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Just Systemic Change: Justice and System Transitions

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Theme: Politics and power in transitions

Description: This paper presents a framework for incorporating justice within transitions research and practice. The framework is created by reviewing how different bodies of literature address questions of distribution, procedural, and recognition justice. The framework is then applied to a case study: the Alberta Energy Futures Lab.

Abstract

A sustainable energy system transition has been defined as "major changes in buildings, energy, and transport systems that substantially enhance energy efficiency, reduce demand, or entail a shift from fossil fuels to renewable inputs. These system transitions entail not only technical changes, but also changes in consumer behaviour, markets, institutions, infrastructure, business models and cultural discourses" (Geels et al. 2016, p. 577). The emphasis within this definition, and a focus point within sustainability transition theories and research, is change; and change can take place either incrementally or radically. While many have argued for a more explicit theorisation of power and politics in transitions research (Shove & Walker 2007; Smith & Stirling 2007; Avelino & Rotmans 2009; Meadowcroft 2009), and many have responded to this call (also see Lawhon & Murphy 2012; Gells 2014; Hess 2014; Avelino and Whittmayer 2015; Murphy 2015; Avelino & Grin 2017; Raven et al. 2016), the concept of justice is not as pronounced in transitions research. In fact, Geels et al's (2016) definition of a sustainable energy system transition does make any mention of justice in any form.

We argue that transitions research more broadly needs to take more account of justice in its analysis. Authors such as Swilling and Annecke (2012) and Newell and Mulvaney (2013), as well as a number of organisations, have pursued this agenda through the concept of "just transitions". Another concept that has emerged in this space is that of "energy justice" (McCauley et al. 2013), which evaluates where injustices emerges, who is affected or ignored, and the remediation processes (Jenkins et al. 2017). This paper will primarily draw from environmental justice literature to engage with the concept of justice in transitions research, as it seeks justice for people, communities, and the non-human environment from negative environmental impacts (Schlosberg 2013). This is achieved through different forms of justice (Walker 2012, p. 10):

- Distributive justice – the fairness of the distribution of benefits and harm.
- Procedural justice – the fairness in decision-making.
- Justice as recognition – focuses on the recognition, misrecognition, or non-recognition of various groups. Related to prejudice and discrimination of all forms.

We ground our theoretical proposal in the case of the Alberta Energy Futures Lab (EFL), a public engagement process designed to accelerate the transition to a sustainable energy future, to provide an empirical example of the application of environmental justice and sustainability transitions. The EFL has been designed to address failings in distributive, procedural, and recognition-based justice within energy system transition deliberations and to bridge entrenched divides in Alberta. The EFL has attempted to address these failings through a process design that that is explicitly non-hierarchical, has a wide-ranging membership, including a range of First Nations representatives, and a portfolio of

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initiatives that recognizes and addresses deeply entrenched inequities in environmental risks, degradation and potential benefits of energy system transition.

Our paper concludes with reflections upon the application of an environmental justice approach to sustainability transitions research, offer insights into a potentially new research agenda, and set of recommendations for practitioners on integrating environmental justice considerations in transition process design and implementation.

Introduction

Energy systems are not static. They change for many reasons: development (or decline) of industries; political change such as wars or colonial expansion; or new technologies that unlock, and require, new sources of energy. Theorists have captured these changes by defining a transition as a long-term process of change, which is the result of interacting economic, social, technological, institutional, and/or ecological developments (Markard et al. 2012). Head-Smashed-In-Buffalo-Jump, in Southern Alberta, illustrates many of these characteristics as it is home to multiple generations of energy systems and change. The earliest is from the Blackfoot Nation who would stampede herds of buffalo off the cliff, then harvest the meat for food and fur for warmth through the winter[3]. Just to the West is an abandoned coal mine in the mountains. Since the 1990s, the Old Man River, which sits diagonally to the South-West, supports a hydro-electric dam. More recently, on land just to the South is a prime location for wind energy, there are seemingly endless rows of wind turbines. As systems change - sometimes purposively guided, other times not - it is important to explicitly acknowledge and address the people, other species, and environments that are part of those systems, arguably more so than in the current literature and in practice. Considering the harms and benefits of these transitions, critically examining who is (and who is not) part of these processes, who wins and who loses, and recognizing the historical exclusion of peoples and worldviews are key components of ensuring that system transitions are not only more sustainable, but also more just.

In this paper, we argue that transitions research needs to have a more explicit account of justice in its analysis. By justice we mean the fair, equitable, and respectful treatment of humans and the environment. We develop an analytical framework for addressing justice specifically within transitions practice and research. The framework is created by reviewing how different bodies of literature (including transitions, environmental justice, and energy justice) address questions of distribution, procedural, and recognition justice. We ground our theoretical proposal by applying the framework to the case of the Alberta Energy Futures Lab (EFL), a public engagement process designed to accelerate the transition to a sustainable energy future, in order to provide an empirical example of the application of justice and sustainability transitions. We then reflect on the application of the framework, before offering some recommendations for practitioners and researchers seeking to integrate justice into their work. Finally, the paper ends with a call for more research to explore questions of justice in the context of transitions.

Literature review

With the aim to develop an analytical framework for incorporating justice into transitions research, we conducted a broad ranging literature review to examine how different disciplines have addressed the concept of justice. Our review is organised into three bodies of literature: transitions, environmental justice, and energy justice. Each literature was selected due to its relationship with system transitions and justice. In particular, we were interested in how transitions research addresses issues related to governance, power, justice, geography, and scale, as they are important issues when addressing justice in relation to system change. Next, we looked at environmental justice because it incorporates both social and environmental elements and provides different ways to engage with concepts and scales of justice. Finally, energy justice includes notions of social and technical understandings of justice, which helps to bridge the socio-technical focus of transitions with the social-ecological foundation of environmental justice.

[3] In the 1500s, there were between 30-60 million buffalo in North America. By the 1990s that had reduced to 250,000 mainly through habitat loss from European settler agriculture, and there are now less than 4,000 wild buffalo in Alberta (U.S. Fish & Wildlife Service 2014; Alberta Wilderness Association 2015)

Transitions

A sustainable energy system transition has been defined as "major changes in buildings, energy, and transport systems that substantially enhance energy efficiency, reduce demand, or entail a shift from fossil fuels to renewable inputs. These system transitions entail not only technical changes, but also changes in consumer behaviour, markets, institutions, infrastructure, business models and cultural discourses" (Geels et al. 2016, p. 577). The emphasis within this definition, and a focal point within transition theories and research, is change; where change can take place either incrementally or radically. As a field of research, transitions focuses on the trajectory of change, and therefore, seeks to uncover the origins, patterns, and mechanisms that drive these transitions. Science and Technology Studies, complex systems analysis, and governance represent the three traditional areas of inquiry, but many more themes have emerged since. In particular, we are interested in new approaches that incorporate a more explicit social science perspective to studying and influencing transitions.

Although governance is recognised as one of the three pillars of sustainability transitions, as a particular strand of research, it has continued to evolve within the field. This is highlighted by the recognition of multi-scales and multi-sectors involved in transitions research, and the use of the multi-level governance framework. Governance research is important because it contributes to understanding the historical contextualization of transitions. It emphasises the embedded patterns, actions, and structures, and how changes within these domains are influenced by exogenous trends (Grin et al. 2010). Governance for sustainable development is about steering society towards a more sustainable future, therefore, it is important to acknowledge who is steering and to what ends, as well as how and where it takes place (Meadowcroft 2007). Grin et al. (2010) argue that governance research highlights the power and politics inherent to processes of profound change, because "politics and political processes lie at the heart of governance for sustainable development" (Meadowcroft 2009, p. 335).

Early criticisms of transitions research noted the lack of power and politics in the analysis of transitions (c.f. Shove & Walker 2007; Avelino & Rotmans 2009; Meadowcroft 2009; Lawhon & Murphy 2012; Geels 2014). Some, like Avelino and others, developed new frameworks to offer "a 'power-laden transition storyline'" (Avelino & Rotmans 2009, p. 563), or to better understand politics by conceptualising (shifting) power relations between actors in transitions (Avelino & Wittmayer 2015). Others suggested that the field of transitions could better incorporate issues of power and politics by gaining insights from the fields of political economy (Geels 2014), political ecology (Lawhon & Murphy 2012), as well as political geography (Murphy 2015). However, "despite growing attention to power and political dimensions of transitions (e.g. Avelino et al. 2016) several authors claim that transition scholars have actually very little to say about equity and justice, and the political economy of transitions (Swilling & Annecke 2012; Eamers & Hunt 2013)" (van Steenbergen & Schipper 2017, p. 3).

Within transitions literature, earlier engagements with justice have come from the concept of the 'just transition'. Swilling and Annecke (2012) provide a comprehensive overview of global environmental and sustainability challenges from the perspective of the Global South, where the concept of a 'just transition' reconciles sustainable consumption with a commitment to sufficiency - essentially arguing for a balanced global approach to resource use and management. Newell and Mulvaney (2013) approach just transitions from a political economy perspective, whereby they argue for the need of equity and justice to be included in efforts to support the transition to a low-carbon future. In particular, they focus on issues related to labour and energy justice, as well as notions of climate justice and vertical forms of environmental justice. They argue that there is a need to understand "who defines *what is just*, and *for whom*," (Newell & Mclvaney 2013, p. 138), and how these questions are related to existing power structures in different contexts. More recent work by Jasanoff (2018) reiterates the need to consider justice in energy transitions from a global, planetary-boundary perspective. She also echoes earlier calls for more social science research and puts forth "humility" as an answer to the uncertainty, ignorance, and inequity within energy and sustainable policies (Jasanoff, 2018).

Another approach to incorporating justice can be referred to as 'justice in transitions'. van Steenbergen and Schipper (2017, p. 2) state that "when dealing with transitions one is automatically entangled in moral and ethical questions". They argue that justice should be understood as a process, and not an end point, meaning justice should be "an essential and integral part of systemic change" (p. 8). Within a more economic focused approach to transitions, Silveira and Pitchard (2018) draw on Sen's (2009) ideas of justice to incorporate 'justice in transitions' in relation to the shift to a sustainable, low-carbon

economy. As their focus is economic, they bring together transitions with innovation studies and business models, which emphasize shareholders and stakeholders (and not necessarily all of society). Another approach is offered by Heffron and McCauley (2018) who recommend bringing together different framings of justice from climate justice, environmental justice, and energy justice with transitions theories and legal geography to create the "JUST" framework (Table 1). The aim of the framework is to "identify problems, and provide research and policy-led solutions" (Heffron & McCauley 2018 p. 76).

Table 1. The Legal Geography "JUST" framework for the Just Transition
(Heffron & McCauley 2018, p. 77)

"JUST" Framework			
J	TRANSITIONS	Justice	Justice takes the form of 3 forms of justice
			Distributional
			Procedural
			Restorative
U		Universal	Universal takes the form of two universal forms of justice
			Recognition
			Cosmopolitan
S		Space	Space brings in location, where are 'events' happening? (in principle, at local, national and international levels)
T		Time	Time brings into transition timelines such as 2030, 2050, 2080, etc. and also 'speed' of the energy transitions (i.e. it is happening fast enough?)

Issues of power, politics, and justice tend to have geographical implications. Questions such as: "Why do transitions occur in one place and not in another? How do transitions unfold across different geographical context[s]? What is the importance and role of relations at different spatial scales for transition process[es]?" (Hansen & Coenen 2015, p. 93) are important to increase the understanding of transitions (Coenen & Truffer 2012). According to Truffer et al. (2015), the core conceptual dimensions of the geography of the transitions agenda are socio-spatial embedding, multi-scalarity, and issues of power. Murphy (2015) also highlights the importance of geography for the reflection and theoretical advancement of transitions theories when applied in different parts of the world.

Related to geography are questions of scale and scope (addressed through distributive justice in the environmental justice literature). While transitions and transformations are often employed in interchangeable ways, the origin and application of the terms differ (Hölscher et al. 2017). Transformation is mostly used within the fields of resilience or social-ecological systems, where there is greater interest on global environmental change. Transformations also refer to large-scale systemic or societal change processes involving social and ecological interactions (Folke et al. 2010), rather than socio-technical change in societal sub-systems (Loorbach et al. 2017). The social-ecological framework has a strong emphasis on the biophysical but is also understood to represent a more holistic perspective, one where technologies, politics, and the economy (amongst other things) are embedded within the social of social-ecological systems. Olsson et al. (2014) and others (O'Brien 2012; Raworth 2012) argue that transformations are responding to implications of change (e.g. risk and vulnerabilities) to avoid undesirable system changes. However, the emphasis here is more on the environmental dimension, rather than issues related to justice and recognition.

Environmental Justice

Environmental justice has been defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (US EPA). It is rooted in the principle that disadvantaged communities should not be subject to disproportionate environmental impacts (Schlosberg 2013). As an approach, it supports political or activist activities against injustice as no group should be unequally burdened by negative environmental impacts (Agyeman & Evans 2004; Agyeman et al. 2010; Schlosberg & Carruthers 2010). Environmental justice takes place across different scales: justice for people, justice for communities, and justice for non-human species and ecosystems (Schlosberg 2013). It is also manifested across horizontal and vertical scales. Horizontal injustice in

connected to a broad range of issues and locales (Walker 2012). Here, environmental justice is often used as an organizing discourse to bring together different issues or groups together to create a larger movement, or to develop shared understandings of an issue. Vertical injustice is global in nature and is related to human relationships with the non-human world. Vertical extensions of environmental justice go beyond borders and into relations between countries and can be categorized as truly global issues. Examples of vertical injustices include: agrarian change in Sumatra, gold mining in Ghana, pesticide drift in California, indigenous water rights in Australia, etc. (Schlosberg 2013).

There are three key concepts of justice in environmental justice: distributive justice, procedural justice, and justice as recognition (Table 2). Distributive justice, perhaps the most popular concept of justice in the academy, focuses on the distribution of environmental goods, costs and benefits. Bell (2004) provides three questions needed to construct a distributive justice claim: 1) Who are the recipients of environmental justice? 2) What is to be distributed? 3) What is the principle of distribution? It is important to recognize that with regards to distribution, it is not only about the direct environmental burden or benefit, but other intersecting dimensions such as vulnerability, need, and responsibility (Walker 2012). In addition to environmental burdens/benefits, distributional justice addresses questions of access to resources and opportunities that are deemed to be critical to redress social injustices (c.f. Schlosberg 2007).

Procedural justice, on the other hand, is about inclusion and exclusion in decision-making processes around environmental and social issues: “Many definitions of environmental justice convey the importance of fairness in procedure or process as a distinct concept of justice” (Walker 2012, p. 47-8). Procedural injustices occur when environmental information is unavailable, as well as when there is exclusion and inequity in relation to public participation in policy, decision-making, and access to the formal justice system.

Finally, justice as recognition focuses on the recognition, misrecognition, or non-recognition of various groups, and is related to prejudice and discrimination of all forms. At the root of these injustices are cultural and institutional processes and legacies that have that have explicitly or implicitly given individuals, communities, or social groups unequal recognition (Walker 2012). Conceptions of environmental justice in the literature have evolved from a relatively narrow conception of distributive justice to include the additional dimensions of procedural and recognition. Recognition is deemed to better engage with pluralist needs, issues and solutions providing a comprehensive conception of justice useful for transition scholarship (Nozick 2017).

Table 2. Concepts of justice (Walker 2012, p. 10)

Concepts of justice	
Distributive justice	Justice is conceived in terms of the distribution or sharing out of good (resources) and bads (harms and risks)
Procedural justice	Justice is conceived in terms of the way decisions are made, who is involved and has influence, and access to the formal justice system
Justice as recognition	Justice is conceived in terms of who is given respect and who is and isn’t valued

The concept of climate justice has evolved alongside environmental justice. Rather than focus on all negative environmental impacts, climate justice is primarily focused on assisting those affected by the impacts of climate change, sharing the burden, and mitigation and adaptation (Lyster 2015). Climate change has the capacity “to compound existing vulnerabilities such as poverty, loss of biodiversity or degradation” (Steele et al. 2012). Climate justice argues that climate change responsibility and vulnerability are not equally distributed, and vulnerability is related to political-economic processes (Barnett 2006). Policies to mitigate or adapt to climate change may create unfair outcomes, further exacerbating, maintaining or ignoring inequalities (Barnett 2006). Therefore, climate justice also recognizes the potential of climate change challenges to impact governance and decision-making processes from a sustainability perspective (Adger et al. 2006).

Energy Justice

Energy justice is defined “as a global energy system that fairly distributes both the benefits and burdens of energy services, and one that contributes to more representative and inclusive energy decision-

making" (Sovacool et al. 2017, p. 677). It has emerged as an agenda to include more social science related disciplines within energy research (Miller et al. 2013; Sovacool 2014). Sovacool (2014, p. 11) argues that "centering energy discussions back on people—and not necessarily resources, technology, or prices—can show us just how much the energy intensity of our communities, and lifestyles, vary". He also offers a new research agenda which includes different methodological and topical areas for future inquiry. Particular relevant to our research are notions of justice and working with 'non-experts' and indigenous communities as sources of knowledge. Energy justice has predominantly been framed in terms of access to affordable energy and fuel poverty, as well as the politics of energy infrastructures (Fuller & McCauley 2016). However, a true energy system transition requires thinking and operating differently, where both the technology and the decision-making processes need to be proactive and collaborative (Otting 2013).

Energy justice as a framework focuses on the evaluation of where injustices emerge, who is affected or ignored, and what processes exist for remediation to reveal and reduce injustices (Jenkins et al. 2016). The energy justice framework can also be understood in terms of specific justices: distributional, recognition, and procedural (as seen in environmental justice). Fuller and McCauley (2016) propose a slightly different framing with two key areas of justice: distribution and procedure, and production and consumption (rather than recognition). Energy justice has also been offered as a conceptual tool, one that can be used to better integrate different forms of justice and has been suggested as an analytical tool to help understand the social aspects of energy systems (Sovacool & Dworkin 2015). In attempt to bring justice and ethical concerns into energy decisions, Sovacool et al. (2016) propose an energy justice decision-making framework, which was then updated by Sovacool et al. (2017) (Table 3). Finally, Jenkins et al. (2017) call for energy justice to be considered as a policy approach, where different applications of energy justice frameworks and tools can be used to support policy-making.

Table 3. An energy justice conceptual framework reconsidered (Sovacool et al. 2017, p. 678)

Energy justice framework	
Principle	Description
Availability	People deserve sufficient energy resources of high quality
Affordability	The provision of energy services should not become a financial burden for consumers, especially the poor
Due process	Countries should respect due process and human rights in their production and use of energy
Transparency and accountability	All people should have access to high-quality information about energy and the environment, and fair, transparent and accountable forms of energy decision-making
Sustainability	Energy resources should not be depleted too quickly
Intragenerational equity	All people have a right to fairly access energy services
Intergenerational equity	All people have a right to fairly access energy services
Responsibility	All nations have a responsibility to protect the natural environment and reduce energy-related environmental threats
Resistance	Energy injustices must be actively, deliberately opposed
Intersectionality	Expanding the idea of recognitional justice to encapsulate new and evolving identities in modern societies, as well as acknowledging how the realization of energy justice is linked to other forms of justice e.g. socio-economic, political and environmental

As energy systems tend to be large, complex systems, it is a challenge to successfully address multiple forms of injustice (Jenkins et al. 2016). Sovacool et al. (2017) highlight some shortcomings of energy justice. In particular they discuss its western theoretical focus, as well as the emphasis on anthropocentric concepts in the field whereby "the field of energy justice has overwhelmingly been defined by concerns with ethics and morality among and between humans" (Sovacool et al. 2017, p. 678). Another weakness of energy justice has been the lack of geography in the discussion. Bouzarovski and Simcock (2017) propose introducing concepts of spatial justice and inequality to energy justice to provide an explicit spatial focus to research. They argue that spatial justice (geographic dimensions of inequality and inequity) help researchers uncover and evaluate energy-related injustices (Bouzarovski & Simcock 2017).

Analytical Framework – Addressing Justice

To develop an analytical framework that addresses justice for transitions, we analysed how the different bodies of literature in our review responded to questions of justice. We did this by categorising the different approaches into the three most commonly used forms of justice which are distributive, procedural, and recognition. These approaches draw on philosophical and political concepts and theories of justice (Walker 2012) and have been employed by others investigating justice. For example, in environmental justice (Walker 2012), energy justice (Jenkins et al. 2016), and justice in transitions (Heffron & McCauley 2018). While other forms of justice or frameworks have been proposed (i.e. the "JUST" Framework in Table 1 and production and consumption in energy justice), we argue that the framework employed by environmental justice (see Table 2) is simple, yet comprehensive enough to incorporate insights from across the range of literatures reviewed (Jenkins et al. 2016). Table 4 illustrates how selected bodies of literature address such questions. Note that in many cases, formulations of justice in different literatures span boundaries and may fit in more than one column of our table. For clarity, we have placed these terms in the column of “best fit”.

Table 4. Addressing Questions of Justice: A literature review

	Forms of Justice		
Literatures	**Distributive** **How does the literature address questions of the distribution of benefits and impacts fostered by transition processes and outcomes?**	**Procedural** **How does the literature address questions of inclusivity and fairness in community engagement and decision-making in social and political spheres?**	**Recognition** **How does the literature address questions of engaging and recognizing pluralist and alternative needs, issues and solutions to sustainability, ways of knowing and being?**
Transitions	"Despite growing attention to power and political dimensions of transitions (e.g. Avelino et al. 2016) several authors claim that transition scholars have actually very little to say about equity and justice, and the political economy of transitions (Swilling & Annecke 2012; Eamers & hunt 2013)" (van Steenbergen & Schipper 2017, p. 3).		
Power and governance in transitions	Need to address power and governance (and their impact on distributional justice) at multiple spatial, jurisdictional and temporal scales (Termeer et al. 2010).	Recognition of importance of power in transitions (Walker & Shove 2007; Avelino & Rotmans 2009; Meadowcroft 2009; Lawhon & Murphy 2012). "… who is steering, and how does steering take place in a decentralised society?" (Meadowcroft 2007).	Whose voices remain unheard? (Markard et al. 2012).
Just transitions	Focus on economic impact, specifically on jobs lost in transitions (Newell & Mclvaney 2013). Reactive (minimizing cost) and proactive (maximizing benefit) just transition policies (Mertins-Kirkwood 2018).	"Managed" rather than inclusive decision-making (ILO 2015).	
Justice in transitions	Equitable distribution of economic benefits (Silveira & Pitchard 2018).	Equal participation in decision procedures, equal capabilities to participate (Silveira & Pitchard 2018). "Who defines *what is just*, and *for whom*," (Newell & Mclvaney 2013, p. 138).	Recognition of variety of needs and cultures (Silveira & Pitchard 2018)
Legal Geography	Space and Time as added dimensions of analysis (Heffron & McCauley 2018, p. 77). Normative dimension – what are we transitioning *to*? (Heffron & McCauley 2018).	Procedural (Heffron & McCauley 2018, p. 77)	Universal – Recognition and Cosmopolitan (Heffron & McCauley 2018, p. 77).
Geography of transitions	Role of scale and space: socio-spatial embedding, multi-scalarity, issues of power (and interconnections between these dimensions) (Truffer et al. 2015)).	Not a big focus Role of the non-human	

	Forms of Justice		
Transformations	Large-scale societal change processes (global, regional, local etc.) involving social-ecological interactions (Folke et al. 2010). Respond to the implications of change (e.g. risks, vulnerabilities) (Olsson et al. 2014) (or distributive???) Individual motives and values supporting transformations (O'Brien 2012).	Outcome focused on creating safe and just operating spaces to avoid undesirable system change (Olsson et al. 2014; Raworth 2012).	Recognition of variety of motives and values (O'Brien 2012)
Environmental Justice	Distribution of environmental impacts. What is to be distributed, who is affected, and how? (Bell 2004).	Inclusion and exclusion in decision-making processes surrounding environmental and social issues (Walker 2012).	Who is given respect? Who isn't valued? Related to prejudice and discrimination of all forms (human and non-human) (Walker 2012).
Climate justice	Global scale Disproportionally affects those already vulnerable (Steele et al. 2012). Responsibility and vulnerability not equal (Barnett 2006).	Impact on future generations	Integrating views from Global South into traditionally Western conceptions of sustainability, transition, and governance.
Energy justice	Availability, Affordability, Sustainability (Sovacool et al. 2017, p. 678). Justice in complex energy systems at multiple scales (Jenkins 2016).	Due Process, Transparency & Accountability, Intra and Inter-generational equity, Responsibility, Resistance (Sovacool et al. 2017, p. 678).	Intersectionality (Sovacool et al. 2017, p. 678). "Centering energy discussions back on people" (Sovacool 2014).

All literatures reviewed include attention to distributive justice, with equitable distribution of benefits and costs being the most prominent feature (c.f. Schlosberg 2007). Most literatures also address procedural justice by stressing the need for inclusion and equal participation in decisions. A subset of literatures explicitly acknowledges issues of power; however, they do not go as far as addressing *how* issues of power should be mitigated. Besides environmental justice, of the literatures reviewed only energy justice, justice in transitions, legal geography, and climate justice engage with recognition-based justice. An important aspect of recognition is the acknowledgement that there are a diversity of needs, values, and interests, so it might go beyond respect to a more fundamental question of how we identify and understand pluralist and complex needs (especially when identities and vulnerabilities intersect). The attempt here is not only to include groups that have been historically excluded from decision processes and create spaces that welcome different groups (procedural justice), but to recognize and address previous and existing exclusion and disproportionate impacts. To do so may mean using different modes of governance, integrating different forms of knowledge (e.g. Traditional Ecological Knowledge) (c.f. Sovacool et al. 2017), different facilitation techniques that encourage marginalized communities to participate in a meaningful way, and challenging how facilitators come to know and recognized different needs, values and interests. This goes beyond having a diversity of participants in a process to recognizing difference and, perhaps, changing processes, designs, and methodologies based on that recognition. This represents a move to recognition as a "relationship, a social norm embedded in social practice (Schlosberg 2007). Recognition based justice remains an unresolved issue within transitions, which we aim to address within our framework.

The next step in the development of our framework was to develop a series of questions that are framed around the three forms of justice and informed by our literature review, see Table 5. In developing the framework, we also drew on literature of participatory process to gain insights into developing a useful framework (see for example Abelson et al. 2003; Rowe & Frewer 2005). Working collaboratively across disciplines has many benefits, including creating shared "ways of thinking, ways of valuing and ways of acting" (Healey 1997, p. 29); democratising practices and discourses (McGruik 2001), and having a higher chance of the knowledge/science created being used by decision-makers (Wall et al. 2017). Collaborative knowledge development (also understood as transdisciplinary knowledge co-production) takes place when researchers work with actors from different sectors (i.e. private, public, and/or civil society) to articulate research questions, undertake the research itself, and to interpret and use results (Robinson & Tansey 2006; Talwar et al. 2011). The participatory process literature reminds us that when trying to incorporate or increase justice within change processes, it is important to understand different notions of participation, cooperation, and co-production and how they can support these aims.

The framework was developed to support practitioners and action researchers designing and implementing processes to facilitate sustainability transitions, and for researchers who wish to evaluate these processes. The framework applies to practitioners and researchers, but may take different forms. For example, the question "*How are minority or marginalized worldviews, knowledges, and values recognized and integrated?*" will mean different things in different contexts. For a practitioner, addressing this question may involve making changes to the process design, or a need to analyse the design team itself to ensure a greater diversity of perspectives. For a researcher, this question may involve challenging the research methodologies and epistemologies at the heart of the research project. Below the questions are potential risks related to the difficulties in incorporating justice, followed by mitigation strategies to overcome these risks.

Table 5. Justice and System Transitions

	Distributive	**Procedural**	**Recognition**
Key questions	Where and how are the costs and benefits of the transition being distributed? What scales (e.g. jurisdictional, spatial and temporal) are used to assess impacts and benefits? Are actions reactions to mitigating impacts of events, or proactive planning for future benefits of the transition? What is the scope of analysis – e.g. pilot project, social innovation lab, or whole system? Are the human rights of affected peoples being respected?	Who is part of the decision-making process and in defining "just" and "transition"? Do all stakeholders have adequate capabilities to participate? If not, what tools or techniques are being implemented to reach a wider set of stakeholders? How are individuals' values and motivations being integrated? How are non-human actors engaged in dialogue? How are future generations engaged in dialogue? What power asymmetries exist within different processes (e.g. financial, political, structural, etc.) and how are they addressed? What happens when there are unresolved disputes or asserted violations of human rights? How are communities impacted by your research engaged in collaboratively developing research goals?	How is recognition, misrecognition, or non-recognition treated? What cultural institutional processes, legacies, or existing inequalities are present? (E.g. what is the role of colonial legacy and relationships with Indigenous peoples?). How are minority or marginalized worldviews, knowledges, and values recognized and integrated? How are conflicting knowledges and values consolidated or addressed? How are multiple overlapping identities (intersectionality) recognized? How are costs and benefits identified (i.e. through different worldviews, knowledges and values)?
Risks to incorporating justice	Availability and affordability (e.g. of energy) during and after the transition. Failure to shift system incrementally raises risk of catastrophic failure or radical change Focusing on costs and risks of transitions, rather than benefits. Assuming equal distribution of resources/opportunities will address inequalities (i.e. costs, needs and benefits range in intensity/severity across individuals/communities).	Small groups of select stakeholders making decisions that exclude broader community participation (particularly marginalized voices).	Focusing solely on Western knowledge and Global North cases excludes Traditional Knowledge and differences in context.
Mitigation strategies to overcome risks	Consider transitions as an opportunity for transformation (system change).	Leverage insights from participatory process literature to design processes that that are fair, inclusive, and present unbiased information Consider ways in which non-human actors can be given a voice.	Engage with local Truth and Reconciliation processes (e.g. adopt the *UN Declaration on the Rights of Indigenous Peoples* as a reconciliation framework). Going beyond conventional strategies (i.e. simple demographics) for identifying diverse needs and identities across communities.

The Energy Futures Lab

To illustrate the practicality of these questions, we present an application of the framework to the case of the Energy Futures Lab in Alberta, Canada. The analysis of the case study draws from data generated through semi-structured interviews with participants in December 2016 - January 2017 (n=18), April 2016 (n=24), and January 2018 (n=34). Weekly design team meetings over the course of January 2016 through to January 2018 were observed, as well as eight workshops from November 2015 to October 2017 across different locations in Alberta. In addition, internal planning, design, and evaluation documents were reviewed. In particular, we looked for evidence of how the Energy Futures Lab had addressed the questions we raise in our framework in the planning, design and execution.

The Energy Futures Lab (EFL) is a participatory engagement process designed to facilitate energy system transitions in Alberta. Led by The Natural Step Canada (an environmental NGO), the process consists of 60 "Fellows" from across the energy system – oil & gas, renewables, municipal, provincial and federal governments, NGOs, academics and First Nations – who have been meeting two to four times per year since autumn 2015. The group has been learning about systems thinking, prototyping, innovation, and sustainability principles. EFL initiatives range from: niche innovations such as new technologies to create carbon fibres from bitumen; regime engagement with energy policy development; and engaging with cultural narratives of energy in Alberta. Convening partners of the EFL are the Natural Step Canada, the Suncor Energy Foundation (one of Canada's largest oil companies), the Pembina Institute (an environmental NGO), the Banff Centre (leadership and development organization), and the Government of Alberta. The majority of the funding for EFL comes from the Suncor Energy Foundation. While the EFL was not designed with an explicit justice lens, the case provides an example of the value of applying a comprehensive view of justice to a specific project. This analysis approaches the EFL by asking if the process has asked questions we raise, and how it has answered them.

Distributive Justice

The EFL vision explicitly recognizes the importance of the distribution of benefits of the energy transition referring to "high quality of life" and the need for "dependable and affordable energy" (Energy Futures Lab 2018a). Many of the EFL projects (such as geothermal and smart energy communities) are aimed at ensuring the distribution of energy to remote communities, including First Nations reserves that are often diesel powered, throughout Alberta. The distribution of costs is addressed through Fellow-led projects focused on workers and communities in transition such as Iron and Earth that is retraining oil sands workers to deploy solar panels. The question of scale has been an ongoing discussion in the lab. The temporal scale of the EFL Vision is 2050, and the spatial and jurisdictional scale is within Alberta. Fellows are now questioning the provincial focus, suggesting that national or international concerns warrant attention. For example, at time of writing, the Province of British Columbia is locked in a battle with Alberta and the Federal Government who want to twin an existing pipeline and take diluted bitumen from the oil sands of Alberta to the BC coast. At the same time, Fellows question whether a global energy transition focus is more appropriate. This argument notes that reducing China's coal consumption through provision of natural gas from Alberta could have a much bigger overall GHG reduction than making Alberta carbon neutral. A challenge for the EFL is translating the impact of projects that may address issues of distributive justice to transitioning the entire energy system in the Province to one that is more environmentally just. This challenge is both a matter of scale (projects to system) and also the need to go beyond distribution to address other justice concerns.

Procedural Justice

From a procedural justice lens, the EFL has attempted to bring the "whole system" into the process. The EFL has a wide-ranging membership including oil & gas, electricity distribution, renewable energy producers, First Nations, Federal, Provincial & Municipal government, academics, NGOs, and other energy-intensive industries such as agriculture and transportation (Energy Futures Lab 2018b). However, there are inevitably challenges in representing a population of 4,000,000 in a room of 60 people. Fellows are very much seen as co-owners of the EFL. For example, the EFL vision was co-developed with a sub-team of Fellows and approved by all of the Fellows. The portfolio of EFL initiatives was also co-developed by Fellows and the EFL Design Team. Fellows are free to propose initiative ideas and proceed with initiatives without needing consensus from the whole group. The EFL vision of

the energy transition is to be "inclusive, accessible, and equitable to current and future generations" and also "enhance the health of our natural environment". Operationalizing those concepts has been more challenging, as there are few mechanisms for engaging with future generations, only a preliminary process for capturing the environmental impacts and benefits of EFL projects, and little conception of environments as having value in themselves. Finally, while the EFL Fellows are very diverse, only superficial attention has been paid to the impact and power dynamics inherent with the inclusion of energy system regime actors such as Suncor, Shell, and Enbridge who are participating in, and contributing the vast majority of funding to, the EFL.

Recognition Justice

The EFL explicitly engages with recognition-based justice in its vision of being "a leader in energy-based partnership toward reconciliation with Indigenous peoples in Canada." The EFL has attempted to put this into practice through the inclusion of First Nations Fellows, territory acknowledgements and cultural engagements with First Nations elders, and projects that partner with First Nations. The EFL has also integrated First Nations' relationship to place and the land through learning journeys to significant cultural sites such as Head-Smashed-In-Buffalo-Jump. As mentioned earlier, this location in Southern Alberta is home to multiple generations of energy systems back to the days of the buffalo harvested by the Blackfoot Nation. In the 1500s (the earliest records made by settlers), there were between 30-60 million buffalo in North America. By the 1990s that had reduced to 250,000 (U.S. Fish & Wildlife Service 2014) mainly through habitat loss from European settler agriculture, and there are now less than 4,000 wild buffalo in Alberta (Alberta Wilderness Association 2015). Recognition of the impact of this loss of culture, land, and energy source on First Nations peoples is an important component of the EFL. At the same time, Fellows themselves are wrestling with what reconciliation means for the EFL. Canada's Truth and Reconciliation Commission's report on the impact of residential schools that took First Nations children away for their families to "westernize" them was released in December 2015, just as the EFL was starting. While First Nations Fellows and projects were included since the beginning, the EFL is still wrestling with questions of how the EFL can recognize the historical injustices and impacts on First Nations in Alberta, and how they can contribute to reconciliation in Canada.

Risk and Mitigation

Working in a Canadian context, engaging with risks identified within recognition justice are most pressing. The EFL has attempted to mitigate these risks by aiming for a diverse group of participants, with a focus on including First Nations representation. After the EFL Workshop in Olds, Alberta in February, 2018 the EFL team sent (as part of the workshop follow up package) the Truth and Reconciliation Commission Calls to Action and United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) to its Fellows (Energy Futures Lab, March 6, 2018). The case of the EFL illustrates the value of an integrated approach to just systemic transitions. While the EFL is making progress along a number of justice dimensions, at present it does not fully address true recognition of First Nations history, knowledge, and participation that recognition justice seeks. However, we note that the same could be said of most transition processes in Canada. The fact that the EFL is engaging with the concept of Reconciliation *at all* provides a model for other transition processes. We hope that the framework proposed in our paper will provide guidance to process designers who wish to address all dimensions of justice in their work.

Discussion

Reflecting on our analytical framework, we see two main values in our contribution. First is the comprehensive and integrated nature of the framework. As we have noted throughout this paper, others have attempted to address the issue of justice in transitions. However, each literature presents a relatively narrow view of justice. By integrating these views, our framework surfaces questions and insights for further research. For example, we found through our review of literature that recognition is not well addressed in theory or in practice. The EFL is well aware of this issue but is still grappling with how to address it. This is partly due to the complexity of reconciliation itself, but also a result of existing literature and practice not providing adequate guidance for theorists and practitioners. We do not presume to have all the answers but propose questions to be addressed through the process and with further research. The second area in which our framework provides value, is in operationalizing

concepts of an environmentally just transition. The literatures we reviewed often challenge theorists and practitioners to be aware of, for example, issues of power in transition but do not provide details on what that might mean in practice. Our framework provides a detailed set of questions that help researchers and practitioners deepen their reflexive practice that may in turn lead to more environmentally just transitions and processes. To answer these questions, researchers may turn to other literatures such as intersectionality which becomes an important consideration/framework when assessing the needs and vulnerabilities of marginalized groups. For instance, *how* are needs or resources identified and distributed? Do they address the diversity and intensity (and often competing) needs and interests of marginalized publics? (c.f. Castán Broto & Westman 2017; van Steenbergen & Schipper 2017).

The questions from our framework should be asked before, during, and after (following van Steenbergen & Schipper 2017) the transition design and implementation. When thinking about process design and developing a research agenda, one should ask who is organizing and facilitating the process? Who is involved in setting the terms of engagement? What are the epistemological and methodological assumptions being made? Lee (2015, p. 85) notes that in a survey of 660 American participatory process designers and facilitators, "71% held advanced degrees, and 88% identified as white" while "'addressing oppression and bias was ranked the most important challenge by only 6% of respondents". Designers and researchers should consider the makeup of their own teams at the outset, a key to both recognition and procedural justice. During the process itself, procedural questions such as ensuring a process is fair and inclusive, and the presentation of unbiased information may be most salient. At the conclusion of a transition process or research project, an environmentally just transition lens can be put on the evaluation component of the project. This may take the form of a procedural evaluation that questions how well the process addressed issues of justice as well as the outcome - did the process lead or contribute to an environmentally just transition that engages with multiple conceptions of justice?

A final reflection is on the importance of context, space, and geography. Our case study is situated within the Canadian context of a settler/colonial/Indigenous culture, so recognition, truth, and reconciliation go hand in hand. As an example, Indigenous concerns through land and title claims are at the centre of public debate in Canada on energy transition. However, institutional responses (e.g. the Government of Canada's Just Transition Task Force) are heavily focused on distribution with some acknowledgement of the importance of procedural justice, but no mention of recognition (c.f. Balkissoon 2018; Marotta 2018; Meyer 2018). In other contexts, different issues may be at play (e.g. racism, the role of immigrant communities, or income inequality) and recognition may take different forms. It is important that researchers and practitioners look to their own contexts and may use our framework to guide thinking and shed light on different forms of justice.

Conclusion

Our hope is that this paper provokes discussion and the development of a new research agenda within the sustainability transitions and transformations community. Meanings of recognition-based justice deserve further investigation. This research should engage with non-Western scholars who are not typically part of the transitions discourse such as Glen Sean Coulthard, a Yellowknives Dene scholar, who argues for self-recognition by Indigenous peoples rather than seeking recognition from a colonial power (2014). There is also value in applying our analytical framework to historical cases. Transitions theory has developed many rich insights from the analysis of past transitions. We believe that comparable insights may be gained from examining historical transitions from an environmentally just transitions lens. Finally, there is a need for additional case studies (both single case and comparative) of contemporary transition processes. Understanding how questions of justice appear, the differences in their application, and choices made by researchers and practitioners to address them, will help others to address justice in their research and practice.

This work is crucial as a transition is happening now in Alberta, in many regions around the world, and at a global level. Economic, environmental, social, and political change is taking place at an exceptional rate. Understanding the historical context of largely environmentally unjust transitions is important, but it is also important that we know where we are going next (or at least agree on where we want to go), consider the "quality" of the transition that is underway, and question if the initiation of a transition is just and desirable (and for whom). These issues are at the core of sustainability transitions research and practice. We argue that we need to work towards a more sustainable and just future. Indeed, one cannot

have a sustainable future without justice being an integral part of that future, as well as the process of getting there. The devastating loss of First Nations culture and environmental degradation at Head-Smashed-in-Buffalo-Jump illustrates an *unjust* transition both for Indigenous peoples and for the buffalo. As we look past coal mines to a future of more hydro-electric dams and wind turbines, how will we put in place processes that help us develop environmentally just transition processes toward a sustainable future? We hope that our analytical framework provides researchers and practitioners with some guidance that may help answer this important question.

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References

Abelson, J., Forest, P.G., Eyles, J., Smith, P., Martin, E. & Gauvin, F.P. 2003. Deliberations about deliberative methods: issues in the design and evaluation of public participation processes. *Social Science & Medicine*, *57*(2), pp. 239–251.

Adger, J., Paavola, J., Huq, S. & Mace, M.J. 2006. *Fairness to Adaptation to Climate Change*, Massachusetts Institute of Technology, Cambridge.

Agyerman, J. & Evans, B. 2004. 'Just sustainability': the emerging discourse of environmental justice in Britain? *Geographical Journal*, 170(2), pp. 155-64.

Agyerman, J., Cole, P., Haluza-VeLay, R. & O'Riley, P. 2010. Speaking for Ourselves: Environmental Justice in Canada, UBC Press, Vancouver, BC.

Alberta Wilderness Association. 2015. Bison. Retrieved from https://albertawilderness.ca/issues/wildlife/bison/

Arthur, W.B., 1998. Competing technologies, increasing returns and lock-in by historical events. *The Economic journal*, 99(3), pp.116–131.

Avelino, F. & Rotmans, J., 2009. Power in Transition: An Interdisciplinary Framework to Study Power in Relation to Structural Change. *European Journal of Social Theory*, 12(4), pp.543–569.

Avelino, F. & Wittmayer, J.M., 2015. Shifting Power Relations in Sustainability Transitions: A Multi-Actor Perspective. *Journal of Environmental Policy & Planning*, 17(5), pp.1–23.

Balkissoon, D., April 20, 2018. To the oil workers of Alberta: We care about you. *The Globe and Mail*. Retrieved from https://www.theglobeandmail.com/opinion/article-to-the-oil-workers-of-alberta-we-care-about-you/

Barnett, J. 2006. "Climate change, insecurity and injustice". In *Fairness to Adaptation to Climate Change*, Adger, W., Paavola, J., Huq, S. & Mace, M. (eds), Massachusetts Institute of Technology, Cambridge.

Bell, D. 2004. Environmental justice and Rawl's difference principle, Environmental Ethics*, 26(3), pp. 287-306.*

Black, L., Burkhalter, S., Gastil, J. & Stromer-Galley, J. 2008. Methods for Analyzing and Measuring Group Deliberation, in *Sourcebook of Political Communication Research Methods, Measures and Analytical Techniques*, Holbert, L. (ed.), New York.

Bouzarovski, S. & Simcok, N. 2017. Spatializing energy justice, *Energy Policy*, 107, pp. 640-648.

Caddy, J. 2005. Evaluating public participation in policy-making. OECD Publishing.

Carpini, M., Cook, F.L. & Jacobs, L.R. 2004. Public deliberation, discursive participation, and citizen engagement: A review of the empirical literature. *Annual Review of Political Science*, *7*(1), pp. 315–344.

Castán Broto, V., & Westman, L. 2017. Just sustainabilities and local action: evidence from 400 flagship initiatives. Local Environment, 22(5), 635-650.

Coenen, L. & Truffer, B., 2012. Places and Spaces of Sustainability Transitions: Geographical Contributions to an Emerging Research and Policy Field. *European Planning Studies*, 20(3), pp.367–374.

Coulthard, G., 2014. *Red Skin White Masks: Rejecting the Colonial Politics of Recognition*. University of Minnesota Press, Minneapolis.

Energy Futures Lab. (2018a). About the Energy Futures Lab. Retrieved from http://energyfutureslab.com/about-the-efl/

Energy Futures Lab. (2018b). Energy Futures Lab Fellows. Retrieved from http://energyfutureslab.com/fellows/

Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Caphin, T. & Rochstörm, J. 2010. Resilience Thinking: Integrating Resilience, Adaptability and Transformability, *Ecologic and Society*, (15(4), pp. 20.

Fuller, S. & McCauley, D. 2016. Framing energy justice: perspectives from activism and advocacy, *Energy Research & Social Science*, 11, pp. 1-8.

Geels, F.W., 2014. Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society*, 0(0), pp.1–20.

Geels, F.W., Berkhout, F. & van Vuuren, D.P. 2016. Bridging analytical approaches for low-carbon transitions, *Nature Climate Change*, 6, pp. 576-583.

Grin, J., Rotmans, J. & Schot, J., 2010. *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*, New York, NY: Routledge.

Hansen, T. & Coenen, L., 2015. The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. *Environmental Innovation and Societal Transitions*, 17, pp.92–109.

Healey, P. 1997. *Collaborative planning: Shaping places in fragmented societies*, UBC Press.
Heffron, R. & McCauley, D. 2018. What is the 'Just Transitions'? *Geforum*, 88, pp. 74-77.
Hölscher, K., Wittmayer, J. M. & Loorbach, D. 2017. Transition versus transformation: what's the difference? *Environmental Innovation and Societal Transitions*.
Jasanoff, S. 2018. Just transitions: A humble approach to global energy futures, *Energy Research & Social Science*, 35, pp. 11-14.
Jenkins, K., McCauley, D., Heffron, R. & Stephan, H. 2016. Energy justice: A conceptual review, *Energy Research & Social Science*, 11, pp. 174-182.
Jenkins, K., McCauley, D. & Forman, A. 2017. Energy justice: A policy approach*, Energy Policy*, 105, pp. 631-634.
Lawhon, M. & Murphy, J.T., 2012. Socio-technical regimes and sustainability transitions: Insights from political ecology. *Progress in Human Geography*, 36(3), pp.354–378.
Loorbach, D. 2010. Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. *Governance,* 23(1), pp. 161-183.
Loorbach, D. & Shiryama, H. 2016. The Challenge of Sustainable Urban Development and Transforming Cities, in *Governance of Urban Sustainability Transitions, European and Asian Experiences*, Loorbach, D., Wittmayer, J.M., Shiroyama, H., Fujino, J. & Mizuguchi, S. (eds.), Springer.
Loorbach, D., Frantzeskaki, N. & Avelino, F. 2017. Sustainability Transitions Research: Transforming Science and Practice for Societal Change, *Annual Review of Environment and Resources*, 42(1).
Lyster, R. 2015. *Climate Justice and Disaster Law*, University Press, Cambridge.
Marotta, S., April 25, 2018. Coal phase-out task force to consult workers, communities to soften blow. *CBC News*. Retrieved from http://www.cbc.ca/news/politics/mckenna-task-force-coal-phase-out-1.4635379
McGuirk, P. M. 2001. Situating Communicative Planning Theory: Context, Power, and Knowledge, *Environment and Planning A, 33*(2), pp. 195-217.
Meadowcroft, J., 2007. Who is in Charge here? Governance for Sustainable Development in a Complex World. *Journal of Environmental Policy & Planning*, 9(3-4), pp.299–314.
Meadowcroft, J., 2009. What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sciences*, 42(4), pp.323–340.
Meadowcroft, J., 2011. Engaging with the politics of sustainability transitions. *Environmental Innovation and Societal Transitions*, 1(1), pp.70–75.
Meyer, C., April 13, 2018. Canada's coal workers are anxious to find work in Trudeau's low-carbon future. *The National Observer*. Retrieved from https://www.nationalobserver.com/2018/04/13/news/canadas-coal-workers-are-anxious-find-work-trudeaus-low-carbon-future
Miller, C.A., Iles, A. & Jones, C.F. 2013. The Social Dimensions of Energy Transitions, *Science as Culture*, 22(2), pp. 135-148.
Murphy, J.T., 2015. Human geography and socio-technical transition studies: Promising intersections. *Environmental Innovation and Societal Transitions*, 17, pp.73–91.
Newell, P. & Mulvaney, D. 2013. The political economy of the 'just transitions', *The Geographical Journal*, 179(2), pp. 132-140.
Nozick, R. (2017). Distributive justice. In Distributive Justice (pp. 3-61). Routledge. London, UK.
O'Brien, K.L. 2012. Global environmental change II: from adaptation to deliberate transformation¸ *Progress in Human Geography*, 36(5), pp. 667-676.
Olsson, P., Galaz, V. & Boonstra, W.J. 2014. Sustainability transformations: a resilience perspective, *Ecology and Society*, 19(4), pp. 1.
Ottinger, G. 2013. The Winds of Change: Environmental Justice in Energy Transitions, *Science and Culture*, 22(2), pp. 222-229.
Raworth, K. 2012. A safe and just space for humanity. Can we live within the doughnut? *Oxfam Discussion Paper*, https://www.oxfam.org/sites/www.oxfam.org/files/dp-a-safe-and-just-space-for-humanity-130212-en.pdf
Robinson, J. & Tansey, J. 2006. Co-production, emergent properties and strong interactive social research: the Georgia Basin Futures Project, *Science and Public Policy*, *33*(2), pp. 151–160.
Ryfe, D.M. 2005. Does Deliberative Democracy Work? *Annual Review of Political Science*, 8(1), pp. 49–71.
Schlosberg, D & Carruthers, D. 2010. Indigenous struggles, environmental justice, and community capabilities, *global Environmental Politics*, 10(4), 12-35.
Schlosberg, D. 2013. Theorising environmental justice: the expanding sphere of a discourse. *Environmental Politics*, 22(1), pp. 37-55.

Schlosberg, D. 2007. Defining Environmental Justice. Oxford University Press. Oxford, UK.
Sen, A. 2009. *The idea of justice*, Harvard University Press.
Shove, E. & Walker, G., 2007. CAUTION! Transitions ahead: Politics, practice, and sustainable transition management. *Environment and Planning A*, 39(4), pp.763–770.
Silveira, A. & Pritchard, P. 2018 *Justice in the transition to a low carbon economy*, A working paper by the Cambridge Institute for Sustainability Leadership, University of Cambridge.
Sovacool, B.K. 2014. What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda, *Energy Research & Social Science*, 1, pp. 1-29.
Sovacool, B.K. & Dworkin, M.H. 2015. Energy justice: conceptual Insights and practical applications, *Appl. Energy*, 142, pp. 435–444.
Sovacool, B.K., Hefferon, R.J., McCauley, D. & Goldtau, A. 2016. Energy decisions framed as justice and ethical concerns, *Nature Energy*, 1, pp. 1-6.
Sovacool, B.K., Burke, M., Baker, L., Kotkalapudi, C.K. & Wlokas, H. 2017. New frontiers and conceptual frameworks for energy justice, *Energy Policy*, 105, pp. 677-691.
Steele, W., Maccallum, D, Byrne, J. & Houston, D. 2012. Planning the Climate-Just City, *International Planning Studies*, 17, pp. 67-83.
Swilling, M. & Annecke, E. 2012. *Just Transitions: Explorations of Sustainability in an Unfair World*, United Nations University Press.
Talwar, S., Wiek, A., & Robinson, J. 2011. User engagement in sustainability research. Science and Public Policy, 38(5), 379–390.
Truffer, B., Murphy, J.T. & Raven, R.P.J.M., 2015. The geography of sustainability transitions: Contours of an emerging theme. *Environmental Innovation and Societal Transitions*, 17, pp.63–72.
U.S. Fish and Wildlife Service. 2014. Timeline of the American Bison. Retrieved from https://www.fws.gov/bisonrange/timeline.htm.
van Steenbergen, F. & Schipper K. 2017. *Struggling with justice in transitions*, DRIFT, Erasmus University Rotterdam.
Walker, G. 2012. *Environmental Justice: Concepts, Evidence and Politics*. Routledge.
Wall, T. U., Meadow, A. M., & Horganic, A. 2017. Developing Evaluation Indicators to Improve the Process of Coproducing Usable Climate Science. Weather, Climate, and Society, 9(1), 95–107.