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Justice in energy transitions

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ABSTRACT

This paper argues that transitions research more broadly needs to take more account of justice in its analysis. This paper draws primarily from environmental and energy 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. This is achieved through different forms of justice: distributive, procedural, and recognition. Our paper concludes with reflections upon the application of a justice approach to sustainability transitions research and offer insights into a potentially new research agenda.

1. 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). For example, 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. 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 which is a prime location for wind energy, there are seemingly endless rows of wind turbines. This most recent change is moving in a sustainable direction, but it is important to consider the historical impact of this change including loss of Indigenous culture and the nearly complete collapse of the wild buffalo, both direct results of colonial expansion throughout Canada. 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 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.

Readers may ask: how important is justice? Does justice in transitions really matter? We have normative and instrumental responses to these questions. From a normative standpoint, we argue that we cannot achieve a sustainability transition without justice, indeed that an unjust transition is not sustainable. An instrumental response is that not considering justice erodes political support for transitions efforts. Recent populist swings in the United States and the United Kingdom illustrate this argument. Many Trump and Brexit supporters are from fading coal mining communities and manufacturing centres that have lost jobs due to globalization – both areas "lost" during the global economic transition still underway (Olson-Hazboun, 2018). Voters that feel they were

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not consulted, that their way of life is threatened, that they do not have decision making power, may respond by supporting populist politicians that promise to restore lost greatness and take control of policy back from outsiders (e.g. the WTO or EU) (Batel and Devine-Wright, 2018, In Press; Swyngedouw, 2018).

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, other species, 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 end the paper by reflecting on the contribution of our analytical framework, and to encourage the development of a new research agenda within the transitions community.

2. 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 organized 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.

2.1. 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. This is often in response to path dependency, which acts as a barrier to innovation and change (Arthur, 1998) and is perpetuated through physical infrastructure, institutional power, and policy discourse (Sturup et al., 2013). Science and technology studies, complex systems analysis, and governance represent the three traditional areas of inquiry (Grin et al., 2010), but many more themes have emerged since. In particular, we are interested in newer 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, 2011). 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 and Walker, 2007; Avelino and Rotmans, 2009; Meadowcroft, 2009; Lawhon and Murphy, 2012; Geels, 2014). Some, like Avelino and others, developed new frameworks to offer "a 'power-laden transition storyline'" (Avelino and Rotmans, 2009, p. 563), or to better understand politics by conceptualising (shifting) power relations between actors in transitions (Avelino and 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 and Murphy, 2012), as well as political geography (Murphy, 2015). However, despite this new work, transitions scholars remain critical of how the field has addressed "equity, justice and the political economy of transitions" (van Steenbergen and Schipper, 2017, p. 3; Swilling and Annecke, 2012). Markard (2018) points to recent work on the role of politics in transition that provides systematic analysis of strategies, coalitions, and positions.

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 and Mulvaney, 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-

Table 1
The Legal Geography "JUST" framework for the Just Transition (Heffron and 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?)

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). 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 and McCauley, 2018 p. 76).

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 and Coenen, 2015, p. 93) are important to increase the understanding of transitions (Coenen and 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 (OöBrien, 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.

Heffron and McCauley (2018) also highlight another important dimension of scale: time (also see Termeer et al., 2010). The time dimension is important when considering the time scale of a transition (e.g. 2030, 2050), the speed of transition processes, and the need to consider multiple time scales and the interests of publics (and non-human) actors at those scales. The time dimension also has implications for issues of inter-generational equity (Sovacool et al., 2017) and raises the question of how future generations are engaged or represented in dialogue processes. This question is addressed in greater detail in the environmental justice literature.

2.2. 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 2018). 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 (Agyerman and Evans, 2004; Agyerman et al., 2010; Schlosberg and 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 is often used as an organizing discourse to bring together different issues or groups to create a larger movement, or to develop shared understandings of an issue (Walker, 2012). 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).

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

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 commonly used 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 regard 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 transitions scholarship (Nozick, 2017).

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).

2.3. 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". 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 and McCauley, 2016). However, a true energy system transition requires thinking and operating differently, where in addition to new technology, decision-making processes need to be proactive and collaborative (Ottinger, 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 and Dworkin, 2015). In attempt to bring justice and ethical concerns into energy decisions, Sovacool et al. (2016) proposed an energy justice decision-making framework, which was then updated by Sovacool et al. (2017) (Table 3). This framework provides a very anthropocentric view of justice and unlike environmental justice does not include other species. Also, while the focus on the framework is energy, this should not limit its conception of sustainability, which is very narrow. 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.

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

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

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 Simcok (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 and Simcok, 2017).

In 2014, Sovacool proposed a new research agenda for this field 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. Recent work by Hulbet and Rayner (2018) confirms the importance of recognition in the achievement of energy justice for indigenous people. Using a case study in Canada, they investigated the procedures surrounding the Chippewas First Nations opposition to a pipeline expansion through a claim founded on sovereign status. In a case study from New Zealand, MacArthur and Matthewman (2018) examine an indigenous led energy transition, which draws heavily on the work of Māori scholars and local environmental governance practices. Another important contribution to this space is research by Castán Broto et al. (2018, p. 645) on the need to open "up a dialogue with postcolonial critiques of development" and energy justice.

3. 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 and 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".

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 recognize 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.

Table 4
Addressing Questions of Justice: A literature review.

	Forms of Justice		
	Distributive	Procedural	Recognition
Literatures	**How does the literature address questions of the distribution of benefits and impacts fostered by transition processes and outcomes?**	**How does the literature address questions of inclusivity and fairness in community engagement and decision-making in social and political spheres?**	**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 and Annecke, 2012; Eamers & hunt 2013)" (van Steenbergen and 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 and Rotmans, 2009; Meadowcroft, 2009; Lawhon and 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 and Pritchard, 2018).	Equal participation in decision procedures, equal capabilities to participate (Silveira and Pritchard, 2018). "Who defines *what is just*, and *for whom*," (Newell & Mclvaney 2013, p. 138).	Recognition of variety of needs and cultures (Silveira and Pritchard, 2018)
Legal Geography	Space and Time as added dimensions of analysis (Heffron and McCauley, 2018, p. 77). Normative dimension – what are we transitioning *to*? (Heffron and McCauley, 2018).	Procedural (Heffron and McCauley, 2018, p. 77)	Universal – Recognition and Cosmopolitan (Heffron and 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	
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) 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).

The next step in the development of our framework was to derive a series of questions that are framed around the three forms of justice and informed by our literature review (see Table 5). In creating 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 and Frewer, 2005). Working collaboratively across disciplines has many benefits, including creating shared "ways of thinking, ways of valuing and ways of acting"

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 engage 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 opportunities are there for resistance to dominant political and economic (infra)structures? 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. 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 of not 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). Lack of public support for decisions. Sub-optimal decisions due to exclusion of knowledge from non-experts. Growing support for populist movements rejecting transition	Focusing solely on Western knowledge and Global North cases excludes Traditional Knowledge and differences in context. Sub-optimal decisions due to exclusion of knowledge from non-experts.
Mitigation strategies to overcome risks	Consider transitions as an opportunity for transformation (system change). Clearly delineate the scale and scope of action and analysis for a given project/process	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. Provide space for dissenting views and voices.	Engage with local Truth and Reconciliation processes where appropriate (e.g. adopt the *UN Declaration on the Rights of Indigenous Peoples* as a reconciliation framework). Move beyond conventional strategies (i.e. simple demographics) for identifying diverse needs and identities across communities.

(Healey, 1997, p. 29); democratising practices and discourses (McGuirk, 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 and Tansey, 2006; Talwar et al., 2011; Hansson and Polk 2018). 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 both 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.

4. 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. We do not presume to have all the answers, but propose questions to be addressed through the process and with further research. The second way 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 transitions, 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 and Westman, 2017; van Steenbergen and 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? For example, Lee (2015, p. 85) noted 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, time, and geography. 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. In different contexts, different issues may be at play (e.g. racism, engagement with new immigrant communities, or income inequality) and a concept such as recognition may take different forms. In locations with a settler/colonial/Indigenous culture, recognition, and truth and reconciliation need to go hand in hand when engaging with justice and transitions. 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). Further, Hulbet and Rayner, 2018, p. 1326) found that a “failure to assess the interaction of all three dimensions of energy justice – distributive, procedural and recognition – will ultimately fail to remedy injustice”. We hope that our framework contributes to new ways of recognizing and remedying historic injustices for researchers and practitioners.

5. 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 (as is evidenced by the majority of references in our own paper). This supports comments by Glen Sean Coulthard, a Yellowknives Dene scholar, who argues for self-recognition by Indigenous peoples rather than seeking recognition from a colonial power (Coulthard, 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 our framework to be applied to 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. We are currently developing one such case study for future publication that focuses on the Energy Futures Lab, which is active in Alberta, Canada – home to Head-Smashed-in-Buffalo-Jump. Transitions theory, like all theoretical traditions, needs to evolve and grow. We hope that our framework can help researchers and practitioners do just that.

This work is crucial as transitions are happening 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). We need to 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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