particular meanings, and included a space for note-making (underneath each set of illustrations) for the reader's own thoughts and to aid reflection.

Short or long exercises inspired by the one we designed and ran could similarly be used to prompt discussion in existing projects, emerging collaborations, or classes. Examples could include:

- Choosing a single word, of particular relevance to the group in question, for people to define and discuss;
- Highlighting a few examples from this Lexicon, and asking the group to suggest what the different definitions might suggest in terms of project foci or methods;

1 SHAPE ENERGY (Social sciences and Humanities for Advancing Policy in European ENERGY) is a €2m EU Platform supporting energy-related Social Sciences and Humanities (energy-SSH). See shapeenergy.eu.

2 Robison, R. and Foulds, C., 2017. Creating an interdisciplinary energy lexicon: Working with terminology differences in support of better energy policy. In: *Proceedings of eceee summer study 2017 - Consumption, Efficiency & Limits*. Presqu'île de Giens, Hyères, France, 29 May-3 June 2017. Stockholm: eceee. 1-267-17, pp.121-130.



- Asking a group to suggest keywords or phrases they have found to be interpreted differently, or are likely sources of confusion or disagreement;
- Writing (or researching) a number of different ways in which a term may be used (particularly through different disciplinary framings), as part of coming up with new thematic groupings;
- ... as well as many other possibilities.

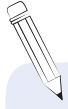
We are aware that other practical tools will have been developed (more or less formally) and/or used to discuss language difference when bringing together interdisciplinary or cross-sector groups, and would be very pleased to be made aware of such initiatives.

Through illustrating difference, we hope that this Lexicon will contribute to discussion and debate on how, when and why energy-related Social Sciences and Humanities terminology is used across energy research more broadly. Crucially, there are no 'right' or 'wrong' definitions.



A lexicon exercise: 20 words in 20 minutes

If you would like to complete the same exercise as the participants at our workshop before looking over the findings, you can take some time to write or type your own definitions (i.e. how you might use or interpret the following terms). If you're not familiar with any of the terms, don't worry about making an educated guess. Our participants had 20 minutes to write definitions for the 20 words.



1. energy behaviour

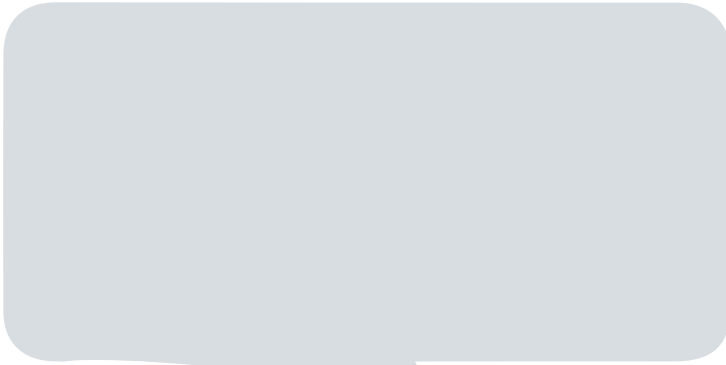
2. energy citizen(ship)

3. energy consumer

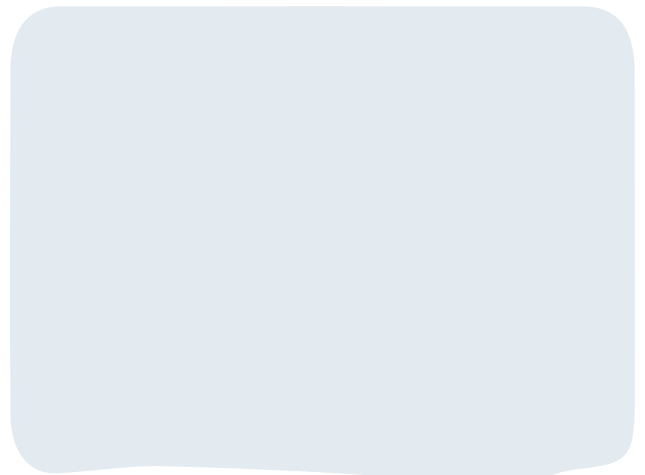
4. energy culture(s)

5. energy efficiency

6. energy future(s)



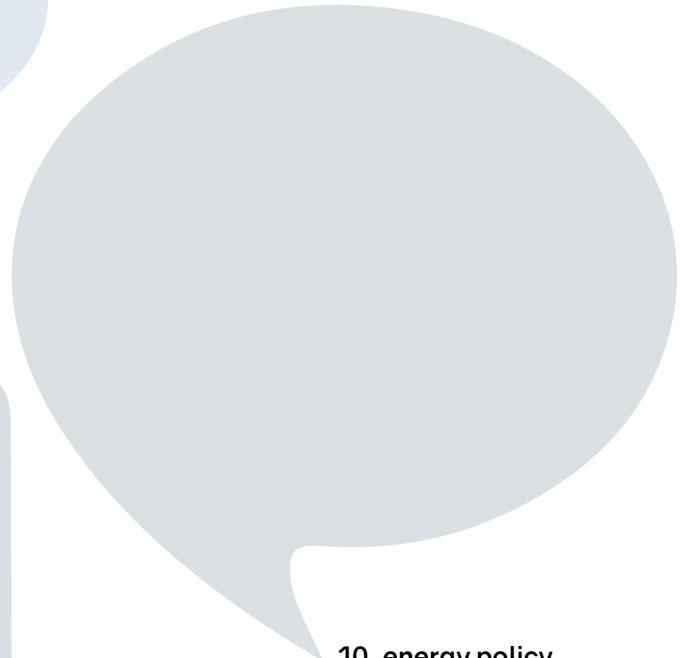
7. energy governance



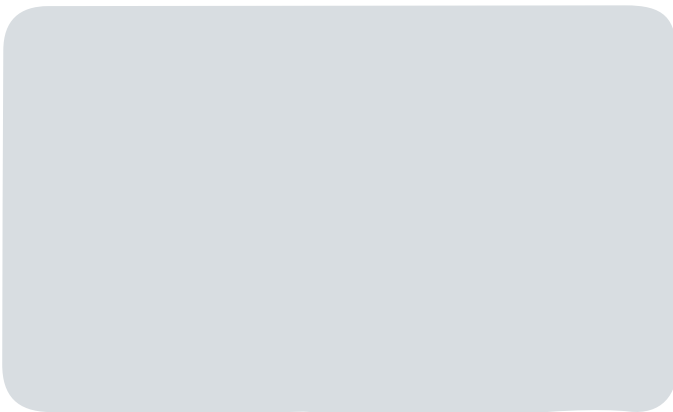
8. energy justice



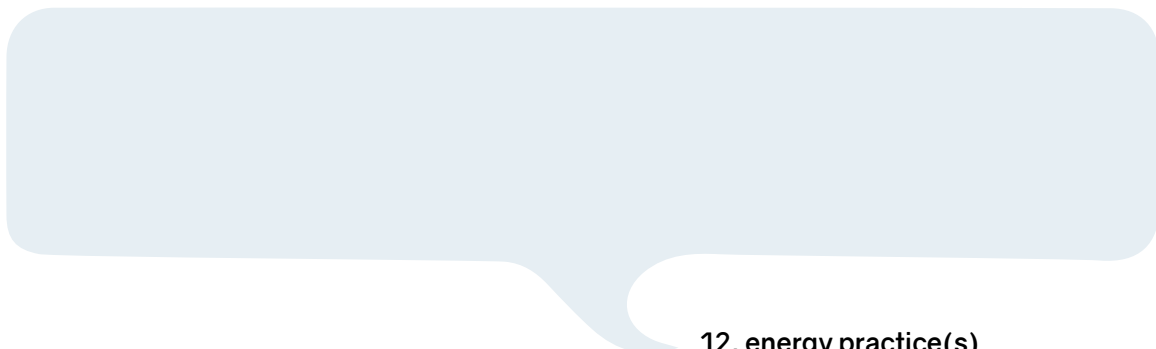
9. energy model



10. energy policy



11. energy poverty



12. energy practice(s)



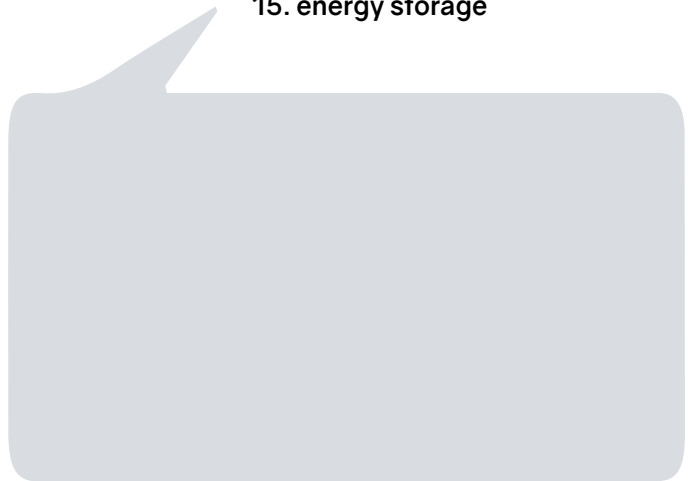
13. energy security



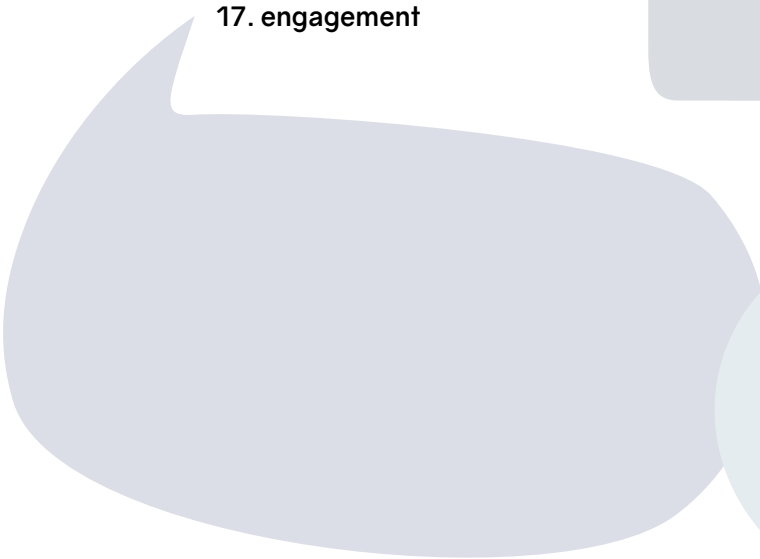
14. energy social science



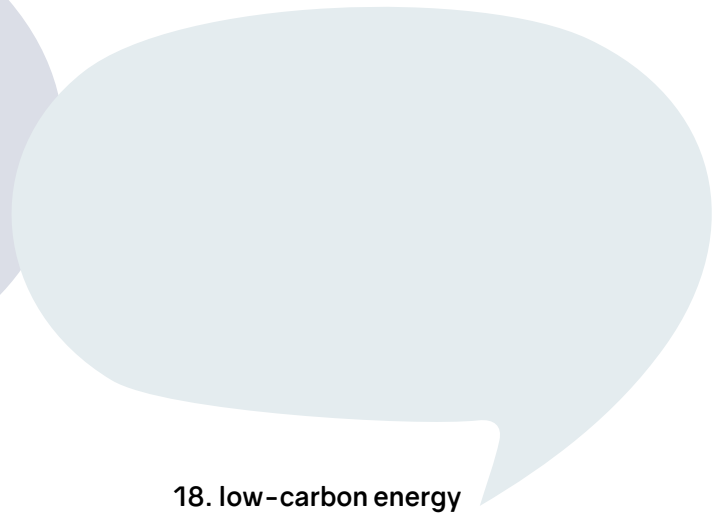
15. energy storage



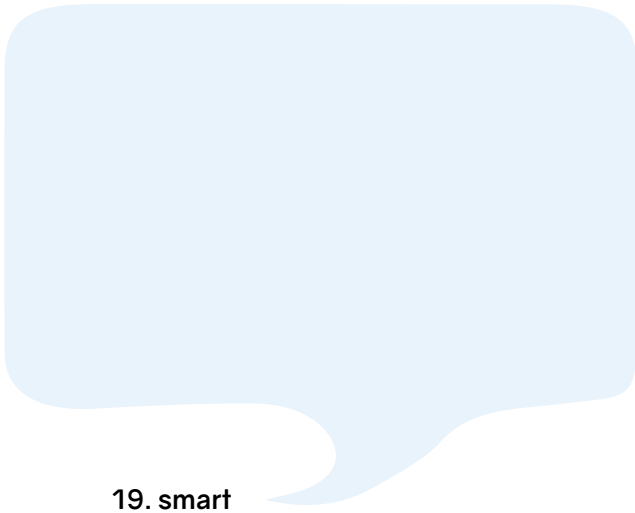
16. energy transition



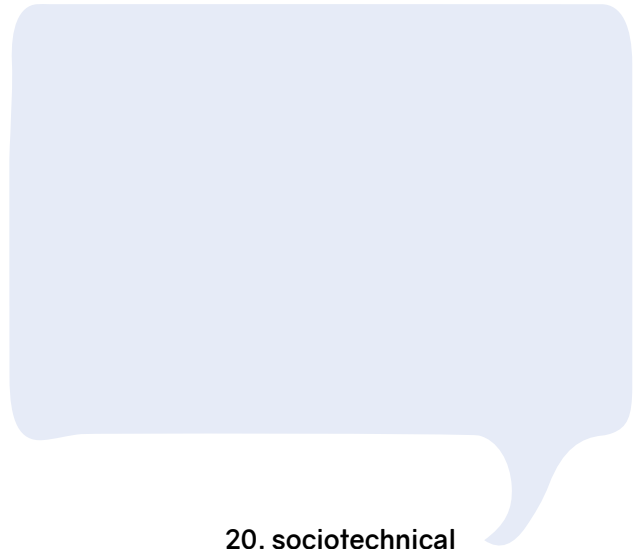
17. engagement



18. low-carbon energy

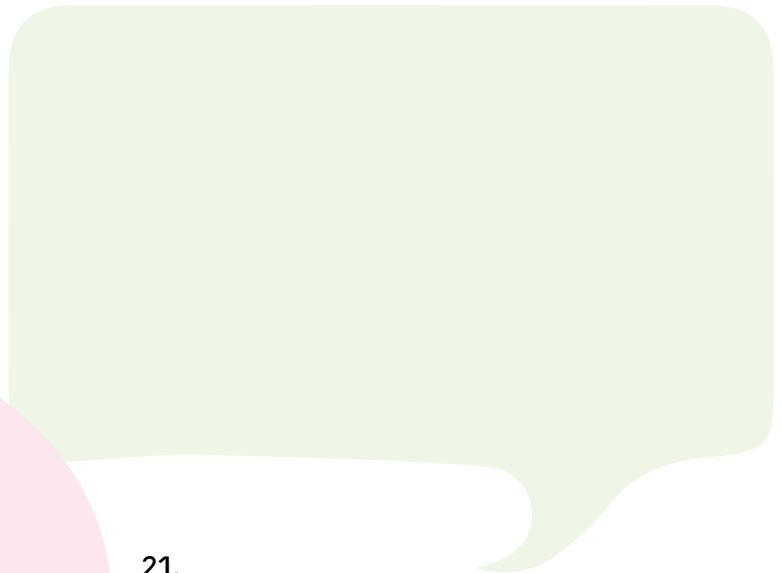


19. smart



20. sociotechnical

You can add your own key terms, and definitions, here:




21.



22.



23.

energy behaviour...

See also: [energy practice\(s\)](#)

... is an action by an individual

Behaviours involve undertaking a specific activity, perhaps making active choices about how to carry out that activity, and/or as a product of one's habits.

e.g. "Actions which use energy directly (e.g. heating, lighting, entertainment, travel)."

e.g. "The habits/routines as well as one-off or occasional activities that individuals participate in."

e.g. "Energy-consuming action, therefore specific task."

... prompts people to think about practices

Whether they saw them as similar concepts, or radically different, workshop participants used the term 'practices' - routinised sets of actions - to illustrate what behaviours are, or are not. There is a particular difference between disciplines here: 'behaviours' are more commonly examined in psychological literature, and 'practices' in sociological literature. However it is clear that, for many, use of one of these terms brings to mind the other.

e.g. "This is a term psychologists might use - sociologists might, rather, look at practices."

e.g. "Shouldn't say practices and behaviour [in the same breath]!"

e.g. "Not routinised set of actions [i.e. practice]."

e.g. "Routines and practices revolving around energy-related action."

... doesn't just relate to 'consumers'

Whilst some concentrated on behaviours of end-users, others highlighted how one might also seek to consider behaviours of other actors in the energy system, e.g. policymakers, suppliers, distributors, as well as the interplays within and between social groupings such as households.

e.g. "One-off and habitual actions, co-shaped/shaping institutional, norms, material elements that reinforce that action on both individual and collective level."


e.g. "How people use energy, practices, e.g. in households."

... may be judged as 'better' or 'worse'


Finally, during discussion, participants noted the judgements which can be passed on particular behaviours. An energy behaviour may be deemed 'better' or 'worse' than another one, depending e.g. on how much energy it uses. This judgement may impose a particular moral framework, which might not be explicitly acknowledged.

e.g. "I often see the distinction of wrong and right behaviour [in research]... social science researchers often know what's wrong and what's right (!)"

e.g. "Action that has to do with energy (good or bad)."



... ? [write or type your own notes here]

energy citizen(ship)...

See also: [energy consumer](#), [energy justice](#)

... implies engagement

A differentiation is sometimes made between an 'energy citizen' and an 'energy consumer', as two contrasting ways of labelling the same individual. A citizen is seen as taking on a more empowered or engaged role than a consumer. Participants did wonder, in discussion, how much of this was academic debate though, rather than of interest to the wider public.

e.g. "One of the identities end-users can have in relation to producing/using energy."

e.g. "Citizen not consumer implies empowerment."

e.g. "Active participation of people in energy transition."

... means involvement in the wider energy system in some way

The concept of citizen encompasses a wide variety of types of role. For example, citizenship could mean greater involvement in (1) the generation of energy, or (2) societal or community level energy debates, e.g. political activism.

e.g. "Is this more energy generation (e.g. prosumer?) Or political action (e.g. voting, protesting) about energy issues?"

e.g. "Individuals as political agents in the field of energy."

e.g. "Has an almost activist connotation."

... is about rights

The term raised questions of equality, the right to access energy, or the right to have a say in energy debates (such as in the political sphere). In this way, it could be seen as applying to everyone, whether or not they were actively 'engaged'.

e.g. "Rights of access to energy... Equality."

e.g. "Energy democracy?"

e.g. "Everyone."

... is about responsibilities

With those rights, came responsibilities and duties, particularly in relation to the wider community or society at large. By considering issues such as equality, rights, and responsibilities, this terminology immediately raises questions regarding the ethics of energy.

e.g. "I think of energy consumers as everybody ... but with an energy citizen I feel they have a responsibility."

e.g. "Do you also reflect on your role as a citizen, as part of a community?"

e.g. "Associate with terms like ethics + responsibility."






energy consumer...

See also: [energy citizen\(ship\)](#)

... means the end-user

In the simplest terms, an energy consumer refers to the 'final' user of energy.

e.g. "Somebody who uses energy, at the end of the energy supply chain"

e.g. "End-users of energy ... usually non-corporate, private individuals".

... is a straightforward term

Although there was still room for interpretation, this term attracted generally short responses, and was seen as being more 'obvious' than some of the other terms.

e.g. "Easy to define."

e.g. "Everyone!"

... is someone who pays directly for energy

Several participants pointed out the link with a market transaction taking place. To be a true consumer one needs to pay. Perhaps for this reason, the discipline most associated with the term was Economics.

e.g. "Households and businesses who buy energy."

e.g. "Someone who uses energy – more specifically often only when financial transactions are involved (i.e. paying consumer)."

... only partly represents the user

There was also discussion of the judgement that may be embedded within the term: the consumer is only concerned with the personal benefits that energy is providing him/her with, not with the wider (social, political, economic, etc.) implications of consumption.

e.g. "A consumer is an unaware user."

e.g. "Dehumanised."

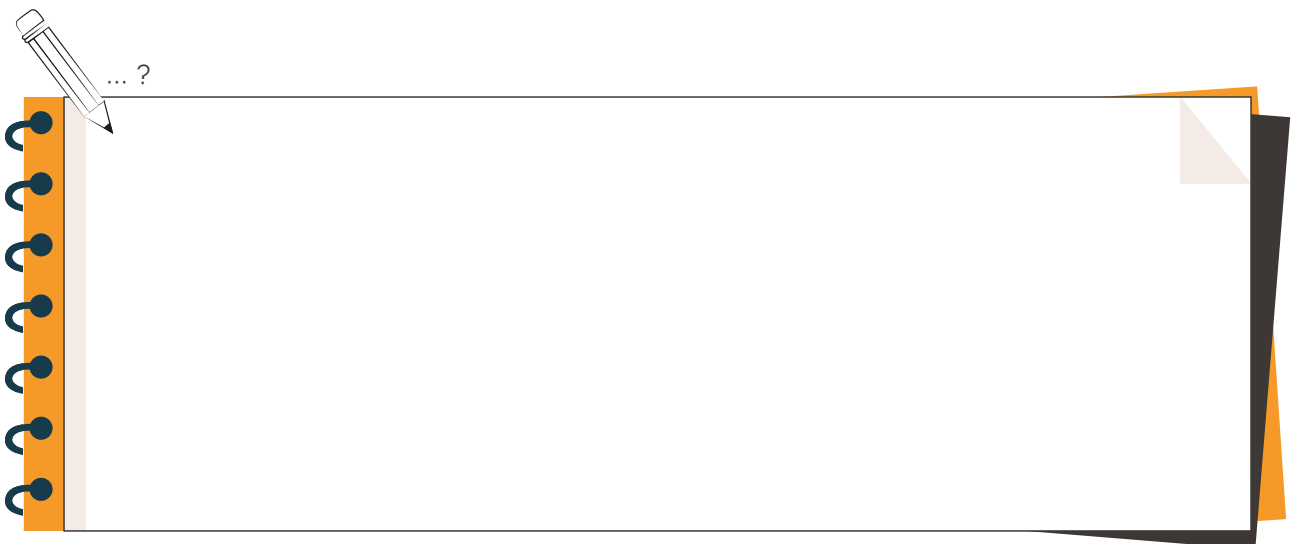
e.g. "[It is often] assumed that the culprit is the energy consumer."

e.g. "A term often used by policy and private sector, but which only partially captures role of public, individuals and society in energy transition."

... could be interpreted very differently as a technical term

Some interpreted it in a wider sense, to include anything or any system (i.e. not necessarily a person) which uses energy.

e.g. "Any thermodynamic system which dissipates energy."






energy culture(s)...

... are shared societal understandings

The largest theme amongst responses here was the idea of shared practices or understandings across particular groups. Thus the important thing was what bound together ways of using energy across society, or the social meanings associated with using energy.

e.g. *"Set of practices around energy, linked between group of people."*

e.g. *"The social norms which determine our energy use."*

e.g. *"Energy ideology."*

... can cross geographical boundaries

Such cultures could certainly be linked to physical groupings (country, region etc.), but didn't necessarily have to be. Cultures can emerge across small- and large-scales, linked by some common 'cultural' characteristic.

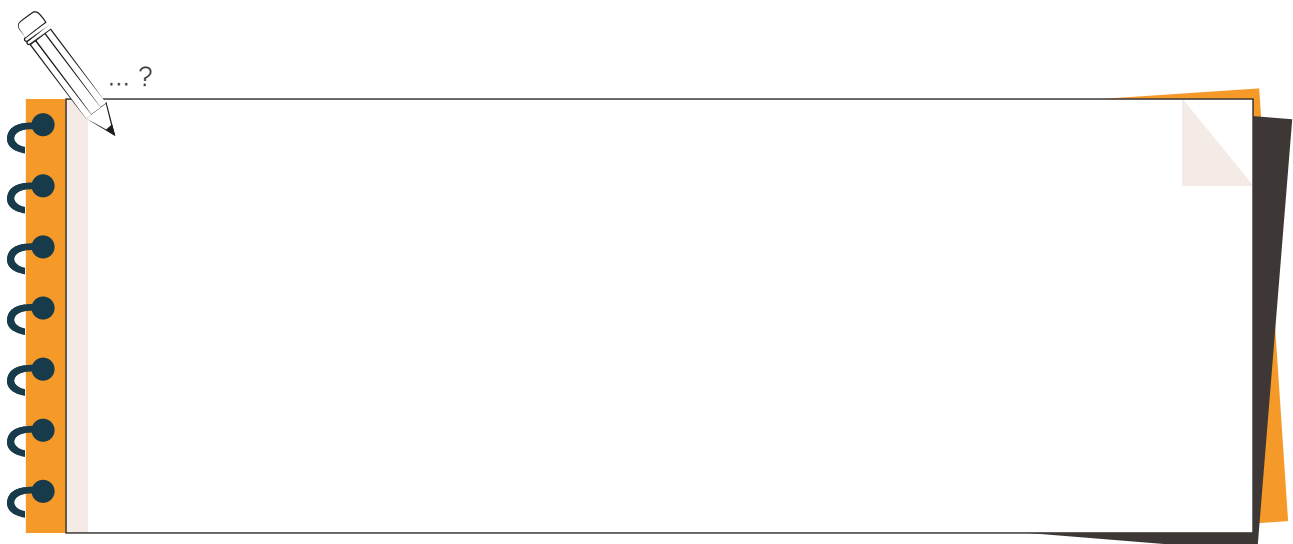
e.g. *"A societal level of organisation that governs how communities act. (Need not be constrained to one space/place, e.g. virtual cultures.)"*

e.g. *"Practices, values, frameworks, institutions etc. that have a decisive influence on energy behaviour, possibly classified by countries, social layers, branches, gender etc."*

... lead to a particular way of analysing data

Since 'energy cultures' puts the spotlight on the collective, societal and contextual nature of energy, this can lead to particular methodological or analytical foci when exploring research data. Disciplines seen as particularly related to this term included Sociology and Anthropology.

e.g. *"A methodology or approach for analysing one-off and habitual actions in context."*






energy efficiency...

... = (energy out) ÷ (energy in)

This term attracted several quantitative and mathematical definitions, including equations. As such, participants referred to this term's common application in Engineering research.

e.g. "Amount of service one gets per unit of energy."

e.g. "I always think about an equation."

... can be about technology, or behaviour

Although it is more often associated with technical solutions, others highlighted behavioural forms of energy efficiency. These two angles of course can require very different types of strategies, in research and in practical initiatives.

e.g. "Technical solutions to energy challenges".

e.g. "Ways of reducing consumption through technology...or behaviour."

... means getting the same (or more?) for less

There were subtly different interpretations of the ultimate 'aim' of energy efficiency. Is it about e.g. delivering an identical standard of living, whilst using less energy? Or using the least amount of energy possible whilst still delivering an acceptable standard of living? Or some balance between these two?

e.g. "Delivering same service with less energy - low energy fridge, loft insulation."

e.g. "Using as little energy as possible for a given purpose."

e.g. "Use less energy for getting the best result."

... is relative

Labelling something as 'energy efficient' is a comparative statement: it can only be more or less energy efficient than something else. Some participants thus saw energy efficiency as a dynamic evolution in achieving reductions in energy use over time (rather than an absolute end state which could be reached).

e.g. "Improving the rate of consumption of energy, relative to the service (enduse) provided."

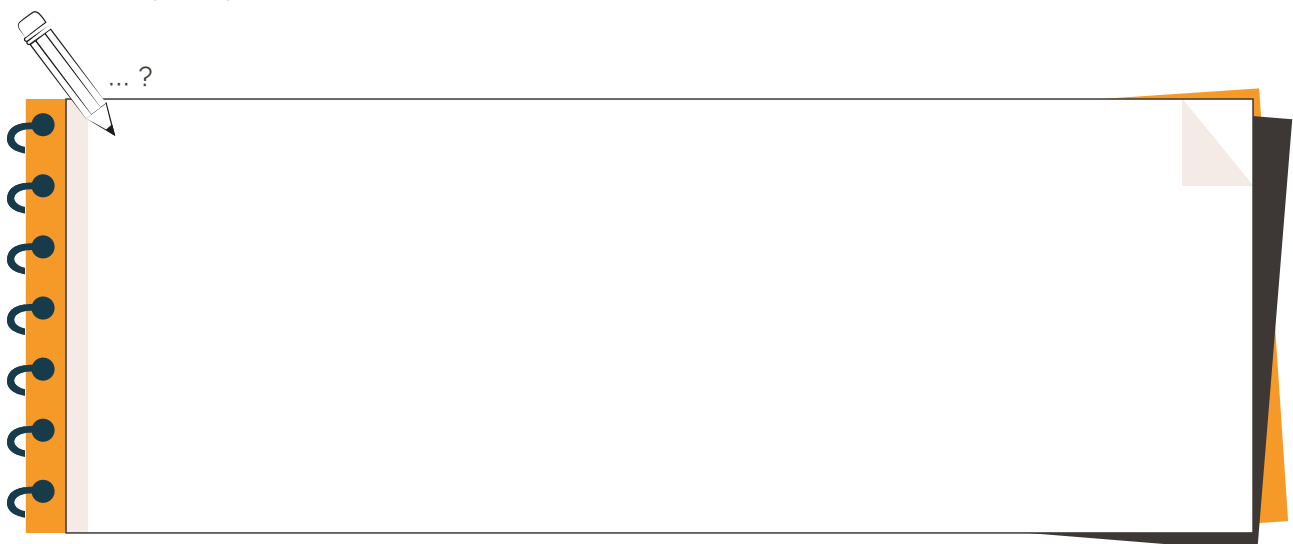
... as a solution, raises questions

The concept of energy efficiency prompted words of caution from some about its limitations as a tool. These included questions of 'rebound effects' - where improved efficiency leads to increased use, and therefore no energy savings are made. Some questioned where the focus on energy efficiency has come from:

e.g. "What about rebound effect...?"

e.g. "Insufficient but [a] first step towards sustainability of the energy system."

e.g. "Western notion of how energy should be used in a more sustainable world."






energy future(s)...

See also: [energy models](#)

... are imagined, often visually

Energy futures are not yet here. Some participants highlighted how imagined futures may be better captured in images (such as through drawing), rather than words.

e.g. "Imaginations/visions of how the energy system may look in the future."

e.g. "I imagine something very visual."

... are different from today

Such energy futures were regarded as ways of thinking about alternative possibilities to today's 'business as usual', and thus may need to be placed at a suitably distant (but not too distant) time in the future.

e.g. "Scenarios in which there are different energy systems operating from those today."

e.g. "Time horizon is usually 20, 30 or 50 years... not 100 years."

... are linked to scenarios

A large number of participants associated this phrase with the term 'scenarios', both in terms of the pathway to get to a particular future, but also in trying to predict where our current direction was headed.

e.g. "Don't use it; use 'scenarios'."

e.g. "We can think about how the future of energy can be created, and focus on one scenario and try to organise our policy etc... to make our vision real."

e.g. "Also another way, can think about the possible consequences of current actions."

... are multiple and subjective

Some particularly emphasised the plural nature of such energy futures (rather than talking about a singular energy future), because different people would have different visions. There was a reminder that researchers themselves would bring their own interpretations:

e.g. "Plural (futures) exists because different ways of imagining a (uncertain) future".

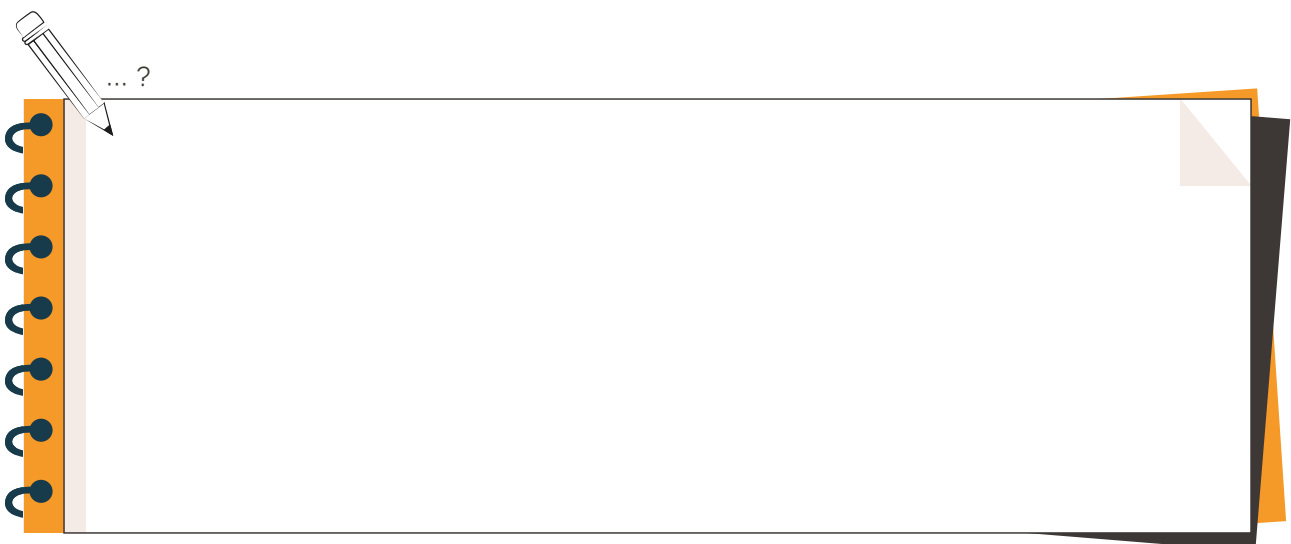
e.g. "The question for the researcher... if we are observers or active participants of scenarios?"

... can be interpreted totally differently!

Finally, there was a reminder that the term 'futures' has a very particular meaning in different fields, such as Finance and Law:

e.g. "Pricing contracts for energy commodities in future markets."

e.g. "I wouldn't use the word 'future' to think about the contribution of law."






energy governance...

See also: [energy policy](#)

... involves policy

Fundamentally, this term was intimately linked to formal political structures, governments, legislation, etc.

e.g. "Systems of controlling and overseeing energy services/infrastructure. Political. Government bodies."

e.g. "Legislation and rule of law management of energy systems."

e.g. "Don't use it; use 'policy'."

... can go beyond policy, or formal rules

However the largest portion of responses emphasised that governance could also include other forms of energy management, which are less 'top-down' or formal than that of government. This was a point of discussion after the lexicon exercise and meant wider stakeholder engagement was regarded as a key to studying energy governance. Some participants emphasised the structures surrounding such decision-making.

e.g. "Decision-making about energy - broader than policy / politics - includes private and third sector and individuals/households."

e.g. "Ways of managing the activities of society. Governance is not just delivered by government."

e.g. "Top-down <-> bottom-up approaches."

e.g. "Coordination of behaviour related to energy, be it induced by politics, business, NGOs and the like or informal rules like traditions or routines."

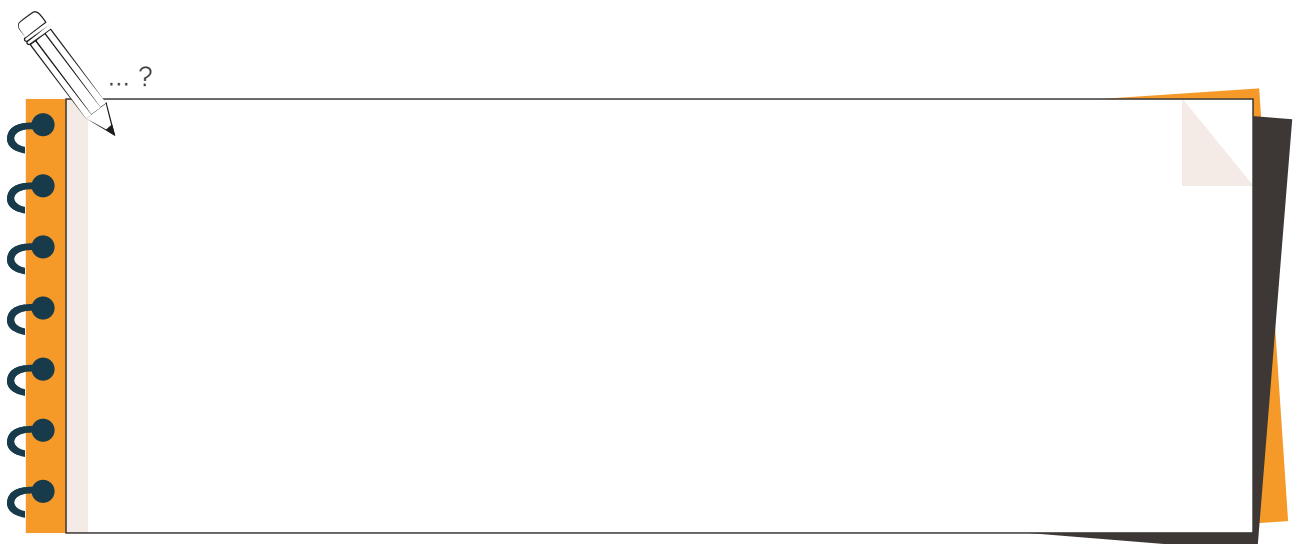
e.g. "Institutional and structural framework for energy policy."

... is about power and control

Governance raises questions of who is making the rules, and how political control is divided.

e.g. "Institutionalisation of power relationships."

e.g. "Power distribution within the energy system with more just distribution."






energy justice...

See also: [energy citizen\(ship\)](#), [energy poverty](#)

... asks us to consider what fairness is

'Fair' was the word most prevalent in participants' definitions of energy justice, including working towards fairness, but also reflecting on what fairness is. For example, equal access to energy might not equate to energy justice, depending on need. The term was thus associated with Sustainable Development, Ethics and Law.

e.g. *"Equity and fairness re. energy – e.g. fuel poverty / winners and losers in energy transitions."*

e.g. *"How to promote a fair, smart, sustainable use of energy."*

e.g. *"Hot countries need more energy for cooling than cold countries."*

... can be about different types of rights

Often, fairness was seen as primarily related to access to energy or fuel poverty, but many other strands of energy justice - and therefore types of rights - were mentioned. These included access to the political system, how negative impacts of energy production or use are distributed, and intergenerational issues.

e.g. *"Right of access to energy."*

e.g. *"Fair... participation [in] how the energy system is organised."*


e.g. *"Fair distribution of positive and negative impacts of energy production and consumption."*

e.g. *"Justice issues... such as local, regional, national and global, and intergenerational justice."*

... is very much associated with current social science research on energy

This term in particular was proposed by a large number of participants before the workshop (although not all participants were familiar with the term).



energy models...

See also: [energy future\(s\)](#)

... are (partial) representations

Models deliberately do not seek to capture everything, rather they may help in focussing on one particular (sub)system, in developing thinking, or in communicating ideas to others. These representations may well be visual - some participants drew diagrams.

e.g. "Mental representation of an energy system and other related systems."

e.g. "Ways to illustrate/represent energy activities."

... are about possible futures

Use of models may be synonymous with predictive or comparative work on future energy scenarios. They pull one towards thinking about certain aspects of a future, and the process of getting there.

e.g. "Associate with quantitative future scenarios, breakdown of sectors using most energy and sources of energy."

e.g. "Abstract representation of energy system used to predict future/inform decisions."

... are often quantitative or technical

Models are often based on numerical data, and/or concerned with mapping physical quantities (such as fossil fuel resource stocks); this means they may treat humans in an intentionally simplistic way (or not at all). They may require expert knowledge to be interpreted.

e.g. "A limited but useful discussion tool highlighting energy flows between demand and supply, usually without humans in it."

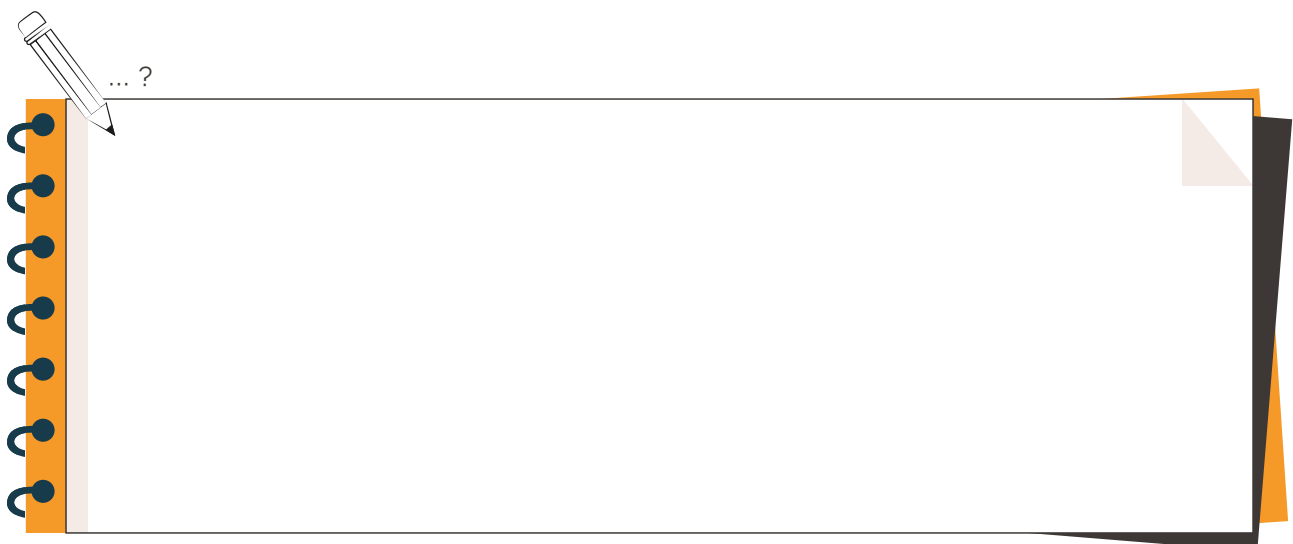
e.g. "More quantitative, ways to map, forecast, predict ... Humans as [data] points."

e.g. "Quantitative, input/output which I usually don't understand."

... are, however, not always quantitative

However models are also used in non-technical domains, again as ways to represent ideas and theories.

e.g. "Ways of drawing relationships for a particular aspect of energy consumption/production/distribution. Need not be quantitative ... e.g. social science theoretical models."





energy policy...

See also: [energy governance](#)

... involves written regulation

Unlike perhaps energy governance, energy policy was primarily considered as the domain of official government. In this way, it was equated with the documentation and laws produced by those in positions of political power.

e.g. "Specific piece of legislation targeted at energy systems."

e.g. "Policies, guidelines, rules set up to guide energy effects, activities or behaviour."

e.g. "Guidance or law of country/region on energy."

... links strategic goals

As well as individual pieces of formal regulation, policy involves an overarching vision, in terms of future goals. This may seek to bind different initiatives together (as per different energy futures).

e.g. "A strategic approach to energy production and consumption."

e.g. "Set of societal goals related to energy and measures to achieve them."

... exists at different levels

Participants highlighted the existence of both different hierarchical levels of government, and different policy programmes, each with their own strategic goals. These goals may align to a greater or lesser extent.

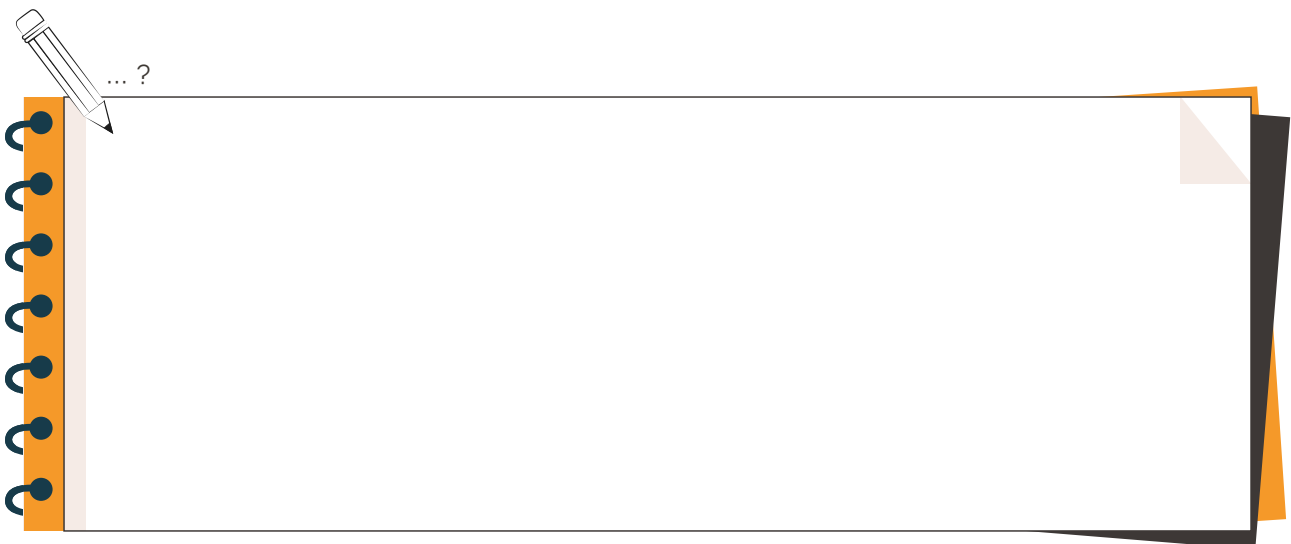
e.g. "A set of political strategies, regulations/laws that relate to energy ... at a given political scale (national/EU/global)."

e.g. "Can be distinguished from climate policy (but two are not mutually exclusive)."

... defines the problem

Importantly, by concentrating attention and resources on particular solutions, policy implicitly or explicitly raises the profile and importance of particular problems.

e.g. "The starting point is defining 'problems' and put them into public agenda."






energy poverty...

See also: [energy justice](#)

... is about facilitating everyday necessities

One was said to be in energy poverty if one was unable to access enough energy to meet one's basic needs.

e.g. "Not being able to pay for / not having access to energy supply in order to meet basic needs (heating, cooking, etc)."

e.g. "Lack or limited access to basic energy facilities, no possibility to use energy in the terms of 'needs'."

... can also go beyond necessity

Related to the fact that what exactly constitutes a 'need' is debated, many also began to problematise what 'sufficient' energy actually is and how that related to enjoyment and desirable (rather than required) levels of living.

e.g. "Not having access to 'sufficient' levels of energy, as part of achieving the required (and/or desired?) levels of living."

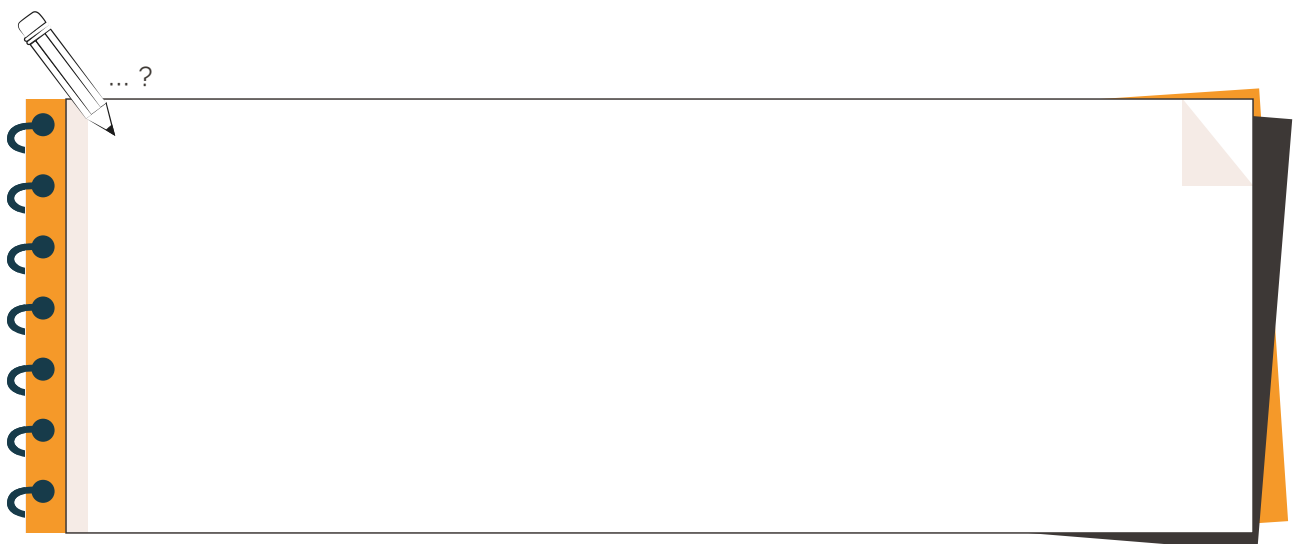
e.g. "Low opportunities of using and enjoying energy related activities."

... is intimately connected to the concept of energy justice

The synergies between energy poverty and energy justice research - e.g. in terms of the equitable and 'just' distribution of energy to all that need it - meant that energy justice was actually a focal point of many definitions.

e.g. "Case where 'energy justice' could not be fulfilled."

e.g. "Associated with energy justice."






energy practice(s)...

See also: [energy behaviour](#)

... is demand-focused

Almost all of the more generic definitions were solely focused on energy consumption.

e.g. "Established ways of using energy."

e.g. "How people use energy."

e.g. "People's habits concerning use of energy."

... is the doing of something in the 'real-world'

Instead of it being a particular social scientific term, some applied the more everyday interpretation of an energy practice, whereby it concerns practical energy-related activities perhaps conducted by industry or government. It was thus not about academic theory and debate, but about real-world practice that was delivering something tangible.

e.g. "Initiatives related to use, production, or management of energy in buildings/districts/cities/regions."

... is a sociological concept

In academic terms, practices were associated with the Theories of Practice literature, which has recently dominated sociological investigations on energy - in particular, energy demand. This theoretical perspective regards practices as routinised forms of doing (e.g. laundering, cooking, policymaking). One increasingly used theory of

practice presents a practice as being made of three elements: materials, competences, meanings.

e.g. "Routinised set of behaviours that co-evolve (with each other) over time. Seems to most often be 'energy-consuming', but it need not be!"

e.g. "What people do when using energy → people don't use energy, but they cook, wash, watch TV, drive etc."

e.g. "Associated with Shove and Walker - Lancaster. Meanings, competencies and materials."

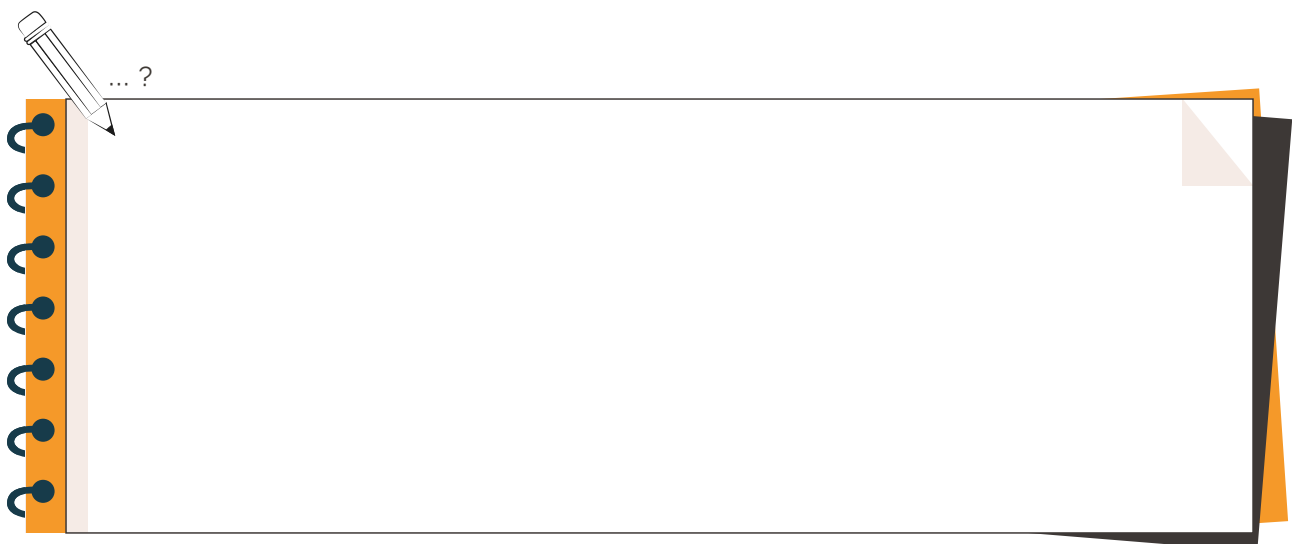
e.g. "Sociological theories of action. Shove says comprises of materials, competencies and meanings (interrelated). Individuals 'carry' practices (hence not individually focused)."

... is an opponent to conceptualisations of individualistic behaviour

Theories of Practice - and thus the use of the term, practice - are often justified as part of a critique of social psychological and behavioural economic accounts of behaviour change. The word practice may come with an understanding that it is the 'right' conceptualisation of social order. Many made it very clear that it was a case of 'either/or' when using language of practice or behaviour.

e.g. "More concrete than just a behaviour."

e.g. "decapitalise"





energy security...

... is about ensuring a consistent energy supply

Being secure in one's supply of energy was the most common definition. This was positioned almost always in generic terms, with no specific temporal or spatial boundaries being stated. Interestingly, energy 'supply' was, by far, the most commonly used word when defining energy security.

- e.g. "Ability to sustain necessary energy supply."
- e.g. "How to deal with security of supply."
- e.g. "Reliable and steady access to energy for everybody."
- e.g. "It refers to effective delivery and supply of energy in the uncertain future."

... is mainly positioned in terms of a particular nation

When spatial boundaries were detailed, it was at a country-level where the balance between energy demand and energy supply was considered.

- e.g. "Typically at national level → how much control over energy supply."
- e.g. "Understanding energy as key issue for national interests."
- e.g. "Enough energy for a country to work on a regular basis."

... is a political issue

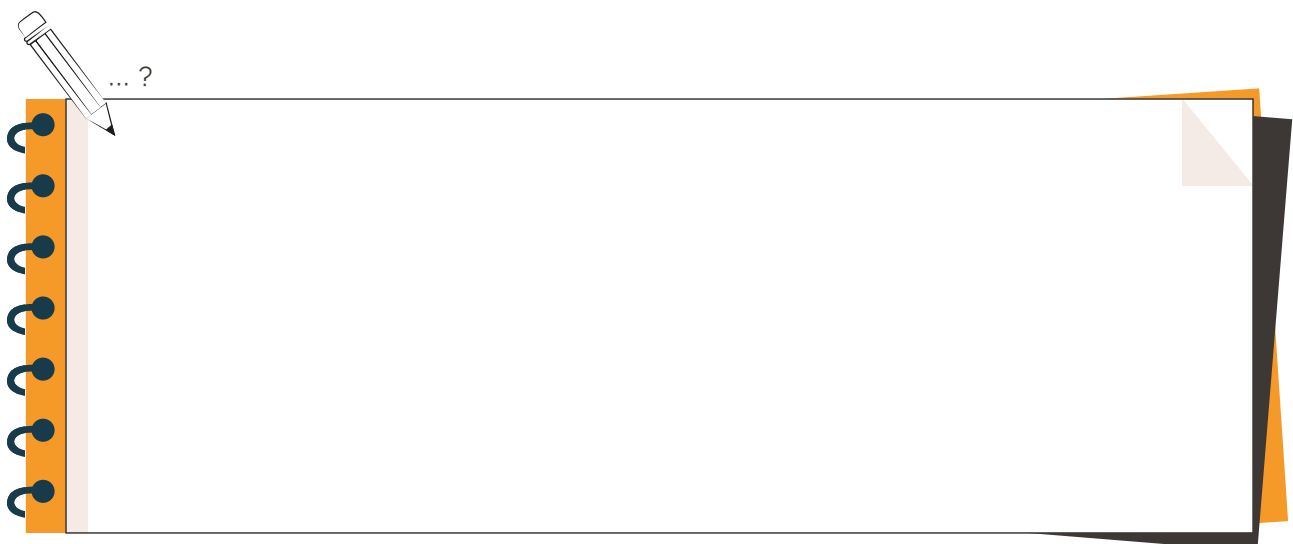
Energy security was sometimes regarded as a term used by political scientists (i.e. decapitalise) when, for instance, investigating the energy-related implications (e.g. in terms of imports and exports) of geopolitical relationships and crises.


- e.g. "Geopolitical (and should also be individual) issues around access to energy."
- e.g. "Reliability of import. The secure access to energy. Disciplines: political science."

... is an economic issue

Others regarded energy security to primarily be a result of energy markets, through which cheaper or more expensive energy can mean one is more or less energy secure respectively.

- e.g. "Access to energy markets at affordable levels."





energy social science...

... is any research connecting society and energy

Essentially any research investigating energy consumption, production and distribution, in the context of society and/or individuals could be energy social science.

e.g. *“Concerned with the societal aspects of energy.”*

e.g. *“Research and theories/methods/approaches that study relations between people and energy at various scales, in various contexts.”*

... is not one singular discipline

Since it is somewhat all-encompassing, some took issue with the very term ‘energy social science’ because it positions it as a singular discipline, with thus a common purpose, boundaries and scope.

e.g. *“Plural? Social sciences? All social sciences that study energy in some broad way.”*

e.g. *“Different academic disciplines addressing social/socio-technical aspect of energy.”*

e.g. *“Social science applied to energy - economics, psychology, sociology, anthropology, political science, law.”*

... involves problem-focused energy research

Some emphasised the problem-oriented component of energy social science research. Here, the argument is that the common link across the wide range of different research is its fundamental link to an energy-related problem.

e.g. *“Social science focused on defining and solving energy problems. Concentrated on human and social dimension on issues linked to energy (resources, exploitation, production, supplying, using).”*

... is an artificial construct for non-expert audiences

Energy social science is simply a term to flag up relevant social sciences research to policymakers and other non-experts. Indeed energy-related social scientific research arguably should have a focus on ‘social phenomena’ (which impact on energy), rather than a more normative focus on ‘energy problems’.

e.g. *“Necessary term to use towards policymakers and other non-academics audiences. However focusing only on energy is part of the problem. Solution is to focus on functions energy performs.”*






energy storage...

... is only an issue because of future energy use

The need for storage only exists because of society's non-negotiable 'need' for future energy. Unsurprisingly, demand/use/consumption were the most commonly used words when defining energy storage.

e.g. "Demand response (and virtual power plants) and physical storage of energy and transfer of energy into often carriers such as hydrogen/heat."

e.g. "The means of (temporarily) storing energy for use at some point in the future."

e.g. "A way of preserving energy for a future use."

e.g. "Place to put energy when produced and save it for later use."

... is linked to the rise of renewables

Demand management has become a particular priority recently because of the rise of renewables, which often come with issues of intermittency (e.g. wind energy is only available when the wind blows).

e.g. "How to store energy (e.g. energy produced by renewable sources)."

e.g. "Increasing issue regarding renewables. How to store..."

e.g. "Associated with wind technology."

... equals batteries!

Out of all the words, energy storage was the one that yielded the most specific examples. Batteries was the most common example provided.

e.g. "Any technology designed to store energy. Batteries/compressed air/LNG/hydro? etc."

e.g. "Batteries etc. - Static. - Mobile, e.g. EUS."

e.g. "Technical approaches to storing energy (e.g. batteries / smart grid distribution etc.)."





energy transition...

... involves moving toward a low(er)-carbon future

The energy transition was often implicitly taken to be a low-carbon transition. Such definitions focussed on the intended or perceived outcomes of a low-carbon future.

e.g. *"The process of changing our energy system from recent high fossil one to a low/zero carbon one."*

e.g. *"Transitions to more sustainable energy sources."*

... requires a systems approach

Achieving an energy transition was said to require systems approaches that acknowledged the interconnectedness and structural nature of the energy system and its constituent components. 'System(s)' was the most commonly used word when defining the energy transition.

e.g. *"Long-term structural changes in energy systems."*

e.g. *"A deliberate program of recombining the elements of a system into something new."*

e.g. *"Radical change in energy system."*

e.g. *"A structural change in an energy system, the direction of which should be defined."*

... is a social problem

Sometimes in opposition to, and at other times in parallel to, the systems proposition, the energy transition was often firmly seen as a social problem. Essentially, for a low-carbon transition to be realised, then society would need to change how it is organised and consequently how it demands/ supplies energy.

e.g. *"A multilevel, multistakeholder, multigenerational and multicontext change process which is hardly manageable top-down but needs also bottom-up and middle-out governance."*

e.g. *"Change in energy culture."*

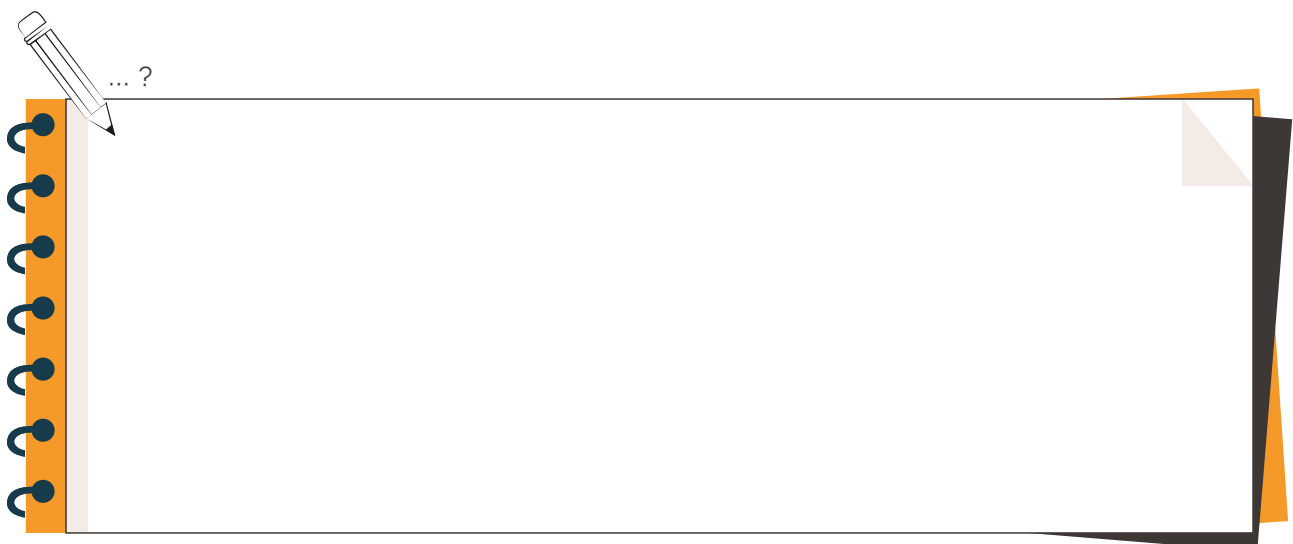
e.g. *"A societal process towards post carbon cities and communities."*


... is a problematic term

Some found the term inherently problematic and responded with questions of their own, particularly relating to where the 'transition' was taking us to.

e.g. *"To where?"*

e.g. *"Typically the low-carbon energy transition. But: to what? From where? Implies end-point?"*





energy engagement...

... is knowledge-based

Energy-related, expert-derived knowledge is communicated to non-experts through engagement. The measure of success is therefore enhanced (public) knowledge, perhaps with the assumption that being more knowledgeable will lead to a desirable change of some kind (e.g. in how one acts).

e.g. *"Citizen interaction with energy knowledge."*

... involves interaction with a process

Going beyond a knowledge-based approach, an alternative approach to engagement prioritises the process by which people are being engaged, rather than focusing on the content of the information provision.

e.g. *"More than informing/consulting! A non-instrumental participation of stakeholders in a process with the aim for justice."*

... is about (at least) two-way exchange, not one-way transfer

Typically, engagement approaches that prioritise the process involve active public participation. This consequently led to definitions that emphasised how engagement allows all parties to co-shape the agenda and direction of discussions together

(as part of an active exchange), as opposed to a one-way transfer of knowledge from experts to non-experts.

e.g. *"2-way dialogue between actors."*

e.g. *"Think of co-enquiry, participation, depth."*

... is simply a means to include people

Whatever the assumptions behind the method of engagement, the intention and purpose is the same: to go beyond the 'ivory tower' of energy experts.

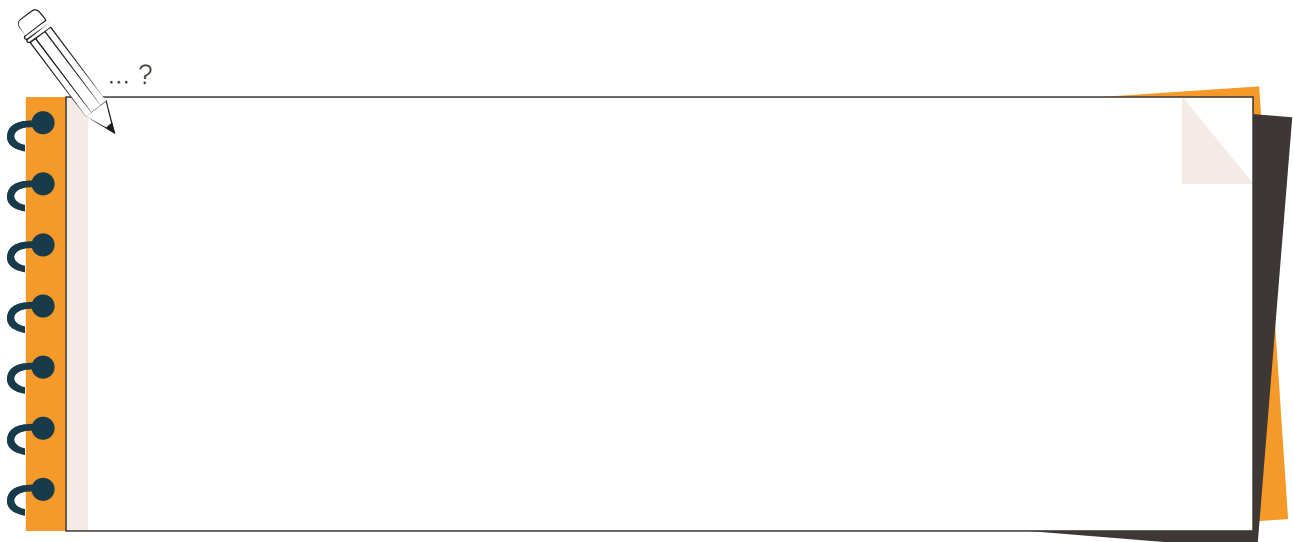
e.g. *"To include and empower people."*

e.g. *"How to get people (consumers/citizens) involved."*

... as a method or intervention?

Questions were also raised about whether engagement represents a research method (e.g. to collect new data or further our understanding), or a way of instigating change (e.g. related to specific energy policies), the answers to which have implications about who, why and how people are 'engaged'.

e.g. *"With whom? Through what? Method or intervention?"*






low-carbon energy...

... is all about energy supply

Whilst it was understood that boundaries and scope were pivotal in determining what exactly it was that was 'low-carbon', energy supply was the dominant focus. Indeed, considerations akin to a low-carbon energy system were rarely noted and energy demand was only explicitly mentioned once.

e.g. "Less emissions producing sources."

e.g. "Energy sources with low CO₂ emissions."

... also includes zero-carbon energy production

Both low- and zero-carbon were used alongside each other when defining low-carbon energy in the context of the absolute/relative amount of greenhouse gas emissions associated with energy production (CO₂ was used as a shorthand for such emissions).

e.g. "Energy obtained through sources that have low or zero carbon emissions."

e.g. "Its production produces a low amount or no CO₂."

... represents low-environmental impact more broadly

Sometimes it was not only about CO₂ though, with the impact of energy production on the natural environment being explicitly raised too.

e.g. "A relative improvement to previous energy sources and carriers with regard to the negative environmental impacts."

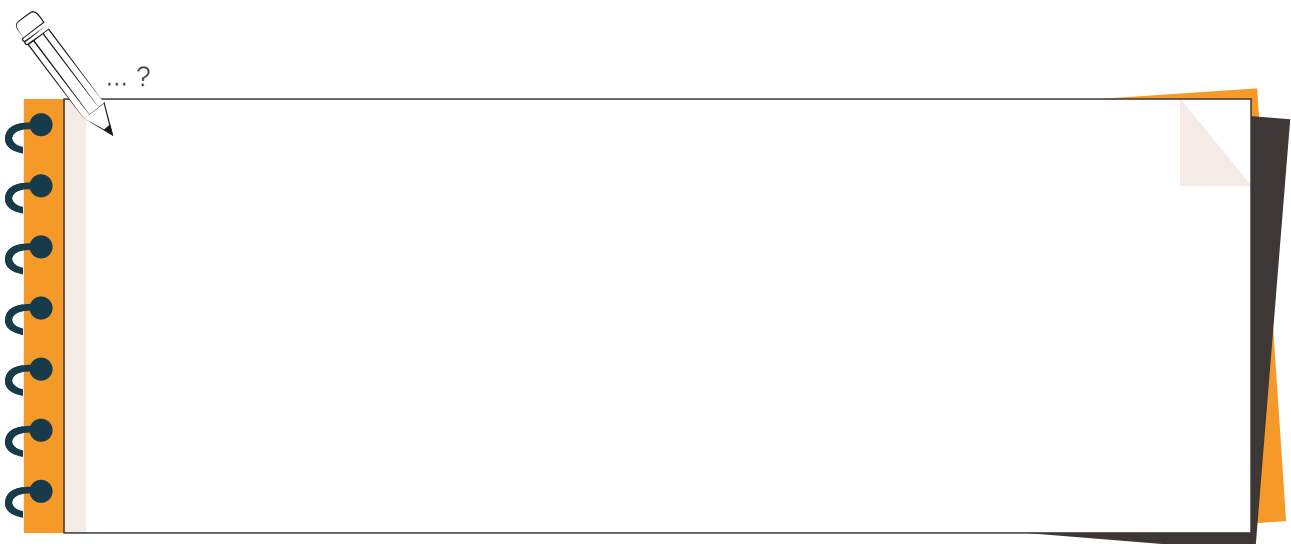
... may or may not include fossil fuels


In achieving 'low-carbon' status, the exact make-up of the wider energy supply was debated. Whilst the generic message of lowering fossil fuels and increasing renewables was common, there were differences over whether that constituted no or some fossil fuel based energy. Moreover, whether or not Carbon Capture and Storage (CCS) should be classified as low-carbon was contested.

e.g. "Energy that does not use fossil fuels at all."

e.g. "Lowering the use of fossil fuel resources and increasing renewable resources."

e.g. "Usually low emissions technology at point of production (not always in full life cycle assessment), but not including CCS."



smart...

... upgrades technologies via enhanced internet connectivity

'Smart' enhances the information-gathering potential and (sometimes automated) capacity-to-act of devices and infrastructures through technological developments that connect them to the internet. This predominantly techno-centric approach is often associated with bypassing the individual consumer.

e.g. "Internet of things."

e.g. "Application of computer-based technologies to energy production and consumption."

e.g. "Traditional technological/policy definition = human-less."

... only exists to deliver particular outcomes

Many responses were rather outcome-oriented and, as such, backgrounded the processes underlying how such outcomes would be achieved. In this way, these responses side-stepped the fundamental definition of 'smart' by prioritising instead what it could provide.

e.g. "Efficiently delivering services to people with the lowest possible use of energy and the fastest possible speed."

... concerns both energy supply and energy demand

The written definitions and subsequent discussions emphasised how smart transcended the energy system, from smart grids (energy supply) to smart homes (energy demand). Relatedly, there seemed to be frustration amongst parts of the group that the term, smart, was used interchangeably between energy demand and energy supply contexts, when in actual fact each meant something different at the systemic level. This was denoted by some individuals as the relationship between 'input' (supply) and 'output' (demand).

e.g. "Information technology enabled energy systems."

e.g. "Innovative technologies. Input-output."






sociotechnical...

... is about integrating social and technical disciplines

This is a multi-disciplinary (or, sometimes, interdisciplinary) approach to research and innovation that explicitly bridges the divide between the social and the technical sciences. Those who are pragmatically working across these fields tended to employ this definition.

e.g. "Methods, approaches, thoughts etc. - combining social science and technical approaches/systems."

e.g. "Complex multidisciplinary, integrated model of understanding reality."

e.g. "A combination of social and technical issues."

... represents a particular form of enquiry

As a (social scientific) point of departure for one's research, it conceptualises the world around us in a way that cannot separate individuals, communities, institutions, etc. from the objects, devices, infrastructures, etc. that surround them. It is typically associated with the academic discipline of Science & Technology Studies (STS).

e.g. "Emphasises the co-production of the material and the social, i.e. the technology and the society/human."

e.g. "A situation of entanglement of the people and the technologies, where agency/effects/actions cannot be attributed to one of the sides only; an assemblage that produces its own effects irreducible to the social or technical alone."

... is inherently about systems

Some of the most commonly used sociotechnical forms of enquiries (see previous definition on this page) have systemic ontologies (ways of seeing the world), such as the Multi-Level Perspective (MLP) from the sustainability transitions literature. Many participants therefore regarded sociotechnical as denoting such (sociotechnical) systems thinking.

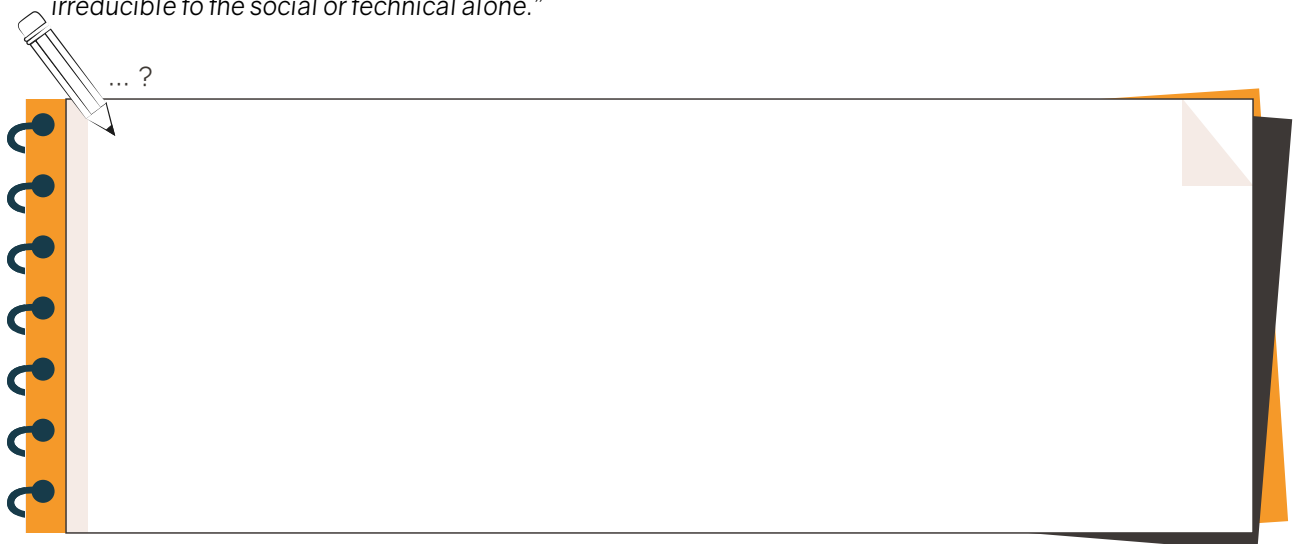
e.g. "Systems, e.g. MLP (linked to energy transitions)."

e.g. "The appreciation that social and technical systems constantly change and co-shape each other and that change needs both elements to (be) shape(d)."

... is (social scientific) jargon!

Out of all the words in this Lexicon, this word was most commonly left blank when completing the lexicon worksheet/exercise. In fact, many explicitly noted that they did understand the word. It was evident that social scientists were more comfortable defining it than others.

e.g. "Don't really know the meaning of this."





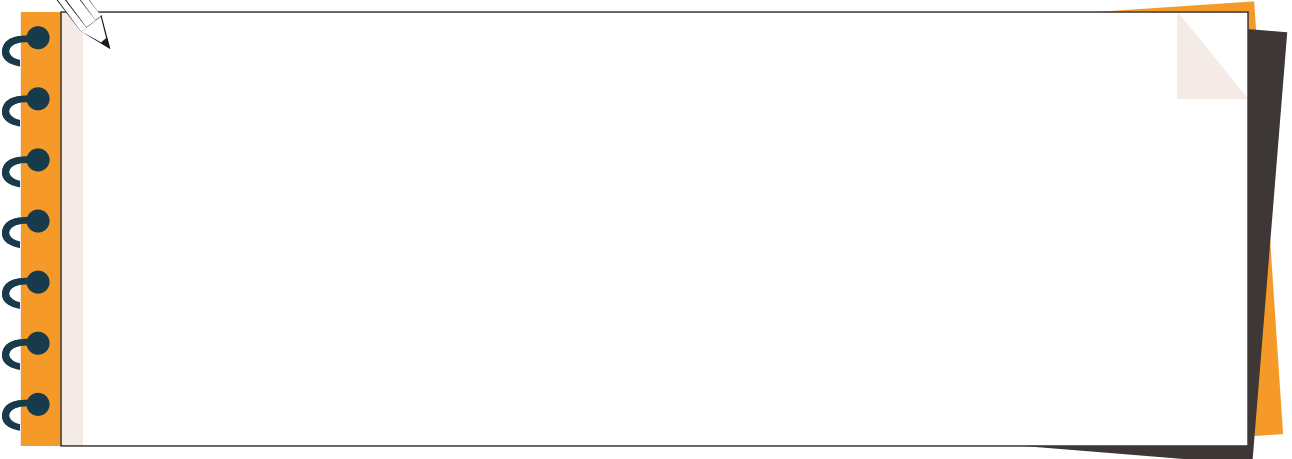
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