

# Ontology in STS and its applicability to energy research: a response to Hess and Sovacool and Sovacool *et al*

## Keywords

Science, technology and society ; new materialism; object oriented ontology (OOO); speculative realism; just transition; environmental ethics; public engagement

## Abstract

This paper takes up the challenge set down by Hess and Sovacool and Sovacool *et al* [1,2] and joins the conversation about future research agendas where STS is aligned towards humanities and social science research of energy solutions. We identified two under-representations in these review papers: 1) New materialism and object-oriented ontological (OOO) approaches and 2) how fictive imaginaries develop the link between OOO and public engagement with energy challenges. We propose that ontology of objects and non-human worlds is central to cocreation work in energy research where there exist assemblages of the Anthropocene. We argue that an ethical, engaged, object-oriented ontology is crucial whatever direction STS takes in energy research.

## 1. Introduction

*You need me like the wind needs the trees to blow in  
Like the moon needs poetry*

The Magnetic Fields, 'Come Back From San Francisco'

This paper responds to Hess and Sovacool and Sovacool *et al*'s comprehensive review of an STS agenda in energy research by outlining the ways in which object-oriented ontology (OOO) can expand the field's horizons and strengthen this project [1,2]. We argue that this will contribute to building the foundations of an emerging collective ethics of sustainability. Objects, their being and their relation to the common human/non-human world have had a remarkable rise to prominence in contemporary theory [3-5]. Materialism has been a crucial part of the neo-Marxist tradition but a more ecological moment for objects is currently placed firmly within STS and affiliated with the arts and social theory. With this new development, there is a connectivity between objects without necessitating a transcendent holism.

As Hess and Sovacool make clear, STS already holds an important position in energy transition, and there is growing potential for further methodologies [1]. A common thread among contemporary STS approaches is to steer a middle ground between epistemological relativism and naïve realism and the review papers significantly aggregate these [2].

However, we wish to highlight two under-representations in those papers that would further provide the foundations for an emerging collective ethics within this energy and sustainability research agenda and that would continue this common ground STS approach:

- 1) exploring ontology, and specifically new materialism and object-oriented ontological (OOO) approaches where there has been an increase of interest from STS scholars over the last decade, exploring agency in objects and related ethics; and
- 2) fictive imaginaries as public engagement, as identified in the literature but also those communities and collectives themselves that shape futures around both objects and mythic ideas

Both have significant relevance for looking at fresh perspectives on energy research that provide greater “human”/“nature” resilience in future societies, and crucially add agency to the non-human and inanimate. We propose that the study of ontology in objects and non-human worlds can bolster cocreation work in energy research where assemblages of the Anthropocene can be mapped and studied.

We begin by setting out the ethical landscape for OOO in energy research, and then continue to explore OOO and fictive connections within the two papers under review while defining the connecting conceptual frameworks of object ontologies, new materialism and speculative realism and how these might be aligned with the Hess and Sovacool theoretical perspectives. We then briefly account for STS works that use OOO and new materialism. The paper then demonstrates where such object ontology emerges through fictive works, particularly film, engaging audiences as collectives for future imaginaries. Our conclusion is that in the cocreation of knowledge research agendas and extended models of energy-landscape analysis, a just transition aesthetic is possible. This will both explore ontology and engage in ethical reflection. We illustrate this with examples from film, documentaries and literature in our reflection.

## **2. Ontology of things, ethical frameworks and opportunities for transdisciplinary ecological research**

Our approach combines an ethics beyond the human with visual and fictive engagement *by* humans. *Imaginary* as we mean it here actually has a realness brought about by the collective through fictive representations of shared futures [6]. However, the studies categorised in the review papers were academic and relatively closed to publics. We will briefly explore other avenues, for example how film - and popular Hollywood films in particular - explore new ontologies and new realities of eco-resilience using the materiality of living “Nature” as well as technologies. Visual storytelling can be more effective at engaging publics [6].

Furthermore, there must be included in any transdisciplinary ecological research empirical description of the Earth itself, whether land, trees, lakes, soil or bogs, and accounts of those who try to claim and “speak” for it. Mini-publics and mini-assemblages are being formed around future energy transitions. Our approach will be to dovetail ethically-minded materiality and OOO that engages public imaginaries into the review papers’ research pathways. This approach moves us all away from nature/culture dualism, still extant in sustainability and energy research. We argue that an ethical, engaged, object-oriented ontology is crucial whatever direction STS takes in energy research.

If this short Perspective paper is part of a critical debate with the broader sociotechnical turn in energy research, there is also a stern, critical dialogue within a dialogue here that provides a meta-argument – how the ethics of object ontology has pulled away from, and at times parted company with, analytical ethics and therefore requiring greater attention from what is already an emerging ethics of the Anthropocene. Such approaches will align critically with moves across traditional environmental ethics, which has long debated the intricacies of anthropocentrism and the possibility of non-anthropocentric ethics. Specifically, the ethics of OOO will be of interest to environmental ethicists focused on developing non-anthropocentric approaches or towards developing an ethics that can account for the interests of non-human nature. Environmental ethical discussions of anthropocentrism have focused on anthropocentrism that is *ontological* (a perspective about the nature of reality that traditionally prioritises humanity), *ethical* (the stance that humanity is morally superior to species) and *conceptual* (the idea that humans can only understand reality from a human perspective). Environmental ethics scholars have spent considerable time on developing non-anthropocentric ethics and the debate over whether this is possible is ongoing. The conceptual anthropocentric thesis – the idea that our conceptual tools are *de facto* anthropocentric – suggests that we may struggle to properly value and morally respect other species and non-human nature. Insofar as OOO develops new conceptual tools, it can also play a role developing new ethical frameworks. However, in terms of the environmental ethics perspective on energy systems, the debate focuses mainly on challenging “excuses” not to adopt renewable or sustainable energy systems. It is taken for granted that the use of fossil fuel and nuclear energy sources are a source of environmental injustice, disproportionately harming children, minorities, the poor as well as the climate and non-human species [7]. Our perspectivalist approach offers a just transition way forward that brings the subaltern of the non-human and material with us.

### **3. Theoretical amendments: ontology beyond Sovacool *et al*'s *Sociotechnical Agendas* and Hess and Sovacool's *Sociotechnical Matters***

In this section, we briefly review the main conceptual parts of both papers that link to the missing elements about how non-human actor and objects might *be*. What Hess and Sovacool and Sovacool *et al* have added impressively to how the STS field relates to energy social science research - as opposed to the overall STS space, as the authors have identified it - is a robust categorisation of the literature. The different cross-sectional approaches of both papers produce exhausting lists of domains that reveal the Western, industrialised bias embedded within energy research. The broad categories empirically derived in early steps of their methodological process were publics, cultural meaning, policy and sociotechnical systems [1]. Positionally an OOO framework would fit within the *sociotechnical systems* and *expertise and publics* domains of Sovacool *et al*'s framework Venn diagram from the literature under review. Within these empirical constructs of the secondary literature, object-oriented work slots into the subcategories “power, identity and justice”, “actors and networks” and “imaginaries and frames” [2]. With respect to OOO and new materialism, of the 68 papers reviewed in Sovacool *et al* 15 “demonstrated theories of practice, materiality and agency from sociology and science and technology studies” (p28) [2]. From Merton, Mumford and Ellul, through Donna Haraway and Brian Wynne, the sociology – and social – of science evolved through multiple pathways, leading to sociotechnical transitions in sustainability and energy research such as Multi-Level Perspectives.

As Hess and Sovacool state, STS approaches attempt to avoid epistemological relativism, where there is an equivalence of truth claims and no external reality on one side, and naïve realism where products and processes of scientific knowledge and technology reveal the

world as the only reality on the other [1]. The papers succeed in demonstrating increased studies in collaborations, in systems and in practices that overcome this divide – or at least they downplay the metaphysical divide. However, there is a diminished role for ontology that could perhaps have been given more prominence within the analytical framework of these papers. *Ontology* defined here is the theories and expressions of being and existence and there has been recent emphasis on ontology and agency of non-human objects that characterises this type of new materialism [8-11]. This would include, for example, the assemblages connected with fuel extraction. In other words, this approach looks for *matter* in sociotechnical matters. While Sovacool *et al* rightly claim in their review that “energy systems are deeply co-produced with human affairs” (p3) [2], Karen Barad provocatively offers a counterpoint that is just as important in their opening line in *Meeting the Universe Halfway*, that “[m]atter and meaning are not separate elements” [12](p3).

While new materialism has been present for longer in the arts and humanities, the ontological or ontic turn in STS and similar interdisciplinary fields has particularly been enhanced by the emergence of OOO and speculative realism since around 2007 - promoted mostly by Graham Harman [13] - and one can make a case for their study in bolstering “practice work”, that is, the study of practices rather than conceptual or cognitive regimes. Climate fiction, for example, was identified in Sovacool *et al* as an area of high ontological complexity [2,14]. This paper found that instrumental technoscience critically lowers ontological status of other-than-human, and the richness of data comes about in fictive and personal testimony imaginaries. Fictions, including dystopian tales of climate disaster, can inform our perceptions of real-world places, such as the Mekong Delta, as Jensen demonstrates in his future ethnography. Indeed, “cli-fi” can, in addition to illustrating the “leaky relation between fiction and reality (p190),” also pull societies towards shared goals of safety, security and redemption [14]. Researchers can benefit from engagement with fictive approaches and experience and learn from these parallel-but-aligned worlds.

While OOO focused clearly on objects, the related area of speculative realism emerged from just a small group of philosophers around the same time in 2007 and has been influential in STS. This is a metaphysical realism which gets us beyond Kant as it were, breaking free from the self-enclosed in-themselves of objects and their necessary ontological status to find the noumenal [13,15,16], breaking from Kantian *correlationism* which Meillassoux defined as “the idea according to which we only ever have access to the correlation between thinking and being, and never to either term considered apart from the other” (p5) [17]. Fiction is one methodological approach [15]. Such arguments appear, however, to be far removed from the concerns of energy ethics which is concerned with justifications for specific ethical choices and challenges the reasons for resisting moves away from dirty energy to cleaner energy. As such, energy ethics arguments focus extensively on science, which is used to outline the potential harms and to delineate alternatives. Energy ethics is then focused on developing arguments that will work to motivate people to take responsibility for energy change [7]. The perspectives that OOO provides, especially in terms of its appreciation of fictive imaginaries, will expand the social scientific material available for ethicists developing such arguments and can help drive the necessary changes.

OOO is not absent from the two articles under review here. Sovacool *et al* identified its emergence when mapping participatory collectives and ecologies of participation within the UK energy system [2]. We want to particularly draw attention to the “publicly-engaged objects” in the Ryghaug *et al* and Marres studies that were part of the review [9,10]. It is not a case of how technology leads the human or vice versa; indeed technology and human are not separate phenomena working with each other, but in this framework are enmeshed. Such analysis is also bolstered by Heidegger’s view of technology as aligned with being [18]. Van Heur *et al*, in their comprehensive bibliometric and literature analysis of STS-inclusive journals, did not see enough evidence for a rhetorical ontic turn in STS but instead saw the growth of a scattering of ontological methods, which we dispute [19]. However, as with the

Hess and Sovacool papers, the net could possibly have been cast wider in terms of defining STS. There is a myriad of objections and differences across new materialism and OOO, which we mention briefly in the next section but a line can be traced back through Deleuze and Guattari, and Spinoza's influence on the creation of hybrid assemblages through practice rather than the correlationism of Kant.

OOO, in its purest form, breaks with Kant, as there is no transcendent ethics only immanent ethics inscribed in being [15, 16]. Gratton, also drawing on the 16<sup>th</sup> century philosopher Spinoza, sees the task of materiality without transcendence as that which needs "to work out conceptions of nature, politics and ethics, while in some sense recognising that reason *itself* is formed in and through the becoming of existence [emphasis in original]" [p68], how energy is not only understood but also *becomes* through our (literal) networks of power [15]. The justice aspect may be immanent but transversal and common to all who act or work towards commonality and common ethics.

New materialism and object-oriented ontology are closely connected and both privilege objectual agency [1, 12, 20]. Meillassoux describes the necessity of contingency in nature, although he certainly breaks away here from other OOO enthusiasts and reaches into transcendence by placing ethics as true justice in a future world to come [15]. Levinas is a useful guide here, where although ethics is reduced to the epistemological, it attributes an Aristotelian view that in order to reach out to the other, you make the observed the same as the observer – a necessary political correlationism that allows a closer human affinity to animals and plants [21].

When these theories are applied in practice, we can trace the full relationships of action in energy co-creation [22]. Marres and Lezaun describe how energy contestation is often categorised in literate, discursive, even linguistic terms, so that they do not easily connect with material reality [23]. This can also apply to the use of emerging technologies such as synthetic biology or artificial intelligence (AI) in energy, where ethical input is sought in the early stages of the development of novel technologies and systems in order to minimise the harms and maximise the potential benefits of these new systems. The problem of the over-discursive is also well described by Sovacool *et al*, how ethics of technologies are applied where "themes around energy and climate "justice" [are] often addressed more in terms of ethical principles and legal instruments than imperatives for bottom-up, direct emancipatory action" (p18) [2]. This has implications not just for the risk of missing disenfranchised views in a rigid, Enlightenment-humanist system of public engagement, but also for identifying who has power, and what power is invoked for controversial emerging energy technologies, and what dynamic do the technologies themselves create for niche-innovations [2]. The central issue is how to address the engagement of multitudes into complex energy policy decision-making, the "uninvited" (p18), or more precisely the "not invited" that goes beyond humanism.

Also, we acknowledge that the two review papers under discussion here move beyond theory and orient themselves towards policy formation which has considerable merit in an era of Sustainable Development Goals [24] and Responsible Research and Innovation [25]. However, we are also in an era of political detachment, large events moving without deep engagement, where there are increasing injustices and inequalities. To further address the rhetorical question posed by Hess and Sovacool, "What's not in the [black] box?" [1], an OOO /agential realist framework is bolstered by feminist/intersectionality of species and things. We can strive to ensure that no thing of agency within an ecological ethical framework is left behind.

#### 4. New materialism and object-oriented ontological (OOO) approaches

Let us briefly examine new materialism and OOO, and their proponent literature. OOO as a method requires fundamental, constitutive and collaborative ethical frameworks for humans and other subjectivities of the Anthropocene. OOO conflicts with sociological STS approaches and historical critique itself, as well as traditional historiography. It suggests that objects have agency and may speak for themselves, but humans can only “speculate” on what they say, as we observe and work together. The attempt to take account of the interests of objects – of the non-human – is essential if we are to move towards a sustainable energy ethics. OOO conflicts with sociological STS approaches and historical critique itself, and traditional historiography. Meillassoux states that, since Kant, continental philosophy has been too influenced by correlationism, not caring to understand the “great outdoors,” while aware of the spectre of positivism. To strong correlationists, knowledge has become a fully human construct. This is where speculative realism fills in the blanks, to a certain degree. The weak-correlationist-to-middle position we present here is in applying the ethics of practices for a good, common world, until one day “we” might all communicate better. While there has been a tradition in environmental ethics of encompassing non-humans and other genders, Rosa Braidotti brings the fight further to demand that the subaltern of under-represented gender and non-humans be brought together in a quest similar to Meillassoux’s counter-Enlightenment, or rather rebellion against the white, patriarchal ideas of humanist Enlightenment [26]. The project of conservation and stewardship of “Nature” has paradoxically destroyed it. Karen Barad’s agential realism and the feminist, ecological materialisms of Jane Bennett and Elizabeth Grosz are also fellow travellers, exploring agency and objectual justice, in the products of science [12]. There are variances in terms of ontological constructs and methodological approaches. Some theorists, such as Meillassoux, have pushed their ontic realism as far as possible away from human knowledge [17], while others, such as Harman, Latour and Haraway stay within relationist modes that veer toward this correlationism [3, 9, 18, 27-29]. This tension in OOO-type theories remains, keeping the ideas malleable towards energy transition frameworks.

Woolgar, a pioneer of STS methodologies, does not see a value of OOO to STS, as the hidden things-in-themselves always slip into relationist practices, thus downgrading its “thingness” [30]. We may need to defend a set of disciplines here. Continental philosophy and the guise it has taken by morphing into ideas about objects and practices, remains controversial. To turn to the truly popular for a second, and specifically a public intellectual for the disenfranchised of post-Brexit Britain: the Marxist journalist-turned-scholar Paul Mason admonishes a high-profile critique of the weaknesses of straying beyond logical positivism, a critique which adds to an increasingly polarised political and cultural environment [31]. Similarly, the literal interpretation of naïve animism is often a straw-person argument created to ridicule object ontology. These are not new criticisms. Timothy Morton points out, following Latour, that traditional Marxism has not benefited the environment as it should [32]. Morton applies a new vision of Marxism to ecology well, but Hylton White has a valid point – and Morton would agree - when he sees an unfair critique from Latour of Marx: Marxist inquiry has placed more agency in objects than many OOO-ers would give it credit [27, 28, 32, 33]. It is critical in every sense to retain anti-capitalist critiques across new materialism, coming from the non-sustainability of capital itself. Traditional environmental ethical approaches have pursued a similar path – criticising capitalist market ideology and the practices of consumption so prevalent in contemporary society [34, 35] whilst analytic ethics, particularly virtue ethics, tends to view the flourishing of individual humans as deeply connected with and dependent on the flourishing of non-human nature [36-40]. The division between analytic and continental philosophies is, as regards the environment, beginning to dissolve.

An STS energy framework would utilise practical examples of bogs for example and “objects of nature” “energising” through ethnographic works but also in literature, as in Zirra’s evocation of Seamus Heaney poems, the lived experience of bogs which are controversial sources of energy [41,42]. Another example is Barad’s enchanted matter rhizomically distributing itself from idea to beautiful words on the page in search of elusive memory [12]. The material turn forces us to consider the acts of extreme cocreation, that is, the assemblages of peat bog excavation, fracking and wind farm structures and surrounding politicians, neighbours, civic society organisations and technicians as well as the wind and shale themselves.

#### 4. Fictive imaginaries as public engagement: identifying communities and collectives that shape futures around mythic ideas

The creative arts have embraced materialism for a longer period than its emergence in STS as applied to fictive imaginaries for public engagement. In addition to the use of climate fiction to understand ontological complexity of climate facts, as described above, it is instructive to do close readings of film texts with its opposite “reception” in how it engages in both the *zeitgeist* and sentiment of publics. There is, for example, an entire subgenre of petrofiction [43].

In the acclaimed Irish documentary *The Pipe* about a contentious, and at times dangerous – for protestors - dispute about offshore gas drilling, the pipeline is the dark protagonist, a villain destroying a community in this polemic movie [44]. The central theme, represented by the pipeline, is the framing of a narrative by strategic powers, a colonial offering of sacrifice in return for energy. The gas pipe represents a nexus of energy needs, government and corporate interconnections and the conflict with local and broader environmental concerns.

Earth and natural resources as sources of animism and posthumanism are also represented in so-called “arthouse” films. A vision of ecocinema as exploration of other-than-human is shared by Michelangelo Frammartino’s *Le Quattro Volte* and filmmakers Sharon Lockhart and Peter Hutton [45]. In both *Le Quattro Volte* and *Uncle Boonmee Who Can Recall His Past Lives* by Apichatpong Weerasethakul there are allusions to metempsychosis, or transmigration of souls [45, 46]. In the case of *Le Quattro Volte* the liveliness, “lived-in-ness” of the tree takes centre-stage after the death of the human protagonist, then switching focus to the chair made from the tree [45]. Boonmee’s deceased wife appears in many non-human guises and in various time-shifts. This is at odds with embodied consciousness of contemporary materiality – the spirit roaming free in inanimate objects – and challenges us to think about time and vitality [46]. Terence Malick’s *The Tree of Life* offers a similar, almost spiritual representation of vital materialism [47].

However, the increased engagement potential of Hollywood blockbusters provides much wider public connections with ideas of OOO and new materialism. These ideas are often inherent, intangible, inarticulate among the subjective experiences of movie-going publics. *Avatar* for example provides old tropes about Wild Western frontier, but as with *Star Wars*, *Interstellar* and other science fiction movies, is set in space [48-50]. In *Avatar*, there was potential for an indigenous cosmopolitics, to use sociologist Isabelle Stenger’s term for politicisation of natural objects, invoking pioneering relationist STS scholar Bruno Latour’s parliament of things – a governance of natural objects by natural objects, a multinaturalism [27, 51-54]. However, the re-valorisation of nature is a key theme in Hollywood – in *Avatar* it is increased by the spirituality of trees, but remains modernist in its assumptions about “primitive” aliens and their kinship to the land and natural worlds through non-human and posthuman agency [6]. *Interstellar* and *The Martian* also – problematically from an OOO perspective on possible technologies – create a theme of re-discovery of the wilderness,

fleeing our over-consumed Earth to exploit other worlds for inanimate food production to service humans [50, 53]. In essence, the same problems exported elsewhere

Non-human agency in sustainable energy issues can be described in other ways in fiction, besides pastoral wilderness, vitality and animism. In *Interstellar*, the US Marine tactical robots such as TARS, CASE and KIPP are co-creators of the new space frontier with human explorers [50]. The militaristic machines are given more anthropomorphised voices of empathy than is usual for non-humanoid robots in film, allowing the agenda of colonisation to be softened. In Latour's framework, nature and culture are one, and the objects and concepts are caught in relationist webs, as with actor-network theory, well-defined in the two papers under review [1,2]. The subjective is in the relation. Wilson, the anthropomorphized volleyball in *Cast Away* and only companion of the main character played by Tom Hanks marooned alone on an island, *forces more humanity* from the human character [54].

In eco-fiction literature and nature composition, multiple perspectives can be taken. *The Story of Yew* and *His for Hawk* are good examples where there is ontology of the posthuman and non-human animal without moving towards children's ideals of anthropomorphised animals [55-57]. The writer's perspectivist eye can shine light on the ethics of ecology and energy conservation and how it engages publics that might evade policy experts [23,58].

The positivists and the staunch realists among us – avoiding Meillassoux's jibe about their naiveté – can reach across and agree with the many object ontologists who say categorically this does not mean that oil and rocks are “alive” [17]. Rather we can track what agency can be found in how a film weaves a story about oil and rocks. As a local example known by us, the authors: Cloughjordan is an Irish eco-village and is both functionally eco-futurist, with its paradigmatic case study for a future sustainable world complete with practical technology and policy, and mythic in terms of the new folklore it adds to the existing history and imaginary of that part of rural Ireland. There are many possibilities for research, such as how primitivism, spiritualism, animism, anthropomorphism, human/non-human relationism and agential realism can be expressed in post-colonialist and modernisation projects.

## **5. Conclusions: methodologies to elevate OOO and materiality in energy research agendas**

In summary, OOO argues that things have agency suggesting that they have interests that we are ethically obliged to respect. In combination with the mapping-out of STS perspectives of Hess and Sovacool and Sovacool *et al* [1,2] this can greatly inform energy ethics and STS, and how publics are engaged about these concepts. Following these frameworks and agendas, we continue the dialogue about potential directions for STS in the service of energy transitions research. We emphasise here the importance of including materiality and non-human perspectives in the energy space, particularly for addressing public and aesthetic issues for just transition. The use of fictive imaginaries sets out collective values for future ethics and brings us towards exploring ontology in the Anthropocene. STS methodologies can be supported by a sub-category within the framework engaging with ethical OOO and materialisms.

With regards to energy policy, this approach helps to define the “who are we?” question in political assemblies of things - paraphrasing Latour - before asserting a sociotechnical imaginary for governance of energy as part of a “collective vision for a good society” but

not, however, “realised through technoscientific-oriented policies” (p687) [27,58]. On a larger, transdisciplinary level, OOO creates a more fertile ground for the arts and humanities to flourish in energy research.

### **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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