Environmental Impact Assessment Review Vol 92
https://doi.org/10.1016/j.eiar.2021.106688

Strategic assessment for energy transitions: a case study of renewable energy development in Saskatchewan, Canada

Abstract

With attention on the renewable energy sector to meet low-carbon transition goals, the need for more coordinated approaches to planning, carefully thought-out decision processes, and long-term policy designs to guide transitions is of increased importance. Despite repeated calls to advance more strategic forms of impact assessment in energy planning, decisions about renewable energy development are still predominantly approached on a project-by-project basis. Using renewable energy transitions in Saskatchewan, Canada, as a case study, this paper demonstrates how a transitions-based strategic environmental assessment (SEA) framework can be applied to explore the capacity needs, opportunities, risks, and obstacles in existing institutions and governance arrangements for low-carbon transitions. Results show significant benefits, opportunities, and risks in renewable energy transitions. Opportunities exist to address energy security concerns and promote distributed generation, but perceived risks include the immediate economic impacts of transitioning away from a fossil-based economy, reliability risks owing to the intermittent nature of renewables, and political uncertainty about the future electricity landscape. Results show the need for clear transition goals and implementation strategies, including full commitment to the transition agenda. For transitions-based SEA, results highlight the need for transparency and accountability to ensure effective implementation and the difficulty in establishing new assessment regimes. Lessons highlighted from the Saskatchewan case are broadly relevant for addressing low-carbon transition challenges and opportunities in other jurisdictions.

Keywords

transitions-based strategic environmental assessment; energy transition; low carbon future; institutional arrangements; energy governance; strategic decision making

1. Introduction

Transitioning to a low-carbon economy will require significant change across economic sectors, from transport and manufacturing to resource extraction, among others. Renewable energy is key to low-carbon transitions, but despite growth in renewables uptake progress towards decarbonization remains slow (Cherp et al., 2016; Gielen et al., 2019). Transition efforts have been frustrated by rigid institutions, politics and power struggles, value conflicts, disparate objectives, and in many instances a lack of leadership (Aklin, 2021; Burke and Stephens, 2018). These complexities manifest in social, political, and cultural processes that transcend techno-economic fixes and improvements (Geels et al., 2017). Addressing such complexities requires "highly effective interventions embedded in strong institutions and well-coordinated governance mechanisms" (Cherp et al., 2011, p. 79).

Decision-makers are increasingly confronted with two key questions: what are the capacity needs in institutional and policy environments to foster low-carbon transitions, and how can the *right* conditions be established to accelerate the uptake of clean energy systems? As attention turns to renewables to meet low carbon goals, there is a need for comprehensive and coordinated approaches to energy planning and assessment of long-term policy designs to guide transitions (Geißler et al., 2021; Fischer et al., 2020) – from setting energy transition goals to informing the policy choices and specific infrastructure projects to be undertaken to achieve those goals. The impediments to energy transition are largely socio-political – encompassing the social, political, regulatory, and institutional aspects of energy policy development and implementation (Jehling et al., 2019; Sovacool, 2009). Several studies have examined the barriers to renewable energy (Aklin, 2021; Geibler, 2013; Kainiemi et al., 2020; Burke and Stephens, 2018), arguing the need for greater attention to the transformative capacity within institutions, supporting policies, governance, collaborative opportunities among stakeholders, and the impacts of transitions on the economy and society (Cherp et al., 2016; Feurtey et al., 2016; Rosenbloom et al., 2018). In response, there is a growing literature on the value and benefits of strategic environmental assessment (SEA) as a formalized instrument to explore and inform the institutional and policy environment needed to support renewable energy transitions (Geißler et al. 2021); McMaster et al., 2021; Mulvihill et al., 2013; Nwanekezie et al., 2021).

SEA was first introduced in the late 1980s as an impact assessment process for policies, plans, and programs, complementing project-focused environmental impact assessment. It is now a legal requirement in more than 60 countries and most all countries have had at least some experience with SEA application (Fischer and González, 2021) – whether through formal requirements, guidelines, or driven by development banks and organizations. SEA has received much attention in offshore hydrocarbon development (Bonnell, 2020), natural gas sector-wide planning (Lyhne, 2012), electricity supply futures analysis (White and Noble, 2012), and various aspects of renewable energy development (Fischer et al., 2020), including wind farms (e.g., McMaster et al. 2021; Phylip-Jones and Fischer, 2015) and tidal energy (Doelle, 2009). In practice, however, the potential of SEA as a sustainability transitions tool in the energy sector has yet to be fully realized (Gibson et al., 2016; Noble et al., 2019; Partidário, 2021). Part of the challenge is that the dominant focus of energy sector SEA remains identifying, assessing, and finding ways to manage the likely impacts of individual energy policies and programs within existing institutional structures (Mulvihill et al., 2013; Doelle and Sinclair, 2019). Considering the challenges involved in the transformation of energy systems, Geißler et al. (2021) argue that research is needed on the benefits and roles of SEA in achieving a low carbon future. There has been some research on the transformative nature of SEA, including in the transportation sector (e.g., Faith-Ell and Fischer, 2021), however there has been only limited research exploring a transitions-based approach to SEA to assess policy and institutional contexts and the opportunities that shape and enable low-carbon futures (Pang et al., 2014; McMaster et al., 2021).

Empirical applications of SEA in the renewable energy sector do exist, but such a distinct transitions-based approach to SEA has rarely been explored in the literature and remains largely untested (Noble and Nwanekezie, 2017; Partidário, 2021). This paper applies a transitions-based to SEA, focused on assessing the institutional and governance conditions that actively shape and facilitate, or constrain, renewable energy transitions. We do so based on an exploratory case study of renewable energy in Saskatchewan, Canada. Although situated in the Canadian context, the lessons for transitions-based SEA in the energy sector are applicable to other jurisdictions.

2. Transitions-based SEA

SEA has received much attention in the energy sector, but the dominant approach under legislated or directive-based systems, such as the EU Directive 2001/42/EC and the Canadian federal Cabinet Directive, is on identifying and assessing policy, plan, or program impacts rather than also shaping their formulation or implementation (Noble et al., 2019). Meeting the long-term challenge of energy sustainability requires a socio-technical restructuring of energy systems (Miller et al., 2015), putting energy transitions at the centre of strategic planning and energy policy decision-making. Introducing transitions-based thinking to SEA provides an opportunity to redefine the role of SEA as an agent of fundamental change (Kirchoff et al., 2011). As Partidário (2021) argues, "strategic thinking for sustainability" (p. 41) is a fundamental tenant of SEA that redirects institutional, social, and policy path dependencies toward more sustainable solutions. This requires an approach to SEA that focused on the strategies behind the proposals (Partidário, 2021), addressing the complexity, structure, and institutional setting that either enables or stifles transformative change (Nwanekezie et al., 2021; Stoeglehner, 2019)

Informed by the multi-level perspective (Geels et al., 2017), transition management (Loorbach, 2010), and strategy-based thinking (Partidario, 2015, 2021), a transitions-based approach to SEA redirects attention from assessing impacts toward supporting innovations in energy policies and sectors. Emphasis is placed on the institutional capacities and enabling conditions required to disrupt existing norms, and the long-term viability of strategic initiatives within the broader social-technical landscape. Transitions-based SEA thus operates within a complex and multi-level structure of governance, institutional arrangements, and actors (Nwanekezie et al., 2021). It is an instrument for understanding the socio-technical and political system dynamics and change processes that influence institutional and development trajectories (Geels, 2011; Lawhon and Murphy, 2011; Geels et al., 2017); identifying transition pathways, including governance activities that influence longer-term outcomes and that tier from one level of decision-making to the next (IAEA, 2018; Loorbach and Rotmans, 2010; Markard et al., 2016); and informing and reforming the institutional structures that influence and support regime change (Cherp et al., 2016).

Five core elements inform transitions-based SEA, each comprised of several guiding questions (**Table 1**) (Nwanekezie et al., 2021). Emphasis is on the institutional and governance contexts that may need to be destabilized, reformed, or established to support the development and implementation of new energy strategies, policies, and programs (Slunge et al., 2009; Jiliberto, 2011; Partidario, 2012, 2021); the factors and conditions, including relationships between actors, that enable, impede, or change the course of a development trajectory (Cherp et al., 2016; Stoeglehner, 2019); and the opportunities and risks of transitioning from one energy trajectory or state to another. These assessment components are by no means exhaustive, but a starting point for the analysis of complex energy transition issues that are often overlooked in SEA design. Sustainability transformations can only be achieved when attention is focused on the decision environment underlying strategic initiatives; where the gaps, strengths and weaknesses, and opportunities and constraints to transitions can be identified and the conditions established to enable long-term change.

Table 1: Key elements and questions of transitions-based SEA

Framework element	Assessment step	Strategic question(s)
Guiding vision	Situation assessment of the guiding vision for proposed transitions	▪ What are the drivers and selective pressures for change? ▪ Is the guiding vision coherent and does it adopt a long-term perspective to guide desired transition pathways?
Institutional and governance context	Assess the institutional and governance context	▪ Is there adequate capacity within existing institutions and governance arrangements to support the desired energy transition? ▪ What are the current institutional barriers to achieving the transition goals? ▪ What new capacity or institutional mechanisms (e.g. policies, instruments, regulations, incentives) are needed to ensure successful transitions?
	Assess the relationship and interactions between relevant actors and stakeholders	▪ Who are the relevant actors in the transition process and how have they influenced the course of the transition? ▪ Are there opportunities to pursue collaboration between stakeholder groups to facilitate the desired outcomes?
Opportunities and risks	Assess the opportunities and risks of sustainability pathways	▪ What are the implications of adopting a renewable-focused energy pathway? ▪ What are the immediate and longer-term risks and benefits of the proposed energy transition?
Progress indicators for on-going transition management	Identify the progress indicators for monitoring the transition progress	▪ What are the progress indicators useful to track the transition and help ensure transition goals, and impact management strategies are being achieved?
Exogenous landscape influences	Assess the impacts of the broader exogenous landscape	▪ What are the impacts of the broader landscape changes on the proposed energy transition?

Source: Nwanekezie et al. 2021.

3. Case study and methods

From GHG emissions reduction to improving energy access for remote communities, renewable energy is an attractive option for jurisdictions seeking to diversify their electricity generation mix (Mercer et al., 2017; Inglesi-Lotz and Thopil, 2019). This is especially the case in Canada, where the urgency to transition to a low-carbon economy and meet climate policy targets is coupled with a need to ensure energy security for northern communities (Potvin et al., 2017). Nationally, however, there is limited direction on how strategic-level undertakings for decarbonization, climate change mitigation commitments, and energy security will be assessed and implemented (Doelle and Sinclair, 2019; Gibson et al., 2019). The need for strategic assessments to guide energy decision-making is even more evident at the provincial level, where fragmented efforts and siloed approaches to energy planning, often poorly aligned with federal climate policy objectives, have largely failed to generate sustainability-enhancing outcomes (Prebble et al., 2018). A few Canadian provinces have taken promising action toward incorporating renewable energy into their electricity mix (Harris et al., 2015; Martens, 2015), and with pressure from the federal government to adopt decarbonization strategies more jurisdictions are pursuing a renewables agenda (Dvorak, 2016). However, most jurisdictions remain at a crossroads in energy sector reform and renewables transition (Beck and Robertson, 2019; Olive, 2019), and across Canada there does not exist formal systems of SEA at the provincial or territorial level to support energy sector reform (Noble et al., 2019).

3.1 Saskatchewan's electricity sector

Transition processes are context dependent and best explored using a case-study from which lessons can be extracted (Laes et al., 2014). The focus of our case study is Saskatchewan, Canada, a western prairie province. Saskatchewan is 651,600 km^2 with a population of approximately 1.1 million, of which more than 35% reside outside a census metropolitan or agglomeration area (Statistics Canada, 2020). The province's current energy mix is comprised of natural gas (44%), conventional coal (28%), hydro (20%), wind (5%) and a mix of other sources (3%) including coal with carbon capture storage and solar (SaskPower 2020).

The Saskatchewan Power Corporation (SaskPower), a publicly owned Crown utility, has primary responsibility for electricity generation, transmission, and distribution across the province (Hulbert et al., 2011). There are two main transmission grids, serving the northern and southern regions of the province. With more than 157,000 kms of transmission and distribution lines, SaskPower has the second largest grid network among all Canadian utilities and the fewest customers per kilometer (SaskPower 2020). All but one community is connected to an electricity grid – Kinoosao, in the provincial north, which is powered by diesel generators. Many northern communities are still considered remote, even though they are connected to a power grid. The northern grid remains vulnerable to power outages and communities lack access to natural gas, which means higher business and household energy costs (Huang et al. 2019).

Saskatchewan is also the second highest per-capita emitter of GHGs in Canada. In 2017, Saskatchewan's per capita emissions were 67.7 tonnes of CO_2^e, more than three-times the national per capita average (Canada Energy Regulator, 2020). The province's electricity sector accounts for nearly 20% of provincial annual GHG emissions (Canada Energy Regulator, 2020). In 2017, the province presented its climate change mitigation strategy and plan to transition toward a low-carbon economy (Government of Saskatchewan, 2017). Detailed in the strategy is a goal to increase renewables electricity generation capacity to 50% of the provincial total by the year 2030. Meeting this target will require the utility to double its renewable energy capacity over the next decade (SaskPower, 2017). Key investment decisions need be made about new energy sources, rebuilding and replacing aging power infrastructure, and improving transmission capacity and modernizing the grid (Saskatchewan Chamber of Commerce, 2019).

Pursuing decarbonization strategies while balancing economic development priorities has been a challenge for the province (Hulbert et al., 2011; Richards et al., 2012; Prebble et al., 2018). Decision-making on greening the electricity sector is highly conflicted, and the abundance of coal, which has traditionally been used to generate affordable electricity while fueling economic growth, has stabilized a regime of emission-intensive electricity generation (Martens 2015; Prebble et al., 2015). Growing energy demand, aging electricity infrastructure, and the need to address climate change commitments and adhere to recent national decarbonization policies are disrupting the existing regime in support of increased renewables-based generation (Martens, 2015; SaskPower, 2017; Prebble et al., 2015, 2018). Political commitments to economic growth have also kept small-scale nuclear energy on the agenda. However, there has been limited strategic assessment of the institutional capacity needs, obstacles, opportunities, and risks associated with provincial energy transition.

3.2 Data collection

The key elements and questions of transitions-based SEA presented in Table 1 guided our assessment of the Saskatchewan case. Attention focused on the institutional variables that are likely to influence the outcomes of renewable energy transitions, specifically the:

- guiding vision and drivers of renewable energy transitions;
- capacity needs and obstacles to transitions in existing institutions;
- opportunities and risks of adopting a renewable energy trajectory;
- progress indicators to guide on-going transition management; and
- the impacts of change in the broader exogenous landscape on desired energy transition.

Data were gathered through semi-structured interviews with key actors (Table 2), selected based on their expert knowledge of and experience working in Saskatchewan's electricity sector development, planning, policy, and decision-making. When assessing strategic issues in the energy sector, it is important to involve actors responsible at different tiers of decision making, from policies to projects, when exploring questions at any single tier (IAEA, 2018). The expertise of study participants is thus diverse, including coal-fired generation, natural gas, energy storage technology, small modular reactor technology, electricity grid planning and infrastructure, renewables (wind, solar, biomass), climate policy, and regulatory provisions in the energy sector (e.g., power purchase agreements, net metering, project licensing). The sample size is small but meaningful, as participants were purposively selected using an iterative sampling design with the goal to engage individuals with intimate knowledge of the sector and significant interest and influence in the future of energy development in the province. This includes individuals with organizational leadership roles in policy and planning for energy transition, and in the development of local and distributed renewable energy projects.

Interview questions followed those set out in Table 1, after first introducing Saskatchewan's provincial renewables electricity generation goal. We probed with examples or illustrations, such as referring to Canada's national energy and climate commitments or to recent examples of renewable energy projects in the province, in rare instances where the interview conversation stalled. Our approach is thus largely constructivist in nature, with results shaped by study participants who are engaged in the province's energy policy and planning context. Where applicable, document review of relevant renewable energy plans, policies, and programs were was used to validate or supplement certain information or claims presented by interviewees. Interviews were conducted both in-person and via telephone during 2019-21. All interviews were with individual, lasting between 45 to 90 minutes. Interviews were recorded, transcribed, coded using NVivo© 12 software, and analyzed based on the elements in Table 1. Despite pre-determined themes, interviews were flexible to accommodate emerging themes and ideas proposed by participants not explicitly addressed in the framework.

Table 2: Study participants

Sector	Description	Sample
Provincial government/Crown utility	Participants from Saskatchewan Power Corporation (SaskPower) - Crown utility representatives of the provincial government	2
Industry	Renewable energy developers/project proponents within the province	4
Indigenous services	Representatives from First Nations Power Authority (FNPA) and Peter Ballantyne Cree Nation (PBCN), directly involved with community-based renewable energy projects	4
Academia	Academic experts knowledgeable about clean energy development trends in Saskatchewan	5
Environmental non-governmental organization (ENGO)	Advocacy groups seeking to advance low-carbon energy transitions in Saskatchewan	2
Legal/Private consulting	Legal practitioner consulting with project proponents on EA processes, approvals and permitting for new renewable energy	1

https://doi.org/10.1016/j.eiar.2021.106688

4. Results

Interviewees highlighted several transition drivers, capacity needs, and institutional barriers, including perceived opportunities and risks of a renewables-focused electricity development path. Results focus on the emergent transition process based on an exploration of the current institutional environment rather than a comprehensive assessment of the broad spectrum of complex future change processes, which requires on-going evaluation and (re)assessment of transition progress indicators.

4.1 Guiding vision for renewable energy transition

Climate change was said to be guiding the vision for energy transition in Saskatchewan, coupled with the need to reduce dependency on fossil fuel-based electricity generation. Most frequently noted, however, were exogenous pressures by the federal government to reduce emissions and decarbonize electricity generation across Canada. In 2019, the federal government, under its Pan-Canadian Framework, imposed a minimum carbon tax on all fossil fuel-based energy generation in those provinces yet to effectively regulate their GHG emissions (Bahn and Vaillancourt, 2020), including Saskatchewan. An industry participant suggested that the federal carbon tax was a significant driver of the province's renewable energy vision, and others indicated that the province is under increasing pressure to adopt an applicable carbon price and green its electricity generation sources. Participants also identified the federal government's Equivalency Agreement with Saskatchewan to retire most of its coal-fired power plants by 2030 as an additional, and significant, regulatory driver.[1] The declining costs of renewables was also identified as shaping the province's renewables vision, but of minor importance.

Participants described the province's renewable energy vision as a step in the right direction, with those from academia and ENGOs noting increased energy access and affordability in northern communities. More than half of interviewees, however, cautioned that the province's 50% renewables target was too ambitious to be achieved under existing policy and institutional arrangements. For others who said the goal was appropriate, they emphasized the need for clearer political direction, specifically strategic direction on how the province would achieve its target. A participant from the FNPA suggested that the ambiguity of the provincial target is an impediment to transition, explaining that a target of "up to 50% renewables by

[1] See Government of Canada (2019). Canada-Saskatchewan equivalency agreement regarding GHG emissions from electricity producers. https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/agreements/equivalency/canada-saskatchewan-greenhouse-gas-electricity-producers.html. The Agreement allows the province the flexibility to transition to a cleaner electricity system including exploring more CCS options for its coal-fired generation, if it achieves its federally mandated emissions reduction levels by 2030.

the year 2030" does not indicate any defined threshold or clear transition pathway, and that the province is yet to clearly communicate how the target will be met.

4.2 Institutional and governance context

4.2.1 Institutional barriers and capacity needs

Lack of a dedicated agency to oversee low-carbon transitions was identified by some participants as stifling transformation. An ENGO participant suggested the need for a separate or independent agency to oversee energy transition and to ensure that commitments are met, indicating that "there's no one in government…given the responsibility to work on that transition; there's no department of energy transition in the provincial government [or] team assigned to that." A participant from academia similarly suggested that the responsibility for managing energy transitions should not be housed within a single government ministry, as it requires coordination and commitment across several ministries, including the Crown utility, in addition to other stakeholders. Most participants, however, noted two main barriers to transition: regulatory complexity, and institutional capacity.

An interviewee from the province's Crown energy utility noted perceived regulatory uncertainty and ambiguity about the future of electricity development in the province as barriers to long-term planning for renewable energy. The participant identified "uncertainty about what the regulations are going to be" and that when "trying to balance two divergent potential regulatory futures, you end up going half-way…, which is cutting your losses or it's managing the risk". Other participants expressed concerns about regulatory hurdles to renewable energy project approvals and the uncertainty it creates, particularly for small-scale developers seeking to invest in the province. Industry participants explained that developers are faced with delays[2] in renewable energy project approvals and a "patchwork regulatory system", whereby developers have to pursue multiple "unnecessary" permitting and approval processes engaging multiple authorities. Transparency concerns around SaskPower's administrative processes were also repeatedly raised, with an industry participant noting "it's not the easiest of business cases for developers to invest in renewables here in Saskatchewan" as the province is not transparent about the rates it is willing to pay to developers. In response, an interviewee from SaskPower commented that any delays are due to risk mitigation efforts to avoid rushing project approval decisions.

---

[2] We were not able to verify whether the approval timeline for renewable energy projects is longer in Saskatchewan versus other jurisdictions. For projects subject to regulatory environmental assessment, McMaster et al. (2021) report timelines that are consistent with other jurisdictions – although the sample size for Saskatchewan is small.

https://doi.org/10.1016/j.eiar.2021.106688

Most participants also identified inadequate capacity of existing institutional arrangements to support renewable energy transition – notably, limited expertise and experience to develop, operate, and maintain renewable energy systems. Industry participants spoke of a capacity gap in provincial "in-house experience" to make decisions about the future electricity generation landscape. This concern was echoed by others, with a FNPA member suggesting that the province doesn't have the experience to "understand the grid really quickly...there needs to be a quicker way to move those projects through the process." The participant explained that it currently takes "anywhere from eighteen months to two years to do an introspection study…it's a construction project that takes all of three weeks". Closely related were concerns that the province's grid connectivity falls short of what is needed to meet future demand for utility-scale renewable power, noting that SaskPower needs to re-evaluate its long-term transmission plans against proposed generation expansion options. An industry participant noted misalignment between the province's longer-term goals for the diffusion of renewable energy and the reality of its infrastructure, suggesting that "the biggest barrier would be transmission infrastructure …and getting power from the renewable source to the load". Only a minority of participants, largely from government, suggested that existing capacity and skill sets were adequate to foster renewable energy transition.

4.2.2 Gaps in existing regulations and policies

Participants acknowledged existing policies to support renewable energy; however, they noted gaps in those policies that stifle transition. A particular concern was the long-term economic viability of the Crown utility's net metering program. When first established, net metering provided customers an opportunity to generate up to 100 kW of power to offset their own power use and receive full-rate credits ($0.14 per kWh) for excess power generated and sent to the grid. An industry participant suggested that the rate structure "is economically unsustainable …given the associated costs required to maintain the grid and power lines". Recent revisions to the program allow credits for excess power at $0.075 per kWh (SaskPower, 2019).

Other participants questioned the support for smaller-scale developers to invest in renewable energy projects, owing to SaskPower's procurement policies. An ENGO participant explained that request-for-proposals for wind energy projects target larger-scale developers or projects up to 200 MW capacity, with limited opportunities for smaller-scale projects. Similar constraints were noted about the province's power generation partner program – a program to support the development of small-scale renewable and carbon-neutral energy projects and allow the sale of the electricity produced to SaskPower. The program's generation capacity cap (up to 1 MW per project, and a total of 10 MW each year), and restrictions that allow only SaskPower to transmit electricity, were identified as economic barriers to independent power producers. Coupled with restricted access to transmission lines under the province's open access transmission tariff, participants indicated substantial barriers to otherwise viable renewable energy projects – especially for Indigenous communities wanting to access utility-scale renewable energy.

Related was the expressed need to re-assess SaskPower's role as the sole regulator of the electricity market. SaskPower holds exclusive franchise for the transmission and distribution of electricity in Saskatchewan and operates as a publicly owned monopoly. Participants suggested the need for a mixed ownership model to increase competitiveness and open the electricity market to new actors, especially to communities and international actors seeking to invest in Saskatchewan. A participant from academia explained that "SaskPower could play more of a facilitator role rather than a sole regulator of electricity development". A participant from the FNPA suggested that such a change would allow communities to adopt a leadership role in energy transition, explaining that "true energy transition is going to be distributed…and people powered; it's going to be communities that are driving the change".

4.2.3 Political context and influence

Participants identified increasing political acceptance of the renewable energy discourse yet cautioned that government may not be fully committed to a low-carbon future, given its commitment to "remove red tape and barriers to economic growth and investment" in its oil and gas sector (Government of Saskatchewan 2020). An ENGO participant identified the dualism of "economy versus the environment" in Saskatchewan, and efforts to maintain economic security through fossil-fuel growth despite the province's climate change strategy, *Prairie Resilience*, launched in 2017. Several participants, however, suggested that the provincial political environment may have limited influence on the long-term renewable energy trajectory. A government participant noted that SaskPower is under contractual obligation to meet the terms of the Canada-Saskatchewan equivalency agreement regarding GHG emissions from electricity producers, and "renewable energy development must be part of that transition". Most all participants identified the need for clearer political direction on a transition strategy, and whether the ultimate goal is a zero-emissions energy future.

4.2.4 Actor and stakeholder collaboration

Improved collaboration between actors was identified by all participants to expedite energy transition. Two avenues of collaboration were identified – within the province, and external to the province. Within the province, participants identified the need for partnerships between the provincial government and First Nations and municipalities. Recent memoranda of understanding between the FNPA, Saskatchewan Association of Rural Municipalities, and the University of Saskatchewan were identified as initial steps toward exploring opportunities to enhance First Nation and municipal participation in renewable energy projects. But participants noted the need for formal partnerships between SaskPower, First Nations, and municipalities to support renewable energy generation, local ownership, and distribution as critical to meeting energy transition targets.

External to the province, participates identified an immediate opportunity for inter-provincial energy partnerships – specifically with the neighboring province of Manitoba. Participants identified an opportunity for SaskPower to increase hydroelectricity capacity, sourced from Manitoba's rich hydro resource base. SaskPower already purchases low-cost hydroelectricity from Manitoba Hydro, also a Crown corporation; building new inter-provincial transmission lines was this seen as an immediate opportunity for Saskatchewan to increase its renewables-sourced capacity. Participants recognized the risk of "political backlash" for relying on externally sourced hydroelectricity to support Saskatchewan's energy transition but suggested that it could open new possibilities for energy security with additional hydroelectricity capacity from Manitoba serving as a backup to address the perceived risks of intermittency from wind and solar.

4.3 Opportunities and risks

Several opportunities and risks associated with provincial energy transition were identified (Table 3). Meeting climate change commitments and curbing GHG emissions were obvious opportunities, but participants emphasized the socio-economic benefits of a clean energy economy – including employment, increased investment, and alleviating energy poverty via distributed generation. Industry participants commented that a growing renewables sector is a key opportunity to reduce vulnerability to power outages for communities connected to the northern grid. Several participants also identified distributed generation as key to job creation in remote communities, even suggesting the potential to offset any anticipated job losses attributed to reduced investment in the fossil fuel industry. That said, the longer-term sustainability of jobs created by a renewables industry was questioned. A participant from academia emphasized the need for longer-term assessment of "whether there would be enough production and demand to create and sustain a viable market for renewable energy technologies – for example, in the form of local manufacturing of wind and solar technology components". Others noted the distribution of opportunities and losses, specifically for those communities whose employment base largely depends on the fossil fuel-based energy sector and for remote, northern communities. An Indigenous participant emphasized the uncertainty of future electricity prices in remote communities under a renewables-based system.

Several transition risks were also identified, including industry and government concerns about the reliability risks of renewable electricity generation. As explained by a SaskPower participant, "assessing the reliability of renewables is a key aspect of the transition that has significant policy, social, and economic implications", emphasizing that "the operability and long-term viability of renewable energy systems and the capacity to sustain a strong electrical grid remains a challenge". Industry participants reiterated that SaskPower "needs to clearly understand how adding more intermittent generation from wind and solar will impact on the reliability of the grid, how much capacity is required from other energy sources [i.e. natural gas] to augment the baseload during peak periods, and what advancements have been made with battery storage technology". Participants thus emphasized the need to weigh the immediate and longer-term consequences of change to the current electrical grid system, including current discussions about the role of small modular reactors and the risks such conversations pose to more immediate investment in renewables and renewables-based policy.

Table 3: Key opportunities and risks of renewable energy transitions in Saskatchewan as identified by study participants.

Opportunities	Risks
▪ Creation of green jobs	▪ Long-term sustainability of renewable energy jobs
▪ Growth in the renewable energy industry with increased opportunities for new investors	▪ Environmental costs and reliability risks associated with electricity generation from renewables
▪ Opportunity to address energy poverty issues in the North	▪ Immediate and longer-term risks of transitioning away from a fossil-based economy
▪ Promote localized distributed generation	▪ Uncertainty around future energy costs particularly for remote Indigenous communities
▪ Significant opportunity to address climate change commitments and transition to a clean energy economy	▪ Policy priorities and direction may change with the political values of the ruling party

4.4 Progress indicators for on-going transition management

There was agreement on the importance of indicators to monitor energy transition. Most all participants identified 'emissions intensity' and 'employment levels', specifically the number of jobs created by the renewables industry, as important progress indicators. Often linked to employment was tracking 'provincial GDP contributions' attributed to the renewables sector, and 'education and training opportunities' as an indicator of new skills sets created by the sector. However, participants also identified a suite of other indicators, often aligned with different transition goals. For example, industry participants identified 'available renewable energy capacity' within the electricity mix. An academic participant suggested 'actual energy production from renewables' was a more suitable metric than capacity, since "without clearly identifying how energy is actually being produced from renewable sources versus fossil-based sources, especially when we take into account periods of intermittency, there may still be no net GHG emissions reduction". An FNPA participant emphasized the importance to track community reliance on diesel and other sources versus renewables for electricity. Another participant suggested the need to monitor progress regarding ownership, specifically the number of renewable energy projects owned by local communities, explaining: "it is one thing to have a community located next to a project, but another if they get to participate in that project, influence that project at all…so, that's a big piece of impact". Lastly, a participant from academia suggested the need to track 'land use' as an indicator of progress, specifically land area impacted by wind and solar versus that by coal mining and natural gas.

4.5 Exogenous landscape influences

Changes in the market price of fossil fuels was identified as a major factor that may influence the pace of energy transition. An industry participant explained that should natural gas prices continue to decline it may influence decisions to continue or even increase reliance on natural gas for electricity generation. At the same time, participants noted that the impact of the federal carbon tax may offset the attractiveness lower natural gas prices and natural gas-based generation. Renewable energy technological innovation was also identified as an exogenous influence, especially improvements to battery storage, making renewables a more attractive and viable option for communities. An ENGO participated noted that innovation, coupled with international trade agreements and tariffs promoting renewable energy technologies will likely influence growth in the renewable energy sector.

As previously noted, participants indicated that the federal government's climate change policies are already having a significant impact on advancing renewables transition. Some participants cautioned, however, that a change in political leadership at the federal level may result in a reversal of these policies. An industry participant emphasized the importance of national policies like carbon pricing in funding new renewable energy projects, noting that it could be a "huge influence on the developers of renewable energy projects…because it allows for those projects to access some funding or some loans that otherwise wouldn't be available if it wasn't for something like the carbon tax".

5. Discussion

Despite scholarly arguments that energy transitions need to be addressed at the strategic levels of decision making (Lyhne, 2012; White and Noble, 2012; Mulvihill et al., 2013; Larmorgese et al., 2015; Fischer et al., 2020), jurisdictions have been slow, and in some cases reluctant, to do so – continuing to rely on processes that assess and then reinforce pre-determined policies and plans (Atlin and Gibson, 2017). Many scholars have argued that SEA needs to focus on the institutional and governance complexities of strategic decision processes in the energy sector, thereby facilitating transitions in institutions, sectors, and policies toward more sustainable energy futures (Doelle 2009; Partidario, 2020; Gibson et al., 2016; Jiliberto, 2007; Noble and Nwanekezie, 2017). Supporting meaningful, long-term energy transitions requires a shift away from solely assessing specific policy and project impacts towards identifying and enabling pathways and solutions for desirable change (Hölscher et al., 2018). This may be achieved, in part, through improved tiering from policies to infrastructure planning and development, but it may also require more fundamental and structural changes in electricity policy, regulatory, and infrastructure environments (Marshall and Fischer, 2006)

There is no 'one-size-fits-all' blueprint for addressing energy transition problems. In this study, we approached SEA as a transitions-based instrument for scoping the strategic issues that are often overlooked under the traditional policy and project impact assessment approach to SEA (see Nwanakezie et al., 2021; Partidário, 2021). Results show significant opportunities to foster renewable energy transitions in Saskatchewan, and equally highlight key capacity needs and obstacles to achieve desired transitions. Importantly, our analysis identified several policy and practice implications relevant to the Saskatchewan case, and more broadly for advancing SEA as a framework for energy transition-based assessment. Although the Saskatchewan context may not necessarily reflect the transition concerns facing every jurisdiction, the lessons highlighted are relevant for addressing low-carbon energy transitions issues in general.

First, transitions-based SEA emphasizes the importance of a guiding vision for energy transitions – especially political direction on transition goals and implementation strategies. Without strategic commitment to a transition agenda, a renewables vision, goals, and targets may gradually be abandoned (Gillingham et al., 2016). As observed in the case study, while Saskatchewan has indicated strong interest in a renewable energy vision, the absence of well-defined targets and implementation strategies may slow or halt transition progress to a renewables-based future. Strategic direction on how to achieve the province's 50% renewable electricity goal by 2030 remains under-developed, suggesting lack of clear commitment to the transition process (Hulbert and Eisler, 2020). Knowledge gaps, particularly around renewable energy technologies and large-scale deployment, may explain in part the reluctance to fully commit to energy transition (Dolter, 2015). Previous studies have identified knowledge gaps as a precursor for other political and policy barriers impacting renewable energy transitions (IRENA et al., 2018), including in the Saskatchewan context (Richards et al., 2012). As observed in our study, there are still certain aspects of renewables transition that are yet to be fully scoped - including how traditional utility-scale centralized power generation compares to smaller-scale decentralized generation based on grid resiliency and economies of scale. However, incomplete knowledge about technology or renewable energy investments in general is not a sufficient barrier to commitment to energy transition processes. Transition should be approached as an on-going process, allowing for continuous needs assessment, feedback, learning, and adjustment (Nwanekezie et al., 2021).

Second, competing energy priorities can pose a barrier to clearly defining a strategic transition vision (Hurlbert et al. 2020). As highlighted in the Saskatchewan case, the province has a competing interest in a nuclear energy technology, specifically small-scale modular reactors, given Saskatchewan's large reserves of high-grade uranium ore (Hulbert and Eisler, 2020). The interest in a nuclear future may have significant implications for renewables deployment – there is risk that a focus on a new energy technology, which may or may not prove viable, can distract from more immediate opportunities to invest in the energy sector, revise existing policies and institutions, and transition via renewables options. Across many jurisdictions, renewables continue to face competition from other electricity supply alternatives (IRENA, et al., 2018). As such, there is a need for clearer strategic direction on how to achieve the desired energy transition, and to ensure that the current renewables vision is actualized amid other competing energy technology and policy interests.

Third, successful energy transitions require changes or adjustments to existing policies, rules, and regulations (Harris et. al., 2015; Martens, 2015). Any consideration to transition from centralized toward decentralized generation for renewables deployment will require enabling regulatory frameworks, particularly those that establish and support the right to generate and sell electricity (IRENA et al., 2018). In the Saskatchewan case, participants identified the need to amend current legislation supporting the role of the province's energy corporation - SaskPower - as sole regulator of the electricity market. While existing legislation has historically been instrumental in creating a stable electricity market, attention must now be given to whether the current monopolistic structure poses a barrier to entrepreneurs actively seeking to invest in the renewable electricity market. Arguably, government-owned energy utilities may have to assume a facilitator role rather than sole gatekeeper of the electricity market, allowing room for private sector investors, including community-owned renewable energy projects – especially Indigenous communities and business interests (e.g. IRENA et al., 2018). As Corneli and Kihm (2016, p.1) suggest, "continued improvements to distributed energy generation will likely erode or even end the dominant monopoly structure of electricity utilities". As such, "there is a need for new regulatory frameworks that can support distributed energy generation to preserve the continued social benefits of grid connectivity" (ibid). In practice, however, changing legislative frameworks within deeply entrenched institutional arrangements faces opposition from established political actors. While the proposition for mixed regulation could potentially be beneficial, concerns have been raised that de-regulation towards mixed ownership will create a greater number of competitors in the electricity market, ultimately resulting in higher electricity prices for consumers (Canadian Centre for Policy Alternatives, 2015).

Fourth, effective institutional arrangements make energy transitions possible (Slunge et al., 2009; World Bank, 2011). If the intent of SEA is to facilitate strategic-change and guide decision processes toward a low carbon future, then a focus on reforming institutional and governance structures to support long-term transitions is highly relevant. SEA is tightly coupled with institutional arrangements and governance contexts (Unalan and Cowell, 2019). Facilitating energy transitions thus requires effective tiering such that visions can transpire and influence policies, programs, and projects (IAEA, 2018). However, notwithstanding the importance and promise of tiering (Therivel and Gonzalez, 2021) the Saskatchewan case study illustrates how institutional arrangements and governance, coordination between the informal and formal decision processes, and the relationship between project-focused decision-making and broader policy-level processes guiding energy sector decision-making, can support or stifle renewable energy transitions. Sustainability transitions in general involve multiple interests, with competing political, social, and economic goals (Atlin and Gibson, 2017), and thus require open and transparent decision processes, clearly defined objectives, accountability in process, and opportunities for stakeholder involvement at all tiers of decision making (Mulvihill et al., 2013; Gillingham et. al., 2016; Atlin and Gibson, 2017). As shown in this study, however, and argued by McMaster et al. (2021), policy barriers and lack of SEA direction in policy development and tiered implementation introduces uncertainty and distrust in the energy transition process, especially for prospective developers and other stakeholders with vested interest in a renewable future.

6. Conclusion

The Saskatchewan case study demonstrates that renewable energy transition is more than developing renewable energy projects – it is largely a political and institutional struggle that challenges well-established norms and relationships. Efforts to shift away from fossil fuel-based, centralized generation toward a decarbonized and distributed energy system will not be realized without changes and adjustments to the dominant energy regime (Geels et al., 2017). Energy transitions thus require critical choices about desired energy pathways and an understanding of governance and institutional arrangements. This study demonstrated how a transitions-based approach to SEA can be adopted to critically assess the decision-making context influencing the development and implementation of strategic energy initiatives. Results strengthen emerging arguments in scholarship and practice concerning the value of SEA for enabling low-carbon energy transitions (Doelle, 2018; McMaster et al., 2021; Nwanekezie et al., 2021). By integrating sustainability transitions and strategic thinking in SEA for energy policy and planning, SEA is better positioned to explore and reshape institutional structures, enhance capacity, and facilitate the *right* decision context to ensure successful energy transitions (Hansen et al. 2013; Partidario, 2015; Monteiro et al., 2017).

Further work is needed to test the broader applicability of transitions-based SEA in other jurisdictions and energy contexts, and research must continue to push the boundaries of what SEA can achieve working within deeply entrenched institutional arrangements.

7. Funding details

This research was supported by the Social Sciences and Humanities Research Council of Canada, grant numbers 435-2018-0008 and 895-2019-1007.

8. Disclosure statement

The authors declare no conflict of interest.

9. Acknowledgements

We wish to acknowledge the Community Appropriate Sustainable Energy Security (CASES) partnership for supporting this work. As CASES researchers and scholars, we embrace the special relationship in Canada that we are all treaty people—we reside on, work with, or are members of Indigenous communities from Treaties 5, 6, and 11, and Metis and Inuit homelands.

10. References

Aklin M. 2021. The off-grid catch-22: Effective institutions as a prerequisite for the global deployment of distributed renewable power. *Energy Res Soc Sci* 72: https://doi.org/10.1016/j.erss.2020.101830

Atlin C, Gibson R. 2017. Lasting regional gains from non-renewable resource extraction: The role of sustainability-based cumulative effects assessment and regional planning for mining development in Canada. *Extr Ind Soc* 4:36–52. http://dx.doi.org/10.1016/j.exis.2017.01.005

Bahn O, Vaillancourt K. 2020. Implications of EMF 34 scenarios on renewable deployment and carbon abatement in Canada: Insights from a regionalized energy model. *Energy Policy*, 142:111518

Beck M, Robertson B. 2019. Canada's energy policy is so polarized that open dialogue about climate change is impossible. The public and other stakeholders need accessible energy data and information. *Policy Options*. https://policyoptions.irpp.org/magazines/july-2019/canadas-energy-data-problem/

Bonnell S. 2020. Project EA scoping in an SEA context: a case study of offshore oil and gas exploration in Newfoundland and Labrador, Canada. *Impact Assess Proj Apprais* 38(1):50-56.

Burke MJ, Stephens JC. 2018. Political power and renewable energy futures: A critical review. *Energy Res Soc Sci* 35(1):78-93. https://doi.org/10.1016/j.erss.2017.10.018

Canada Energy Regulator 2020. "*Provincial and Territorial Energy Profiles – Saskatchewan*". Retrieved from https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/sk-eng.html?=undefined&wbdisable=true (June)

Canadian Centre for Policy Alternatives 2015. *The Wrong Track: A Decade of Privatization in Saskatchewan, 2004-2015*. Saskatchewan Office –Canadian Centre for Policy Alternatives. https://www.policyalternatives.ca/sites/default/files/uploads/publications/Saskatchewan%20Office/2015/10/The_Wrong_Track_SK_Privatization.pdf

Cherp A, Jewell J, Goldthau A. 2011. Governing global energy: systems, transitions, complexity. *Glob Policy 2*(1):75–88. https://doi.org/10.1111/j.1758-5899.2010.00059.x

Cherp A, Vinichenko V, Jewell J, Suzuki M, Antal M. 2016. Comparing electricity transitions: A historical analysis of nuclear, wind and solar power in Germany and Japan. *Energy Policy* 101:612–628. https://doi.org/10.1016/j.enpol.2016.10.044

Corneli S, Kihm S. 2016. Will distributed energy end the utility natural monopoly? Electricity Policy-Electricity Daily. https://emp.lbl.gov/sites/all/files/Corneli_29June2016.pdf

Doelle M. 2009. Role of strategic environmental assessments in energy governance: a case study of tidal energy in Nova Scotia's Bay of Fundy. *J Energy Nat Res Law* 27(2):112–144.

Doelle M, Sinclair AJ. 2019. The new IAA in Canada: From revolutionary thoughts to reality. *Environ Impact Assess Rev 79*:106292. https://doi.org/10.1016/j.eiar.2019.106292

Dolter BD. 2015. *Greening the Saskatchewan grid*. [Doctoral dissertation, York University]. https://yorkspace.library.yorku.ca/xmlui/handle/10315/32183

Dvorak P. 2016. Legal trends in Canadian renewable energy. *Windpower Engineering & Development*. 1–9. https://www.windpowerengineering.com/legal-trends-in-canadian-renewable-energy/

Faith-Ell C, Fischer, TB. 2021. Strategic Environmental Assessment in Transport Planning. In Fischer T, González A (Eds) Handbook on Strategic Environmental Assessment. United Kingdom: Edward Elgar.

Feurtey É, Ilinca A, Sakout A, Saucier C. 2016. Institutional factors influencing strategic decision-making in energy policy; A case study of wind energy in France and Quebec (Canada). *Renew Sustain Energy Rev* 591455–1470. https://doi.org/10.1016/j.rser.2016.01.082

Fischer D, Lochner P, Annegarn H. 2020. Evaluating the effectiveness of strategic environmental assessment to facilitate renewable energy planning and improved decision-making: a South African case study. *Impact Assess Proj Apprais* 38(1):28–38.

Geels F. 2011. The multi-level perspective on sustainability transitions: responses to seven criticisms. *Environ Innov Soc Transit* 1(1):24–40.

Geels FW, Sovacool BK, Schwanen T, Sorrell S. 2017. Sociotechnical transitions for deep decarbonization. Science *357*(6357):1242–1244. https://doi.org/10.1126/science.aao3760

Geißler G. 2013. Strategic environmental assessments for renewable energy development - Comparing the United States and Germany. *J Environ Assess Policy Manage* 15(2) https://doi.org/10.1142/S1464333213400036

Geißler G, Dahmen M, Köppel J. 2021. Strategic environmental assessment in the energy sector. In Fischer T, González A (Eds) Handbook on Strategic Environmental Assessment. United Kingdom: Edward Elgar.

Gibson RB, Doelle M, Sinclair AJ. 2016. The next generation environmental assessment project. *J Environ Law Pract* 1–89.

Gibson RB, Péloffy K, Greenford DH, Doelle M, Matthews H.D, Holz C, … Grenier F. 2019. From Paris to Projects: Clarifying the implications of Canada's climate change mitigation commitments for the planning and assessment of projects and strategic undertakings. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=35119

Gielen D, Boshell F, Saygin D, Bazilian M, Wagner N, Gorini R. 2019. The role of renewable energy in the global energy transformation. *Energy Strategy Rev* 24: 38-50. https://doi.org/10.1016/j.esr.2019.01.006

Gillingham MP, Halseth GR, Johnson CJ, Parkes MW. 2016. The Integration Imperative: Cumulative Environmental, Community and Health Effects of Multiple Natural Resource Developments. Springer: New York.

Government of Canada. 2019. Canada-Saskatchewan equivalency agreement regarding greenhouse gas emissions from electricity producers. https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/agreements/equivalency/canada-saskatchewan-greenhouse-gas-electricity-producers.html

Government of Saskatchewan. 2020. *Saskatchewan's Growth Plan. The Next Decade of Growth: 2020-2030.* Regina SK: Government of Saskatchewan.

Government of Saskatchewan. 2017. *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*. Publication no: 104890. Regina SK: Government of Saskatchewan.

Hansen AM, Kornov L, Cashmore M, Richardson T. 2013. The significance of structural power in Strategic Environmental Assessment. *Environ Impact Assess Rev* 39(1):37–45.

Harris M, Beck M, Gerasimchuk I. 2015. *The End of Coal: Ontario's coal phase-out*. IISD REPORT. International Institute for Sustainable Development. (June)

Hölscher K, Frantzeskaki N, Loorbach D. 2018. Steering transformations under climate change: capacities for transformative climate governance and the case of Rotterdam, the Netherlands. *Reg Environ Change* 19:791-805.

Huang D, Pride D, Poelzer G, Holdmann G. 2019 Renewable energy prefeasibility assessment results: A summary of the viability of future development of various renewable energy sources in the communities of the Peter Ballantyne Cree Nation. The Alaska Center for Energy and Power, University of Alaska Fairbanks. https://renewableenergy.usask.ca/documents/PBCN%20SaskPower%20Prefeasibility%20Report%202016%20-%20FINAL.pdf

Hurlbert M, McNutt K, Rayner J. 2011. Pathways to power: Policy transitions and the reappearance of the nuclear power option in Saskatchewan. *Energy Policy* 39(6):3182-3190. https://doi.org/10.1016/j.enpol.2011.03.003

Hulbert M, Eisler D. 2020. Are Small Modular Nuclear Reactors in Saskatchewan's Future? Retrieved from https://www.schoolofpublicpolicy.sk.ca/research/publications/policy-brief/are-small-modular-nuclear-reactors-in-saskatchewans-future.php

Hulbert M, Osazuwa-Peters M, Rayner J, Reiner D, Baranovskiy P. (2020). Diverse community energy futures in Saskatchewan, Canada. *Clean Technol Environ Policy* 22:1157–1172. https://doi.org/10.1007/s10098-020-01859-2

IAEA 2018. Strategic environmental assessment for nuclear power programs: Guidelines. IAEA Nuclear Energy Series NG-T-3.17. Vienna, Austria: International Atomic Energy Agency.

Inglesi-Lotz R, Thopil G.A. 2019. The transition from fossils to renewables and its impact on consumer prices. *The Conversation*. https://theconversation.com/the-transition-from-fossils-to-renewables-and-its-impact-on-consumer-prices-125242

IRENA, IEA, REN21 2018. *Renewable Energy Policies in a Time of Transition*. IRENA, OECD/IEA and REN21. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_IEA_REN21_Policies_2018.pdf

Jehling M, Hitzeroth M, Brueckner M. 2019. Applying institutional theory to the analysis of energy transitions: From local agency to multi-scale configurations in Australia and Germany. *Energy Res Soc Sci* 53: https://doi.org/10.1016/j.erss.2019.01.018

Jiliberto R. 2007. Strategic environmental assessment: The need to transform the environmental assessment paradigm. *J Environ Assess Policy Manage* 9(2):211–234. https://doi.org/10.1142/S1464333207002731

Jiliberto R. 2011. Recognizing the institutional dimension of strategic environmental assessment. *Impact Assess Proj Apprais* 29(2):133–140. https://doi.org/10.3152/146155111X12959673795921

Kainiemi L, Karhunmaa K, Eloneva S. 2020. Renovation realities: Actors, institutional work and the struggle to transform Finish energy policy. *Energy Res Soc Sci* 70: https://doi.org/10.1016/j.erss.2020.101778

Kirchhoff D, McCarthy D, Crandall D, Whitelaw G. 2011. Strategic environmental assessment and regional infrastructure planning: the case of York Region, Ontario, Canada. *Impact Assess Proj Apprais* 29(1):11-26.

Laes E, Gorissen L, Nevens F. 2014. A comparison of energy transition governance in Germany, The Netherlands and the United Kingdom. Sustainability (Switzerland) 6(3):1129–1152. https://doi.org/10.3390/su6031129

Larmogese L, Geneletti D, Partidario MR. 2015. Reviewing strategic environmental assessment practice in the Oil and Gas sector. *J Environ Assess Policy Manage* 17(2):1550017-1 – 150017- 26. https://doi.org/10.1142/S1464333215500179

Lawhon M, Murphy JT. 2011. Socio-technical regimes and sustainability transitions: Insights from political ecology. *Prog Hum Geog* 36(3):354–378.

Loorbach DA. 2010. Transition management for sustainable development: A prescriptive, complexity-based governance framework. *Gov Int J Policy, Admin, Inst* 23(1):161–183. https://doi.org/10.1111/j.1468-0491.2009.01471.

Loorbach D, Rotmans J. 2010. The practice of transition management: Examples and lessons from four distinct cases. *Futures*. https://doi.org/10.1016/j.futures.2009.11.009

Lyhne I. 2012. How strategic dynamics complicate the framing of alternatives in strategic environmental assessment: the case of Danish natural gas planning. *Impact Assess Proj Apprais* 30(3):157-166.

Markard J, Suter M, Ingold K. 2016. Sociotechnical transitions and policy change – Advocacy coalitions in Swiss energy policy. *Environ Innov Soc Transit* 18:215–237. https://doi.org/10.1016/j.eist.2015.05.003

Marshall R, Fischer TB. 2006. Regional electricity transmission planning and tiered SEA in the UK –the case of ScottishPower. *J Environ Plan Manage* 49(2): 279-299.

Martens L. 2015. *Power shifts: The politics of sustainability transitions in electricity systems and the possibilities for First Nations participation*. [Doctoral dissertation, University of Saskatchewan]. https://harvest.usask.ca/handle/10388/ETD-2015-03-1979

McMaster R, Noble B, Poelzer G, Hanna K. 2021. Wind energy environmental assessment requirements and processes: an uneven landscape. *Impact Assess Proj Apprais* 39(1):11-23. https://doi.org/10.1080/14615517.2020.1815271

Mercer N, Sabau G, Klinke A. 2017. "Wind energy is not an issue for government": Barriers to wind energy development in Newfoundland and Labrador, Canada. *Energy Policy* 108:673–683. https://doi.org/10.1016/j.enpol.2017.06.022

Miller C, Richter J, O'Leary J. 2015. Designing tomorrow's socio-energy systems: expanding energy policy and governance for energy transitions. *Energy Res Soc Sci* 6:29-40.

Monteiro MB, Partidário M, Meuleman L. 2017. A comparative analysis on how different governance contexts may influence strategic environmental assessment. *Environ Impact Assess Rev* 72:79–87. https://doi.org/10.1016/j.eiar.2018.05.010

Mulvihill P, Winfield M, Etcheverry J. 2013. Strategic environmental assessment and advanced renewable energy in Ontario: Moving forward or blowing in the wind? *J Environ Assess Policy Manage* 15(2):1340006-1–1340006-19.

Noble BF, Nwanekezie K. 2017. Conceptualizing strategic environmental assessment: Principles, approaches and research directions. *Environ Impact Assess Rev* 62:65-173 https://doi.org/10.1016/j.eiar.2016.03.005

Noble B, Gibson R, White L, Blakley J, Nwanekezie K, Croal P. 2019. Effectiveness of strategic environmental assessment in Canada under directive-based and informal practice. *Impact Assess Proj Apprais* 37(3-4):344–355.

Nwanekezie K, Noble BF, Poelzer G. 2021. Transitions-based strategic environmental assessment. *Environ Impact Assess Rev*.91, doi.org/10.1016/j.eiar.2021.106643.

Olive A. 2019. In a province defined by a resource-based economy, a carbon tax feels perennially unfair and ineffective, even as emissions skyrocket. *Policy Options*. https://policyoptions.irpp.org/fr/magazines/july-2019/saskatchewans-long-history-of-rejecting-carbon-pricing/

Pang X, Mortberg U, Brown N. 2014. Energy models from a strategic environmental assessment perspective in an EU context—what is missing concerning renewables? *Renew Sust Energ Rev* 33:353–362.

. Strategic Environmental Assessment Better Practice Guide: Methodological Guidance for Strategic Thinking in SEA. Portuguese Environment Agency and Redas Energeticas Nacionais, Lisbon.

Partidario MR. 2015. A strategic advocacy role in SEA for sustainability. *J Environ Assess Policy Manage* 17(01):1550015. https://doi.org/10.1142/S1464333215500155

Partidario MR. 2020. Transforming the capacity of impact assessment to address persistent global problems. *Impact Assess Proj Apprais* 38(2):146–150. https://doi.org/10.1080/14615517.2020.1724005

Partidário MR. 2021. Strategic thinking for sustainability (ST4S) in strategic environmental assessment. In Fischer T, González A (Eds) Handbook on Strategic Environmental Assessment. United Kingdom: Edward Elgar

Phylip-Jones J, Fischer TB. 2015. Strategic environmental assessment for wind energy planning: Lessons from the Unites Kingdom and Germany. *Environ Impact Assess Rev* 50: 203-212. https://doi.org/10.1016/j.eiar.2014.09.013

Potvin C, Burch S, Layzell D, Meadowcroft J, Mousseau N, Dale A, Henriques I, Margolis L, Matthews D, Paquin D, Ramos H, Sharma D, Sheppard S, Slawinski N. (2017. Re-energizing Canada: Pathways to a Low Carbon Future. Sustainable Canada Dialogues. http://sustainablecanadadialogues.ca/pdf_2017/ReEnergizing_Final.pdf

Prebble P, Henry D, Hidlebaugh M, Wardell W. 2015. *Building an environmentally sustainable future for Saskatchewan: Saskatchewan's role in global climate change and the path to sustainability*. Canadian Centre for Policy Alternatives (CCPA). (March). https://www.policyalternatives.ca/publications/reports/building-environmentally-sustainable-future-saskatchewan

Prebble P, Asmuss M, Coxworth A, Halliday B. 2018. *Prairie Resilience Is Not Enough*. Saskatchewan Environmental Society. http://environmentalsociety.ca/wp-content/uploads/2018/12/Prairie-Resilience-Is-Not-Enough-Full-Report-Final.pdf

Richards G, Noble B, Belcher K. 2012. Barriers to renewable energy development: A case study of large-scale wind energy in Saskatchewan, Canada. *Energy Policy* 42:691–698. https://doi.org/10.1016/j.enpol.2011.12.049

Rosenbloom D, Haley B, Meadowcroft J. 2018. Critical choices and the politics of decarbonization pathways: Exploring branching points surrounding low-carbon transitions in Canadian electricity systems. *Energy Res Soc Sci* 37:22–36. https://doi.org/10.1016/j.erss.2017.09.022

Saskatchewan Chamber of Commerce. 2019. *The Renewable Energy Sector in Saskatchewan*. Issue in Focus. [February 2019]. https://saskchamber.com/isl/uploads/2019/04/State-of-Renewable-Energy-in-Saskatchewan.pdf

SaskPower. 2017. *The path to 2030: SaskPower updates progress on renewable electricity*. https://www.saskpower.com/about-us/media-information/news-releases/2018/03/the-path-to-2030-saskpower-updates-progress-on-renewable-electricity

SaskPower. 2019. *SaskPower set to launch revamped net metering program*. https://www.saskpower.com/about-us/media-information/news-releases/SaskPower-Set-to-Launch-Revamped-Net-Metering-Program

SaskPower. 2020. *How we've met the Province's Power needs until now.* https://www.saskpower.com/Our-Power-Future/Powering-2030/Help-Plan-Our-Power-Future/How-We-have-Met-the-Province-Power-Needs-Until-Now.

Slunge D, Nooteboom S, Ekbom A, Verheem R. 2009. Conceptual analysis and evaluation framework for institution-centered strategic environmental assessment. http://siteresources.worldbank.org/INTRANETENVIRONMENT/Resources/ 244351

Sovacool BK. 2009. Rejecting renewables: The socio-technical impediments to renewable electricity in the United States. *Energy Policy* 37(11):4500-4513.

Statistics Canada. 2020. *Figure 1.4: Saskatchewan – Census metropolitan areas (CMAs), census agglomerations (CAs) and regions outside CMAs and CAs*. https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/desc/Facts-desc.cfm?LANG=eng&GK=PR&GC=47&TOPIC=1&#fd1_4

Stoeglehner G. 2019. Strategicness – the core issue of environmental planning and assessment of the 21st century. *Impact Assess Proj Apprais* 38(2): 1-5.

Therivel R, Gonzalez A. 2021. "Ripe for decision": tiering in environmental assessment. *Environ Impact Assess Rev* 87: https://doi.org/10.1016/j.eiar.2020.106520

Unalan D, Cowell R. 2019. Strategy, context and strategic environmental assessment. *Environ Impact Assess Rev* 79: https://doi.org/10.1016/j.eiar.2019.106305

White L, Noble B. 2012. Strategic environmental assessment in the electricity sector: an application to electricity supply planning, Saskatchewan, Canada. *Impact Assess Proj Apprais* 30(4):284–295. https://doi.org/10.1080/14615517.2012.746836

World Bank. 2011. *Strategic environmental assessment in policy and sector reform: Conceptual model and operational guidance*. Washington: World Bank.