Place-based power production deliberations in Saskatchewan: engaging future sustainability

Margot A. Hurlbert

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Abstract

This article addresses a gap in knowledge of peoples’ strategies and recommendations concerning power production and achieving reductions in GHGs to address climate change. Employing mixed methods, two-day deliberative focus groups in three communities in Saskatchewan, Canada included pre and post-focus group surveys, coding and analysis of discussions, and the creation of consensus recommendations for sustainable power production in the future. These innovative mixed-methods provide insights into how to advance individual and social learning. Results of comparative case study analysis provide strong support for renewables and illustrate place-based differences. All communities supported renewable sources. The community in proximity to coal, oil, and gas production supported coal, and coal with carbon capture and storage (CCS) and was concerned with the social cost of job loss on the welfare system; engaging the public was not a priority. In contrast, the other two communities stressed the importance of engaging the public and considering all costs, risks, benefits across the entire lifespan of power production sources. To achieve future sustainability, policy implications include addressing important concerns of resource-dependent communities, namely job loss, and conducting holistic policy assessment of potential power production sources that account for carbon and cost across the entire supply chain and include land-use change.

Keywords Place-based energy systems · Clean energy technology · Renewable energy · Carbon capture sequestration · Small modular nuclear reactors

Introduction

There is a gap in current efforts and those needed to address climate change by stabilizing GHG emissions (IPCC 2019) and the window of opportunity when significant change can be made is rapidly narrowing (IPCC 2019: 557). Significant transformational change requires learning, involving people, and inspiring action to achieve measurable change in the personal sphere of ideas, values, and paradigms (Few et al. 2017; Scoones et al. 2020). Quite simply transformational change and learning involve social science research (Gillard et al. 2016). However, research exploring energy futures in the context of climate change and transformation often lacks engagement with social scientific perspectives (Stoddart et al. 2021). As developed countries increasingly advance goals of achieving net-zero carbon emissions in the future, including social science is increasingly important in understanding what socially acceptable pathways might be (Sovacool et al. 2015; Linzenich et al. 2020). However, people have diverse views of future pathways. Socio-ecological and community characteristics are important in clean energy transitions and responding to climate change (Sovacool et al. 2015; Linzenich et al. 2020). People’s sense of place and attachment to place has been shown to be an important factor in the success of renewable energy development (Devine-Wright 2011; Baxter et al. 2020). However, less is known about place attachment and ‘upstream’ or pre-project research surrounding potential for renewable energy, clean energy projects, and people’s perceptions of whole power production system portfolios (Devine-Wright and Wiersma 2020; Pidgeon et al. 2014). This research contributes to filling this gap in knowledge.

Saskatchewan is an interesting case study in the transition to net-zero carbon emissions and energy futures. In the context of climate change and sustainability, Saskatchewan’s
options are narrowing. The province has transitioned from over 70% of its power production supply being attributable to coal, to a mix of renewables, hydro, and natural gas (Hurlbert et al. 2020). The provincial utility is subject to increasing regulatory requirements to shut down coal without CCS by 2030 (CER 2020). But Saskatchewan is a large province with a small population (close to 1 million people). Saskatchewan is 588,239 square kilometers ranging from semi-arid dryland in the southeast to boreal forest in the mid-latitude, and permafrost and tundra in the north. While the north is home to the world’s second-largest uranium mining industry, the south of the province boasts vast supplies of easily accessible lignite coal (TCE 2020). The province and crown-owned utility, SaskPower, successfully achieved the first post-combustion power production plant with carbon capture and storage (CCS) in 2008 at a coal power plant in Estevan, Saskatchewan (one of the study communities).

The regulatory landscape is changing to account for commitments in the Paris Agreement. Natural gas regulations are incrementally being introduced by the federal government such that after 2024 no new natural gas power production will be built. Increased import of hydroelectricity from neighboring Manitoba with necessary transmission development has recently been contracted and more is possible with expansion of northern Manitoba dams. Saskatchewan, Ontario, New Brunswick, and Alberta have recently signed a memorandum of understanding to coordinate in exploration of small modular nuclear reactors (SMRs) and demonstration projects are advancing with potential availability in 2026 (Djuric 2019). With coal-fired generation facing shut down (without expensive CCS modifications and SMRs on the horizon), and natural gas following thereafter, the Province offers an interesting landscape for case studies on people’s perceptions of power production and clean energy futures, and insights into this ‘wicked’ or ‘messy’ problem (Urquiza et al. 2018) of power production in the face of climate change. Saskatchewan’s extremely cold temperatures, short daylight hours in winter, and large electricity grid with few customers belie a problem defying complete definition, with elusive solutions that generate further issues (Rittel and Webber 1973).

This research answers the questions: (1) How do peoples’ sense of, and attachment to place impact their preferences, learning, and facilitated group strategies for power production into the future? (2) Do two-day deliberative focus groups with expert presentations advance learning and social learning?

After reviewed literature on place-based energy geographies, and describing the research methodology, the paper outlines (based on the research results) what community power production looks like in the future. An assessment of learning and social learning is made from the results of the two-day citizen juries. This article summarizes the strategy for a sustainable power production future that each community developed. The elements common to each include sections on costs of power production sources, ideas surrounding environment, education, research, and public involvement. The similarities and differences in these strategies are compared and contrasted in order to analyze place-based differences.

**Place-based energy geographies and learning**

The question of how to mitigate and adapt to climate change cannot be answered by science alone, as organizing policy response is difficult without a shared understanding of the messy problem of climate change (Shaw and Corner 2017). Society plays an active role in accelerating or preventing new decarbonized energy technologies (Pellizzone et al. 2017; Shaw and Corner 2017) and social science provides insights into the hopes, concerns, expectations, and resistance underscoring this role (Pellizzone et al. 2017). People’s narratives expressed in energy discussions can provide accurate understandings of their cultures, lifestyles, and decisions in relation to decarbonized energy technologies (Pellizzone et al. 2017; Allansdottir et al. 2019; Moezzi et al. 2017; Sovacool et al. 2015). People’s perceptions of risk and benefits are important in relation to acceptance of new clean energy technologies and energy infrastructure (Osazuwa-Peters et al. 2020; Linzenich et al. 2020).

One important development in the literature surrounding new renewable energy technology is the importance of people’s sense of place attachment and the development of place theory (Devine-Wright 2011). Place theory explores peoples’ place-based symbolic meanings in relation to renewable power production technology and place attachments, including bonds people have with their ‘place’ and with each other and constructed sense of identity of place (Devine-Wright 2005, 2011). This literature and much of the literature pertaining to people’s perceptions about energy futures is only concerned with renewable energy including wind and solar; much relates to exploring why a particular wind project failed to proceed in a particular community (Devine-Wright 2011; Bell et al. 2013; Batel and Devine-Wright 2015). There is less ‘upstream’ research surrounding the potential for renewable energy projects before (not after)

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1 Many climate mitigation scenarios to maintain global warming well below 2 degrees Celsius rely on combinations of CCS (IEA 2018; Koelbl et al. 2014), renewables, and nuclear (Tavoni et al. 2012); nuclear is argued to be essential to achieving net zero carbon in a cost-effective manner (MIT 2018).

2 Regulations Limiting Carbon Dioxide Emissions from Natural Gas-fired Generation of Electricity (SOR/2018–261).

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they are proposed (Devine-Wright and Wiersma 2020) and less knowledge surrounding peoples’ perceptions of a whole system portfolio, or future energy scenarios addressing climate change (Pidgeon et al. 2014). One study considered the entire power production system, but only through three-hour focused discussions (Hurlbert et al. 2020).

Increasingly, addressing the gap in renewable energy implementation involves people in decision making whereby mechanisms of reflection, anticipation, inclusive deliberation in and around processes of research and innovation are employed (Owen et al. 2012). Decision-making processes surrounding new renewable energy technologies require sustained and diffuse efforts from all stakeholders and need to overcome a series of technical, economic, cultural, and political barriers posed by mainly fossil fuel locked in energy systems (Pellizone et al. 2017; Lehman et al. 2012). New thinking about problem definitions and new forms of knowledge are being created through public participation. Participation has emerged both theoretically (Chilvers et al. 2018) and methodologically through practices of reflexivity and two-way information flows (Urcan and Dryzek 2015; Urquiza et al. 2018). Dialogues of interested parties can facilitate experimentation, learning, and change (Dietz et al. 2003), where people become co-creators of innovation (Pellizzone et al. 2019).

Although there is a lack of consensus defining learning, literature identifies it both at 1. an individual level, involving cognitive change and often a social-relational process (Armitage et al. 2017); and 2. at a meso, group, or organization level (Baird et al. 2014). When learning occurs as a social-relational process, it is termed social learning (Cundill and Rodela 2012). This social-relational process occurs when issues are framed, alternatives analyzed, and choices debated in an inclusive, deliberative process (Keen et al. 2005).

Reflexivity is a mechanism advancing social learning; it is “the ability of a structure, process, or set of ideas to reconfigure itself in response to reflection on its performance” (Dryzek and Pickering 2017: 353). Cognitively, reflexivity occurs through deliberation, or a dialogue amongst people aimed at producing reasonable and well-informed opinions through discussion, exploration of new information, and claims made by fellow participants. Participants must be willing to revise their preferences in light of discussion (Chambers 2003).

Literature surrounding public participation in energy decisions often focuses on programs and policies of government (Chilvers et al. 2018; Chilvers and Longhurst 2016; Hurlbert 2014). There is rich literature on public and deliberative engagement in relation to energy, the characteristics, and procedures of this engagement (Dryzek and Pickering 2017), descriptions of formats wherein people are engaged as subjects, objects, or in performance of participatory collectives (Chilvers and Longhurst 2016), and synthesis of literature categorizing these models into ‘ecologies of participation’ (Chilvers et al. 2018). Much of this literature is theoretical (Dryzek and Pickering 2017) or assesses government engagement activities (Chilvers et al. 2018). There is a gap in literature on how to advance social learning for transformational change and reduction of GHGs in power production (Stoddart et al. 2021).

Methods

In order to answer how peoples’ sense of, and attachment to place impact their preferences, learning, and strategies for power production into the future, a comparative qualitative case study was conducted with three communities in Saskatchewan. Comparative case studies can provide evidence of social context and complex social processes, as well as preferences and interests that shape energy systems and their transitions (Sovacool 2014; Geels 2010). The advantage of comparative case studies over other methods (such as a provincial survey of attitudes or individual interviews) is the opportunity to explore deeply the context of each case study and use multiple methods to gather data (Kaarbo and Beasley 1999). An innovative mixed-method (of qualitative and quantitative data collection) was employed to determine if two-day deliberative focus groups with expert presentations advance learning and social learning. A quantitative survey was used in order to quantify changes in opinions surrounding power production sources and their preference pre and post focus groups. This mixed-method allowed for data source triangulation (Carter et al. 2014) in respect of changing opinions surrounding power production sources. The steps in the research study are illustrated in a flow chart in Fig. 1.

Two-day intensive focus groups were held in the cities of Estevan, Regina, and Saskatoon in late 2017. Estevan is located centrally to coal, oil, and gas development in the very south of the province (Estevan 2020); Regina is the government capital located between Estevan and Saskatoon (Regina 2020); Saskatoon is the furthest north bordering the boreal forest (Saskatoon 2020). Participants were selected randomly through telephone calling using published phone numbers, to be reflective of gender, employment status, age, and income (as reflected in the Statistics Canada (2017) database. Focus groups were facilitated by an expert facilitator and occurred on two full-day sessions one week apart. All sessions were recorded and the transcripts coded using Nvivo software in respect of individual power production sources, learning, and recommendations for future power production strategies.

The purpose of the focus groups was to collect opinions on clean energy options in Saskatchewan, first by obtaining participant perspectives through survey, then providing some
background knowledge through presentations by two power production utility experts from SaskPower (first day), and then an independent power producer expert (IPP) (second day). Each community received the same presentations and followed the same procedure whereby the expert left the room after the presentation, giving participants an opportunity to formulate questions. This method was employed to advance reflexivity. It is recognized that reflexive processes cannot be wholly dominated by citizens, nor dominated by experts in order to open up, rather than close down conversation surrounding science (Blue and Medlock 2014).

After discussion of the presentation with the expert outside of the room, the expert then returned and answered questions formulated by participants and posed by the facilitator. In the middle of the first day, and at the end of day two, the participants identified the most important factors for a good Saskatchewan power production strategy. At the very end of day two, the groups agreed on recommendations for future Saskatchewan power production sources. In closing, participants completed the same survey surrounding perceptions of power production sources they had initially completed.

Dialogues amongst participants were facilitated and the underlying premise was dialogue cannot be one hundred percent consensual, but must contain contested elements for re-evaluation and reflection (Dryzek and Pickering 2017). In order to arrive at a final group strategy and recommendations, all participants were allowed five votes and were able to vote on the most important aspects of the strategy. The elements recounted in this article are the top priorities based on votes received.

Results

What community power production looks like

The case study communities were consistent in their support for renewable energy. Ranked from highest preferred source to lowest were: solar energy, wind energy, hydroelectric energy, coal, natural gas, and nuclear. Figure 2 depicts the support, or lack of support for power production sources at the beginning of day one, and then again at the end of day two.3

Solar and wind energy received the greatest support in all three focus group communities. Interestingly, while solar was ranked highest followed by wind on day one, by the end of day two, wind was ranked higher than solar (albeit in Saskatoon wind and solar remained even). This result may be partly due to discussions surrounding the necessary land required to support large solar power installations which would compete with Saskatchewan’s agricultural use of land. van de Ven et al. (2021) concluded such land-use effects, depending on the region, might cause a net release of carbon. In addition, the expert identified challenges during the Saskatchewan winter when temperatures of minus 40 degrees Celsius increase power demands, but the sun isn’t shining. Further renewable challenges include the lack of storage capacity for renewable power production (including battery), and the nature of the Saskatchewan electric grid joining sparse customers over very far distances (and resultant energy losses). Participants did express support for wind because of Saskatchewan’s strong wind resource.

3 See supplementary materials for detailed statistical analysis.
Post-citizen jury participants expressed a lower degree of support for hydroelectric energy. The expert pointed out that further expansion of Saskatchewan’s hydro resources is limited. This could explain the decrease in support for hydro from day one to day two. However, there are several other reasons apparent in the transcripts of the citizen juries: 1. the potential new sources of hydroelectricity in Saskatchewan are very limited and would have to be imported from Manitoba, the neighboring province over a long distance; and 2. there was some discussion surrounding the impacts on traditional livelihoods of Indigenous people, and the flora and fauna, as a result of construction and operating hydroelectric dams.

Coal power production support was based on place and location of the community. Estevan, clearly supported coal, even at the end of day two. In fact, there was a shifting in favor of coal on day two in Estevan even after discussions around climate change and the federal government phasing out coal power plants. Estevan’s support for coal is much stronger as compared to Regina and Saskatoon. This is partly due to the fact in deliberations, participants in Estevan focused on their coal, oil, and gas economy (Estevan 2020). An Estevan participant stated:

This is in Estevan, this is a bit of a hot spot here, you come in here and stand up and say you are going to stop coal and, you know, everybody here has got something affiliated to coal. You’ve got to be a little bit brave, you know.
One Estevan participant stated, “I live in Estevan so I want to keep the power plant going: the people who work there hire me to repair their houses.”

Nuclear energy was discussed in relation to SMRs and the fact they were still in development. One exchange between the expert presenter and participant is of note:

Participant: Where do the small modular reactors exist right now?
Expert witness: They do not exist. They are in the design phase.
Participant: They do not exist? [Expert: They do not exist]. So why are we even talking about it?

In a previous term, the government determined that large nuclear plants were not appropriate for the Saskatchewan grid. This decision related both to the fact power production is dispersed over a great distance and power production sources no larger than 300 MW exist on the grid (Hurlbert 2014). In Estevan conversation surrounding nuclear centered on the perceived reduced number of jobs associated with nuclear, as a risk. One participant stated:

You know, what it is. Employment, you know; we put increase or decrease, you know, if it’s truly efficient you are going to lose jobs, right. It doesn’t take a lot of people to run a nuclear plant once its built. You know, that is bad, or is it going to bring in more people, is it cost efficient?

**Learning and social learning**

The facilitated process of the focus groups advanced the social-relational process necessary in social learning (Armitage et al. 2017) which was inclusive, deliberative, and reflexive with ideas revised based on reflection (Keen et al. 2005; Dryzek and Pickering 2017). This social-relational process was orchestrated by the facilitator as well as the consistent expert presentations made in each community. The experts framed issues in relation to future power production options in the Saskatchewan context given climate change and increasing mitigation concerns. However, the alternatives, their analysis, and ultimate choices (Keen et al. 2005) were determined by focus group participants. As depicted on Figure 2, the pre and post-survey results did evidence cognitive change of participants as support changed in relation to solar, wind, and hydro based on expert presentations.

In relation to coal, significant differences occurred between Regina and Saskatoon, where coal continued to be opposed both pre and post focus groups and Estevan. In Estevan support for coal marginally increased between pre and post focus groups. Disregarding the expert presentations on climate change, the focus in Estevan was on jobs (see quotation above) and also the discussion and support in Estevan for CCS. As the site of the world’s first post-combustion power production CCS plant, participants embraced the continuation of coal given the potential for its ‘cleaner’ production and the significance for their local economy. This finding illustrates the importance of location to reflexivity and focus group outcome and co-creation of innovation (Pelizzzone et al. 2017). The people of Estevan’s attachment to their coal, oil, and gas economy was apparent in respect of their acceptance of coal and CCS (Devine-Wright 2011).

**Strategy for a sustainable power production future**

A significant amount of time during the focus groups was dedicated to facilitated discussion surrounding a strategy for a sustainable power production future in Saskatchewan. On day one after the first expert presentation, and again on day two after the second and third expert presentations, participants worked in groups to determine the most important factors for a good Saskatchewan power production strategy. Each group presented their factors on worksheets and thereafter the entire group was given five votes to allocate to the most important factors. Factors that received the majority of votes appear in Table 1 organized by theme.

While costs, decision-making, environment, and education themes were discussed both days, (Table 1) and appear in the recommendations (Table 2), public participation in decision-making shows up only in recommendations made on day 2. Differences exist within these themes based on the local of the focus group. Most significantly, Estevan has a different perspective on costs, environment issues, and public participation in decision-making.

**Decision making**

All focus groups discussed decision-making. Saskatoon stressed transparency and participation (especially IPPs), Regina identified the importance of research and universities and removing ‘politics’, while Estevan focused on allowing the experts to choose.

In Saskatoon participants engaged with setting transparent goals and criteria to help energy policy and direct decision making. These criteria should be developed based on research, environmental safety, diversification, sustainability, cost/benefit analysis of the present and future. Criteria included social impacts on people in proximity and creation of jobs. “We have to have the public involved in setting the policies...keep the people educated and involved.” Saskatoon participants indicated, “We have to have more independent power producers.... More incentives for IPPs... more emphasis on local power production.” In summation one participant rapporteur stated:
Table 1  Most important factors for good power production policy

| Estevan                                      | Regina                                                                 | Saskatoon                                                                 |
|----------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------|
| **Most important factors for a good power production policy – after presentation 1 – Day 1** |                                                                        |                                                                          |
| Cost                                         | Cost effectiveness; product efficiency                                 | Public ownership of crown corporation to control cost; More information on all energy options and lifecycle costs (and reliability, pollution costs) |
|                                              | Providing employment                                                   |                                                                         |
|                                              | Benefits to the population                                             |                                                                         |
|                                              | Different sustainable power options                                    |                                                                         |
| Decision-making                              | If the decision makes sense economically and without political interference (even if not politically correct) | Transparent and honest decision making                                    |
|                                              |                                                                          | Develop decision-making criteria based on research, environmental safety, diversification, sustainability Develop public education for informed population to make informed decisions |
| Environment                                  |                                                                          |                                                                          |
| **Most important factors for a good power production policy – after presentation 2 and 3 – Day 2** |                                                                        |                                                                          |
| Cost                                         | Cost efficiency to the customer                                       | Need to take into account all costs across the life span and future generations |
|                                              | If there are no jobs there is no economy                              |                                                                         |
| Environment                                  | Environmental issues are very expensive which results in absolute higher taxes; see the bigger picture | Preserve clean air, water, and take into account effects on human health; consider impact on wildlife and habitat |
| Education                                    | Invest in proven technology (don’t reinvent the wheel)                | Knowledge is key and knowing the facts                                    |
| Decision-making                              |                                                                          | Transparent decision-making                                               |
### Table 2: Recommendations for future Saskatchewan power production sources

| Final Recommendations—end of day 2 | Estevan | Regina | Saskatoon |
|-----------------------------------|---------|--------|-----------|
| Costs (All) & Environment (Regina and Saskatoon) | Shouldn’t choose a cheaper option if reduces jobs and impacts economy | Consider all costs (environment, affordability, impact on indigenous people, wildlife, global and health) | Present public with cost benefit analysis (all costs cradle to grave) |
|  | Job loss will increase public service costs in welfare, healthcare, social programs which required working people paying taxes | Provide incentives to reduce carbon |
|  | Operating costs need to be reasonable to avoid increasing cost to consumer | Cost should not take priority over the environment |
|  | Entice corporations to Saskatchewan to replace job loss and support the economy |  |
| Decision-making | Decisions should be based on technology not politics | Leave it to the experts not politicians; unbiased university and researchers | Transparent decision making based on local criteria and impact |
|  | All technology must continue to be progressive and forward thinking | Consider all risks, benefits and how decisions impact society and future | Make environment assessments accessible to the public |
|  | Any new energy resource should be sustainable | No privatization of power production | Clear definition on policy and criteria available to the public |
| Public involvement and education | Keep public informed | Consult the public more and allow participation in decision making | Two way accessible public feedback/outreach program for energy consumption |
|  | More research into pros and cons of pollution | Educate on energy options in school | Research alternatives to the status quo and commit to continuous improvement based on evidence |
|  |  | Get a trusted source to educate the public (not the government) | Phase out fossil fuels and invest in renewable resources and production |
| Specific policy recommendations |  | Wind power should be 30% by 2030 | More incentives and resources for IPP |
|  |  | More emphasis on local production |  |
Saskatchewan needs a clear definition of policy criteria available and understood by the public. Decisions should be made based on the different locales. Saskatchewan should be different from Estevan. Transparency in public energy policies, leadership in public decision making.

One Saskatoon participant concluded, “People generally have a lot of misconceptions of the different types of energy, how they work, their infrastructure, and the cost.”

Transparency and honesty in decision-making were also a theme in Regina. Regina participants also noted that politics should be removed from decision making and recommended education and accountability in decision-making:

So, remove politics from the decision so that in turn the decisions that are made are truly in the best interest of us, the people that are paying the bill. Educating the public to make sure that what you are doing, we all understand to some degree, not that we need to know it from start to finish 100%, but so we understand it. Make sure that whatever they choose is sustainable.

Another added, “We think university researchers, the expert, we invest in our universities, we’ve got all these great grad programs and researchers, and the power companies with their internal experts should be creating the policies. It shouldn’t be the government.” On day one it was concluded that a team of energy companies, scientists, research community, and the public should make decisions. One specific solution was better inter-provincial cooperation. For instance, a participant suggested that a cooperation be created with Manitoba in order to create storage options.

In Estevan, the discussion and concluding points in respect of decision making centered on technical solutions. It isn’t surprising Estevan’s sentiments were to support technology, “even if not politically correct.” Given Estevan’s comments surrounding jobs and their oil, gas, and coal economy, it isn’t surprising that participants felt any new energy resource should be sustainable (albeit their focus on sustainability was in relation to jobs and economy).

Costs of power production

All three focus groups discussed costs at length and this theme appears in both Table 1 and 2. However, the discussion and conclusions surrounding costs are different between Estevan and the other two cities of Regina and Saskatoon.

In Estevan priority was very much on local economy and jobs. The focus group discussion concluded the environment was healthy and focus should be on jobs. This discussion started very early in the focus group and continued until its finish:

The rivers are clean, the air is pure, you have to have people working to keep that 47 in healthcare in other words. So, so much of this is in my opinion, in our opinion, is coal bad? Shut down coal-burning power plants, hundreds of people are out of work, not contributing that 27, 37% income tax, and it just goes on and on).

Concern was over the vicious cycle of lost jobs, cessation of spending, rising welfare costs, and a poor economy. It was summed up as: “So that’s what we talked about and we talked about the fact that if we were going to lose the jobs then everybody doesn’t benefit.” Even if a more expensive option was chosen, it was acceptable if there were more jobs involved. Estevan concluded that ‘Job loss will increase public service costs in welfare, healthcare, social programs which require working people paying taxes.” The solution was seen as enticing corporations to Saskatchewan to replace job loss and support the economy. Neither Regina nor Saskatoon expressed the same sentiments.

Saskatoon was interested in ‘cradle to grave’ costs or understanding the entire cost and not just the initial cost of power production sources. Doing a cost and benefit analysis of the present and also the future was important. “Sustainability, consistent, reliable sources and supply…being sustainable, you need people’s buy-in, so community participation and engagement” were key criteria. Transparency in information and costs and benefits was also stated as important.

In Regina, ‘all’ costs were a key focus of discussions. It was stated, “life cycle costs, as cost that’s considering the ongoing maintenance and replacement. Reliability mentioned before. Environmental impact…. We are looking at the society impact, which is how it affects the lower-income people.” Future generations and their cost burden was also considered. These differing perceptions surrounding important costs unite to form a holistic provincial vision of significant future power production costs that would be important to a regional strategy depicted in Fig. 3 below.

Environment

Environment and its protection was a key theme in Regina and Saskatoon and Tables 1 and 2 reflect this. One rapporteur on day two in Regina stated:

“Okay, I got a question for all of you, this group wants to understand how can we reduce carbon emissions and slow climate change? Anybody got an answer for
me? Switch to renewables like wind and solar. It will reduce that carbon emission. And this is a big impact on my people, First Nations people. This is our livelihood. We got to keep our wildlife there for us to hunt. We eat this and if we don’t have clean air and water for our people, you are getting a lot of news about that now, because no clean water, some First Nations are struggling because they don’t have this. And the clean water would also deal with the fish and all that….

Yea. Because I have seen a lot of my people, my age, younger than me, they don’t look their age anymore. They are older, even if they are younger than me, they look older than me and this is what I see is happening. These three things really impact my people, First Nations people. This is something that I don’t really understand. How do I reduce carbon emissions? Okay, this is a learning part of my being here, okay. But this here is very very very important to me.”

While in Regina the conclusion was that costs should not take priority over the environment, in Estevan it was different. The focus group concluded, “Environmental issues are very expensive which results in absolute higher taxes.”

Participants identified the need for more research on the effect of decisions on the environment and ‘everything else.’ The final statement included, “We need a trusted source to educate the public, not the government.” And lastly education, from school age to seniors, so the public can be consulted and we don’t have biased decisions. Again, there was less focus on the issue of education, research, and public involvement in Estevan. One of Estevan’s bullet’s appearing in Table 1 and 2 is to “keep public informed.”

Education, research, and public involvement

Regina participants suggested education occur on energy production in school, researchers and experts should make decisions (with citizen engagement), and a trusted source should educate the public about climate change and energy (not the government). One rapporteur stated, “You want someone you trust. Not necessarily the politicians themselves [laughs].” Another stated at the end, “We need the experts, not the politicians.”

Saskatoon participants’ discussion included: researching which alternatives were effective, sustainable, cost-efficient, and safe in relation to social and environmental impact, which were efficient, which had better costs from cradle to grave, and how to provide more incentives and resources for IPPs. The final recommendation of Saskatoon included more emphasis on local production. “Honest unbiased research” was the solution to removing politics from decision-making processes. In Regina, it was acknowledged that there was so much scientific information out there, but people didn’t necessarily have access to the best of it and other information was put forward by people who don’t have enough knowledge. Both Saskatoon and Regina made final recommendations that the public be involved in decision-making. One Regina participant stated:

“If we want to involve the public in decision making about technologies, people actually need to be informed and not misinformed about the technologies available and the environmental impacts of those technologies.

Discussion

This paper attempts to address the gap in understanding how people envision energy futures, and how place attachment impacts these perceptions of energy futures. It also explores if two-day deliberative focus groups advance social learning in three diverse communities in Saskatchewan, Canada.

The results of the analysis of qualitative and quantitative research are clear that how people envision energy futures, in which community, may be highly divergent (Haggett 2016). This confirms literature that also has documented differing place attachments in relation to energy and power production (Devine-Wright 2011; Bell et al. 2013; Batel and Devine-Wright 2015). Place attachment significantly correlates to an already industrialized mining landscape, such as Estevan’s confirming the results of Hurlbert et al. (2020). Estevan, with coal power production (also located centrally to coal, oil, and gas resources), substantially differed in results in
several significant aspects. First, Estevan continued to support coal power production even after discussion of climate change and the challenges of decarbonizing electricity. This is in part due to the fact Estevan has the world’s first post-combustion coal CCS plant. Participants were very favorable to this as a means to keep their local economy going while responding to climate change. Second, all communities focused discussion on costs. However, Estevan focused on the entire costs to the economy including welfare, if jobs were lost. The other two communities stressed life cycle and future generation costs of power production sources. Third, Estevan only supported the idea that people be informed, not that people be involved in power production decision-making (as was supported in both Regina and Saskatoon).

While all communities expressed strong support for the continuation of the Crown-owned electric utility, Saskatoon differed in its support for IPPs and prosumers, as well as its wish for institutional change. All three focus groups wished for politics to be taken out of decision-making, contrary to the literature (Kern 2015; Markard et al. 2015) and perhaps naively. In Regina, the Estevan CCS plant was cited as an example of bad politics and support for the oil and gas industry; in Estevan CCS was regarded as a proven technology and referenced in Estevan’s final recommendations in relation to advancing technology (even if not politically correct). Almost in a reconciliatory tone (even though focus groups occurred independently without reference to each other’s results), Saskatoon advanced the notion that local communities should determine the power production sources in their community.

A theme that arose from the data (and not a specific question) in all three communities was the expressed trust in universities and research, with less trust in government. Transparency of decision making, clearly defined and communicated criteria of decision making, and more education were supported in Regina and Saskatoon. Typical of extractive industries’ political economy underpinnings (Schrecker et al. 2018), Estevan’s recommendations did not concern transparency, political accountability, and concern for the environment. The magnitude and ambit of Estevan’s difference of findings in relation to energy futures that are beyond support for resource extraction activities were surprising. These findings are important as they will need to be addressed in order to facilitate new decarbonized energy technologies (Pellizzzone et al. 2017). It will be important to address the objection of resource-rich communities (as identified in Osazuwa-Peters et al. 2020; Linzenich et al. 2020) and specifically Estevan’s risk perceptions surrounding welfare costs beyond unemployment.

Another novel finding was the holistic picture of what costs were important in a provincial power generation strategy the focus groups arrived at depicted in Fig. 3. Although Saskatoon and Regina were concerned predominantly with future generations, life cycle, and ‘cradle to grave’ costs, Estevan was concerned with the entire economy, welfare costs as well as jobs. This finding buttress the importance of using diverse case studies for understanding a holistic regional (provincial) case study.

This research is novel in that it not only combines people’s perceptions of energy futures, but it explored their learning and social learning. Cognitive individual learning occurred as evidenced by survey, individual statements (e.g. see the quote in Environment), and the expressed importance in all communities for more education. Social learning did occur methodologically through reflexivity, or the bringing together of divergent thoughts and opinions, and involved respectful interaction with experts. Contrary to findings of van Veelen and Haggett (2016), reflexivity did occur in the two-day focus groups and is evidenced by survey. Findings reflect the respectful two-way information flows between participants and experts and thoughtful dialogue (Urquiza and Dryzek 2015; Urquiza et al. 2018). After discussions, there was moderated support for hydroelectricity (when participants discovered there were no significant remaining hydroelectric assets in Saskatchewan), and support for solar also waned (given Saskatchewan’s winter, lack of battery storage, and land use requirements). However, support for wind increased due to Saskatchewan’s strong wind resource.

**Conclusion**

This research confirms that place-based attachment, especially in a fossil fuel-rich community, is an important determinant in how people envision energy futures and develop a strategy and recommendations for future power production. Addressing this community’s place-based concerns, priorities, values, and risk perceptions will be important in addressing climate change and achieving climate change targets in the future. In addition, two-day focus groups, using respectful expert facilitated dialogue methods with expert presenters, can advance learning, social learning, and reflexivity.

This research is novel as an upstream, whole power production system portfolio, has been envisioned through research participant engagement. This partially addresses what Pidgeon et al. (2014) identified as a gap or something that had not been done previously. This research has also done more than revisit people’s perceptions why a particular renewable or wind project failed to proceed in a particular community (Devine-Wright and Wiersma 2020; Devine-Wright 2011; Bell et al. 2013; Batel and Devine-Wright 2015). This research’s contribution is three place-based strategies created to address climate change by making significant transformational change through learning involving people (Few et al. 2017; Scoones et al. 2020). Social science
methods of engagement with experts and two-way communication flow that advance reflexivity is documented, addressing a social learning research gap (Stoddart et al. 2021). Important implications for the discipline include the confirmation of our existing understanding of the importance of place-based attachment. However new findings include implications for addressing fossil fuel-dependent communities’ concerns in order to achieve climate goals; these are important implications for the discipline.

Policy implications of this research include the need to address loss of jobs and economy in jurisdictions dependent on extractive industries such as coal, oil, and gas that will be impacted in the transition away from fossil fuels. Healy and Barry (2017) conclude job loss is often overlooked in just energy transitions. The role of labor, and the loss of jobs, is a key concern for these communities and the entry point for policies of transition, which might include employment transition and retraining programs.

This research demonstrates that when engaged in significant transformational change tackling problems such as climate change, people think in holistic ways. Research participants stressed inter-generational and entire life cycle costs. This type of problem-solving has policy implications. In order to emulate this research and consider the suite of policies necessary to affect our research participant’s visions, to achieve measurable change (Few et al. 2017; Scoones et al. 2020), policy-makers will have to consider policies in such a holistic joined-up fashion. As a start, in order to holistically address climate change, land use and power production planning can no longer occur as separate activities. In all communities, our research concluded place-based land use planning is required in order to increase wind and solar power production. In respect of solar this planning would ensure displaced land not compete with agriculture, or land acting as a carbon sink. Further, power production policies addressing climate change require more than consideration of levelized costs (the current policy practice) but will require calculations of supply chain or life cycle (including such things as recycling of batteries, wind, and solar power production equipment).

This research has limitations as it is not statistically significant (given only 43 participants). However, the diverse comparative case study communities, rich focus group discussions, and focused activities of identifying important factors for future power production and making consensus recommendations offer rich qualitative data. Further research on power production and the future given climate change and Canada’s increasingly stringent carbon pricing policy is warranted. Within a provincial jurisdiction, can diverse community contexts be accommodated? Can one community’s desire for more IPPs and decentralization, and another’s for more coal with CCS be workable? Lastly, how can different communities with different values and perspectives be brought together in order to advance learning and social learning?

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