

# **Comparing the market for nuclear power in Alberta and Saskatchewan**

**By**

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## **ABSTRACT**

This paper compares the markets for nuclear power in Alberta and Saskatchewan. This is done by comparing the two provincial panels that were released in Spring 2009 (Saskatchewan's Uranium Development Partnership and Alberta's Nuclear Power Expert Panel). Each panel's the terms of reference, membership, process, analysis, recommendations, and public consultation process are examined. Other variables for comparison include the history of its involvement in the nuclear sector, the political support, and public support. It concludes by arguing that Saskatchewan is a better market for nuclear power and that it is likely that a nuclear reactor will be built in Saskatchewan, but that surplus electricity will also be exported to Alberta.

The possibility of building new nuclear power plants in both Alberta and Saskatchewan is increasing. This would not only increase the size of the Canadian nuclear industry it would also geographically expand it. Many non-Westerners see the prairies as a homogenous whole, but there are critical differences between Alberta and Saskatchewan. Analyzing these political and market differences would provide a good predicative power over the ultimate success of the nuclear power initiatives.

This paper conducts a detailed comparison of the Alberta Government's Nuclear Power Expert Panel (NPEP) report and the Saskatchewan Government's Uranium Development Partnership (UDP) report. Topics for comparison include the terms of reference, membership, process, analysis, recommendations, and public consultation process. It also examines the history of each province's involvement in the nuclear industry; the level of political support including the positions of the provincial political parties; and the level of public support and knowledge.

## **1. Panels on Nuclear Power**

As the governments of Alberta and Saskatchewan investigate the development/ expansion of the nuclear industry in their respective provinces, they responded by appointing advisory panels. First off the mark was the Alberta government which, in April 2008, appointed the Nuclear Power Expert Panel (NPEP), chaired by former federal Conservative Cabinet Minister Harvey Andre, to prepare a comprehensive report on nuclear power in Alberta. The NPEP would examine: environmental, health and safety issues; waste management; comparing nuclear energy with other electricity generation technologies; current and future nuclear power generation being used in Canada and around the world; Alberta's future electricity needs; and social issues/concerns related to nuclear energy.<sup>1</sup> The report would not make any recommendations; instead the panel's mandate was to "prepare a balanced and objective Report for the government of Alberta on factual issues pertinent to the use of nuclear power to supply electricity in Alberta."<sup>2</sup> Unlike other panels appointed by the Stelmach government, most notably the Oil & Gas Royalty Review, no public hearings would be held during the drafting of the report. Instead, the panel's findings would be used as the basis for a public consultation process that would gather input from Albertans.

The report was drafted in secrecy; it relied on its member's personal expertise and a specially commissioned technical study by the Alberta Research Council (ARC) and the Idaho National Laboratory (INL).<sup>3</sup> In fact the ARC/INL study was substantially more detailed than the NPEP report. At three times the length and written by nuclear experts it was able to more fully describe the following topics:

- Electricity supply and demand in Alberta;
- Comparisons between the different electricity technologies of fossil fuel-based, nuclear, and renewables;
- Integrating nuclear power plants into Alberta's electricity grid;
- Nuclear reactor's operation, maintenance, and decommissioning;
- Nuclear fuel handling and disposal;
- Nuclear safety and security;
- Water usage and sourcing;
- Environmental and social impacts;
- Regulatory processes;
- Comparisons of different nuclear reactor types; and
- A synopsis of the of the Chernobyl accident.

It was apparent from reading both studies that the ARC/INL report formed the technical basis of the NPEP report. What the NPEP did was evaluate the ARC/INL's data, condense its information, add in its own economic analysis, and put it in more laymen's language. Although the ARC/INL study was acknowledged by the NPEP report and was listed in its bibliography, its importance seemed to be downplayed. For instance, you cannot find the ARC/INL study on the Alberta Energy website as part of the NPEP documents, nor was it mentioned in the subsequent consultation process by the Alberta government. Instead, you had to go to the Alberta Research Council website to locate their report. The ARC/INL study would not be widely read, but it should have been more transparently available due to the obvious influence that it had on the NPEP report.

The NPEP's report was widely touted in Alberta's long-term energy strategy paper. The Alberta energy strategy paper stated that "nuclear energy, dependent on mined uranium, is one alternative to fossil fuels. Uranium is still plentiful globally, however issues include waste management and environmental, health, safety, and social concerns. Nuclear has experienced resurgence as the world attempts to reduce its CO<sub>2</sub> emissions. Some synergistic applications involving bitumen processing may be available. Alberta is currently examining the merits and challenges of nuclear power."<sup>4</sup>

Even before its release, the NPEP report generated controversy over the panel's membership. Anti-nuclear activists targeted John Luxat because of his past life with Atomic Energy of Canada Limited (AECL). At the time of appointment, Luxat was teaching nuclear engineering at McMaster University, but prior to that he was a decades-long employee of AECL. Critics charged that he would be biased in favour of the nuclear industry in general and the CANDU reactor system in particular. As the Citizens Advocating the Use of Sustainable Energy (CAUSE), an Alberta-based anti-nuclear group, argued that "the very composition of the panel made it inevitable that we would be presented a very one-sided and biased view of the nuclear issue. The nuclear panel report can in no way claim to be objective."<sup>5</sup> They also asserted that somebody from the anti-nuclear community (Helen Caldicott, Gordon Edwards, a member from the Pembina Institute) should have been added to the NPEP to provide balance. This charge became amplified when Luxat recently returned to AECL as a member of its Board of Directors. That being said, the NPEP required some advanced technical knowledge of nuclear power and Luxat provided it. None of the other panellists had a nuclear background: Andre was a former federal politician who is now working in the oil & gas sector<sup>6</sup>, and Joe Doucett and Harrie Vredenburg are business professors specializing in energy policy at the Universities of Alberta and Calgary.

The NPEP, after several months of delay, was released by the government on March 26, 2009.<sup>7</sup> Although it does not contain any recommendations, it does make some important conclusions that will frame the debate over the development of nuclear power in Alberta. These are the key conclusions of the NPEP:

1. Alberta's economy and population will continue to grow and significant additional electrical power will be needed to maintain and improve the standard of living of Albertans. Options include more fossil-fuel-burning power plants (with or without carbon capture), more renewable sources and greater energy efficiency, as well as nuclear power.
2. Each technology has trade-offs associated with it. Such trade-offs include the availability of technology, environmental impacts, costs and operating implications for the Alberta system.

3. The decision to build a plant – whether powered by thermal combustion, or wind or nuclear – is a private-sector decision taken by a company based on its assessment of the project's economic viability. But, as with any large industrial construction project, all such plants must obtain approval from relevant government and regulatory authorities regarding their impacts or consequences.
4. Nuclear power has been in use for generating electricity for more than 50 years, and more than 400 units are in operation worldwide. New designs, based on learning from previous incidents and from long-term safe operation, are safer, more efficient and easier to control and operate.
5. Nuclear power does not release carbon dioxide. This is a significant difference (in environmental terms) between it and traditional technologies using coal and nuclear gas.
6. The offsetting concerns relate primarily to nuclear waste disposal. While the spent fuel removed from a reactor is radioactive, more than 99% of this material is made up of the heavy metals uranium and plutonium, which can be recycled to be reused as nuclear fuel. The remaining waste fission products decay comparatively quickly. Thus a program of separating the spent fuel and recycling heavy metals will dramatically reduce the amount of waste to be dealt with and the time period during which this material would be radioactive at levels above the natural background radiation. (Capturing carbon from fossil fuel plants also creates storage issues).
7. In Canada, the Federal Government has the authority and responsibility for approving and regulating all nuclear facilities and nuclear related activities. Normal provincial approvals required for any major project would also be required, based on the Provinces' constitutional responsibilities for land resources.
8. Any nuclear generating project would be a major construction project and have social impacts in areas such as schools, hospitals, transportation infrastructure, Aboriginal communities, local economies, housing and so on. Significant though these issues might be, they are regularly dealt with by the Government of Alberta and its agencies and affected municipalities. (pp. 4-5)

A thorough examination of the tone and emphasis within the NPEP report reveals strong support for the development of nuclear power in Alberta. The report makes clear that the demand for electricity will rise in Alberta. It estimates annual increases of 3.3% until 2024 (p. 14). Therefore the question is what electricity sources will be used to meet the demand: coal, natural gas, hydroelectric, wind, solar, or nuclear? On this point about comparative energy sources, the NPEP repeatedly emphasized that the absence of greenhouse gases in the generation of nuclear power "is a significant difference (in environmental terms) between it and technologies using traditional coal and natural gas" (p. 52). When the discussion turned to renewable energy, the NPEP pointed out that "while there is considerable interest in other non-conventional power generation means such as geothermal, bio-fuel, solar, etc., it is unlikely that these technologies will be able to satisfy all of Alberta's growing electricity needs" (p.10). In addition, "compared with hydroelectric and wind power, nuclear has a smaller physical footprint on the landscape" (p. 52).

Nuclear waste is a prominent issue among both anti-nuclear activists and the public in general. How can highly toxic elements, some of which have half-lives in the range of hundreds of thousands of years, be effectively handled? The NPEP's response was twofold. It began by

emphasizing the role that fuel recycling (also called reprocessing) can play in significantly reducing the amount of waste. It highlighted the fact that “more than 99%” of spent fuel “is made up of the heavy metals uranium and plutonium, which can be recycled into nuclear fuel. The remaining waste fission products decay comparatively quickly” (p. 53). All of this is true, and in fact, is critical to mitigating substantially the long-term nuclear waste issue. The problem is that fuel recycling is not yet cost effective. However, there is a ramped up research and development effort in this area that should start to bring results. Its second point was to describe in detail Canada’s Nuclear Waste Management Organization’s *Phased Adaptive Management* approach to spent fuel. This is a three-pronged approach:

- Phase One, lasting 30 years, is on-site dry storage (done at all existing facilities);
- Phase Two, lasting another 30 years, sees the spent fuel moved to a centralized facility (these exist in Manitoba, Ontario, Quebec, and New Brunswick); and
- Phase Three, after 60 years, sees the used fuel moved to a permanent storage facility in a deep geological repository (p. 34).

The NPEP does acknowledge that “opinions on nuclear safety tend to be highly polarized between supporters and opponents, making it more difficult to develop an objective, balanced view of the risks and impacts” (p.35). Nevertheless, the report follows that statement up with a detailed chapter identifying all of the comprehensive safety features of a nuclear reactor (pp. 35-43). In the process, it minimizes the risks of radiation exposure (by comparing nuclear-created radiation and natural radiation), reactor safety (by listing the triple redundancies of control, cool, and contain features), and the lessons learned from accidents like Three Mile Island and Chernobyl (by citing the role played by the International Atomic Energy Agency, World Association of Nuclear Operators, and the Canadian Nuclear Safety Commission in ensuring reactor safety). The NPEP was correct to note that nuclear reactors have been functioning for six decades with few fatalities. Chernobyl being the obvious exception, and even then, it notes that the “consequences” have often been “overstated” (p. 42). When these facts are presented, it becomes apparent that around the world, nuclear power has a substantially better safety record than any other energy source, and better than other sectors like construction or agriculture.

One of the tasks that the NPEP was mandated to address were social issues. This is because anti-nuclear critics often highlight social issues as a reason to prevent or eliminate nuclear power. However, the NPEP maintained “that there are no separate social issues which fall within provincial jurisdiction that are uniquely associated with nuclear power generation plants. Any project of the magnitude under consideration will have social impacts in areas such as schools, hospitals, transportation infrastructure, aboriginal communities, the local economy, housing and so on” (p. 53).

There are some unique challenges identified in the NPEP report that would have to be resolved before a nuclear power plant could be built in Alberta. For example, the large size of a nuclear power plant (a 800-1,000 MW reactor is over twice the size of the largest coal unit at 450 MWs) “could require increased operating reserves or, alternatively, additional transmission interconnections with neighbouring jurisdictions” (p. 44). Another challenge is the requirement of nuclear specialists such as engineers and physicists. The report notes (moving very closely to making a recommendation) that “it might be desirable to develop the nuclear-specific skill sets within Alberta, both for future employment within Alberta as the sector grows and as a technical-service export to a growing international sector. This would require training programs to help

develop the necessary expertise, which could be sponsored by government or facility owners” (p.46).

Critics who were hoping for a denouncement of nuclear power have argued that the NPEP was biased. For example, Gordon Edwards, the head of the Canadian Coalition for Nuclear Responsibility, was blunt when he said that “they are really presenting a very one-sided, very limited picture which doesn’t give the average member of the public, or the average politicians, any real insight into the nature of the hazards that are peculiar to nuclear.”<sup>8</sup> Meanwhile, Brian Mason, the leader of the Alberta New Democratic Party complained that the panel “cannot claim to be unbiased when it clearly tries to abdicate responsibility of the decision to have or not have nuclear power. B.C. and Manitoba have anti-nuke policies and we should too.”<sup>9</sup>

For its part, CAUSE has argued that the NPEP was riddled with errors and omissions. Here is just a sampling:

- does not discuss the design and construction problems of generation III+ reactors;
- does not discuss the risks and consequences of a nuclear accident;
- ignores the Nuclear Liability Act that makes insurance available to nuclear operators at a fraction of the costs of a catastrophic accident;
- does not address the health risks of nuclear power;
- and ignores the real financial costs of nuclear power (hefty government subsidies, massive cost overruns, costly unscheduled reactors repairs, etc).<sup>10</sup>

CAUSE also responded to the NPEP with its own report: *Nuclear Power in Alberta: An Alternative Perspective*.<sup>11</sup> This alternative view, which was written prior to the release of the NPEP report, was heavily influenced by the Pembina Institute’s *Greening the Grid* report.<sup>12</sup> It reiterates most of *Greening the Grid*’s recommendations: appoint a panel on renewable energies; Alberta should collaborate with the federal government on a study on the health effects of nuclear power; and Alberta should establish a centre of excellence to support growth and expertise in renewable energies. The rest of CAUSE’s short rejoinder<sup>13</sup> repeats most of the typical arguments against nuclear power: it is unsafe, unreliable, expensive, has cost overruns, damages the environment, consumes too much water, and produces massive amounts of highly radioactive waste.<sup>14</sup>

In a sense, these critics are correct; the NPEP did come out in favour of nuclear power. The NPEP authoritatively dispelled some of the myths around nuclear power and put it on a level playing field with other electricity sources. This is the very definition of neutrality. The NPEP has properly framed the debate not as “nuclear yes or no?” but “what electricity sources does Alberta need to build to address its growing needs?”

Nuclear power is very contentious. Therefore, it is crucial that the people are heard. The NPEP will be the basis for a “multi-faceted consultation process” to gather the views of Albertans on nuclear power. Innovative Research Group, an independent research firm, was commissioned by the government to collect the data and provide a summary to the government. The process will include:

- Albertans can review and complete an online workbook and feedback form that covers the themes of the NPEP report. This can be done either in paper form or via an interactive online mechanism;
- Discussion groups with stakeholder groups, representative of environmental, business, energy, and other interests will be held;

- Discussion groups with randomly selected Alberta citizens will be held in 10 communities across Alberta; and
- A public opinion survey will be conducted.<sup>15</sup>

Anti-nuclear activists have been critical of the public consultation process. For example, they note that the online workbook and feedback form starts with the executive summary of the NPEP. Thus, what they see as “a biased nuclear panel report with one-sided, pro-nuclear information will play a key role” in the public discussions. They believe that a counter-document, focusing on alternative energy, needs to be commissioned by the government to balance the debate. Instead of “selective meetings with stakeholders and some focus groups,” they recommend that “public hearings be held throughout the province.”<sup>16</sup> However, the reason that public hearings were not chosen was because they often get hijacked by interest groups. The only people who tend to participate in public hearings, with the exception of hearings at potential reactor sites (which will be included in the consultation process) are the rabid anti-nuclear and pro-nuclear activists. It is to avoid this problem that focus groups, where the participants are not told what the topic is in advance, will be used to provide input from Albertans who are undecided about nuclear power. Allowing any interested person to fill out the workbook (in combination with the stakeholder consultations and focus groups) is a legitimate compromise.

It should also be pointed out that CAUSE is trying to mobilize people to fill out the survey, but in a way that opposes nuclear power. For example, they are sending out emails, labelled a “call for action,” through affiliated organizations with instructions on how to fill out the survey. They write that “the information preceding the survey is full of false and missing information. I am attaching again CAUSE’s response to the Nuclear Panel Report, our alternative report and media release. Here is a summary of some of the errors in the government document preceding the survey (this new government document is similar, but not identical, to the Nuclear Panel Report.)”<sup>17</sup> Imagine if this sort of public mobilization was being led by Bruce Power, AECL, or the Canadian Nuclear Association.

The Saskatchewan government, in November 2008, appointed its own nuclear panel. The Saskatchewan Uranium Development Partnership (UDP) was to make recommendations to the government on value-added opportunities in the uranium industry. In particular, conversion, enrichment, reactor fuel manufacturing, and the use of nuclear reactors. “The report is to include details of the investment, legislative and regulatory conditions required for nuclear development as well as timelines for putting enabling measures in place.”<sup>18</sup> Its report was released on March 31, 2009. In some respects it was quite similar to the Alberta panel. For example, in both cases a distinguished group of individuals were commissioned to draft a report that would be the basis for public consultation within the province. However, in the areas of membership and mandate it was completely different from the Alberta approach.

The UDP was chaired by Richard Florizone, the Vice-President Finance at the University of Saskatchewan and a nuclear physicist. Other members were taken from the top reaches of the Canadian nuclear industry: Duncan Hawthorne, President and CEO of Bruce Power; Jerry Grandey, President and CEO of Cameco; and Armand Laferrere, President and CEO of Areva Canada. Some additional panellists were also well acquainted with nuclear power: Edward Mathie, a nuclear physicist at the University of Regina; Patrick Moore, Chair and chief scientist of Greenspirit Strategies and co-founder of Greenpeace. The remaining panellists were Ray Ahenakew, business development advisor at the Saskatchewan Indian Institute of Technology;

Keith Brown, representing the Saskatchewan Chamber of Commerce; Neil Collins, representing the International Brotherhood of Electrical Workers at SaskPower; Allan Earle, President of the Saskatchewan Urban Municipalities Association; Jim Hallick, Vice-President of the Saskatchewan Association of Rural Municipalities; Alex Pourbaix, President – energy for TransCanada Corp.

The composition of the UDP, particularly the involvement of Grandey, Hawthorne, and LaFerrere was a target of opposition by environmental groups. Ann Coxworth, of the Saskatchewan Environmental Society, who turned down an invitation to join the panel because she said it would be biased, stated that “I think it’s got a clearly pro-nuclear development mandate and their question is not whether to proceed with development, but how.” Coxworth is certainly correct that the mandate of the UDP was to identify ways that the province could develop value-added opportunities in the uranium sector. Enterprise and Innovation Minister Lyle Stewart confirmed that “we recognize that we need to add value to our raw resource, so whether that be refining, whether it be upgrading, whether it be a nuclear fuel production facility, whether it be generating nuclear power, whether it be all of these things, that’s what we have to determine.” Crown Corporation Minister Ken Cheveldayoff echoed this sentiment when he said that “we see the potential here as enormous and we want to make sure we’re not falling behind, we want to make sure we’re leading the way given the resources that we have.”<sup>19</sup> Since the mandate of the UDP was not to address the pros and cons of the uranium and nuclear industry, but to maximize its potential within Saskatchewan, it only makes sense that industry leaders would play a significant role in the UDP’s composition.

The UDP report was released on March 31, 2009.<sup>20</sup> The thrust of the report is stated right in the preface: “we believe great potential exists for the Province of Saskatchewan in the uranium and nuclear industries. We have identified where we believe these opportunities lie and what it would take to successfully realize them. We have also identified efforts that the Partnership believes should *not* be pursued in the foreseeable future” (p. i). In evaluating the opportunities for Saskatchewan across the entire nuclear fuel cycle the UDP followed a four-part approach:

1. Identified specific commercial opportunities at each step of the chain.
2. Evaluated the business case for each opportunity.
3. Estimated the potential benefits accruing to Saskatchewan from each opportunity.
4. Created a strategy for pursuing the opportunities over time and developed clear recommendations to inform discussions and decision making (p.3).

The UDP makes 40 findings and provides 20 specific recommendations across five sections. Here is a brief synopsis of the key recommendations:

- **Exploration and Mining:** measures to assisting the uranium mining industry in Saskatchewan, ie., royalty framework, infrastructure, foreign ownership guidelines, etc.
- **Upgrading:** Saskatchewan should not pursue either a conversion or a fuel fabrication facility; in the long-term start to work on establishing the political and technology requirements for uranium enrichment.
- **Power Generation:** build a nuclear reactor for electricity generation both for Saskatchewan’s own needs and for export to Alberta.
- **Used Fuel Management:** Saskatchewan should not pursue fuel reprocessing; Saskatchewan should consider hosting a long-term nuclear waste repository.

- **Research, Development, and Training:** Create a centre for excellence for nuclear research and training; expand educational programs in the areas of mining and exploration, nuclear engineering, physics, and related social sciences; build a research reactor; and pursue medical isotope production (pp. 4-9).

There were also technical appendices on the health and safety considerations of nuclear power, managing the risks of nuclear proliferation, introduction to medical isotopes, and small reactors<sup>21</sup> (pp. 95-111).

The UDP identified that “the high-priority opportunities for Saskatchewan appear to be exploration, mining, nuclear power generation, and hosting a used fuel repository” (p. 90). The UDP also proposed a time sequence for implementing its recommendations. In the immediate term (2009-2014), the focus should be on uranium exploration and mining, and building a centre of excellence for nuclear research and development. In the medium term (2015-2025), Saskatchewan should see a power reactor coming on-line, “potentially constructing Canada’s first enrichment facility,” and take “the initial steps to develop a deep geological repository in the Province” (p. 93). Finally in the long term (2025+), “Saskatchewan would have established core investments across the value chain that would create a range of new options and opportunities” for example, the possibility of initiating activity in conversion, fuel fabrication, and reprocessing technology (p. 93).

In evaluating the UDP report several themes emerge. First, despite Premier Wall’s repeated public calls for Saskatchewan to diversify away from its mining base and start adding value to uranium, the UDP report focuses on how “to maintain [Saskatchewan’s] position as a leader in uranium mining” (pp. 27-41) and discourages the creation of uranium conversion or fuel fabrication facilities (pp. 43-53). This is significant because it showed that the UDP panel was independent of the government. It ignored the signals from the premier’s office and made its own conclusions based on market capacity. In addition, the panel included the heads of the key private sector firms who would have been responsible for building the conversion and fuel fabrication facilities (Cameco and Areva). Obviously, Cameco and Areva realized that due to the new facilities that it was building in France, Kazakhstan, and the United States that expansion into Saskatchewan was not warranted. The only nod that the UDP did to value-added uranium was to support, in the long-term, a public-private partnership on emerging laser enrichment technology (a pet project of Cameco).

It is also interesting that the Saskatchewan government quickly distanced itself from the UDP’s recommendation to pursue a permanent nuclear waste repository. Pre-empting the consultation process, the government noted that it had already determined that there was a lack of public support for locating a nuclear waste repository in the province.<sup>22</sup> Clearly the government feared that the nuclear waste boogeyman, if not confronted directly and quickly, would undermine the entire UDP report. They feared this possibility because local anti-nuclear activists for decades have asserted that there were plans to turn Saskatchewan into the world’s “nuclear waste dump.”<sup>23</sup>

There was criticism of the UDP report when it was released. Jim Harding, a prominent anti-nuclear activist in Saskatchewan, has summarized many of these criticisms: a government commissioned panel should focus on renewable energy, the UDP’s assumptions were flawed, all aspects of the nuclear fuel cycle require public subsidies, and it fails to resolve the nuclear waste issue. A surprising target of opposition is the UDP recommendation for a centre for nuclear excellence. This, in Harding’s view, will facilitate the “collusion” between the nuclear industry

and the academic community. According to Harding, “the nuclear industry has always counted on government funding for its R & D, and on sympathetic or oblivious scientists for doing it.”<sup>24</sup>

Similar to the Alberta government, the Saskatchewan government established a public consultation process. Headed by Dan Perrins, the former head of the Saskatchewan Public Service, the consultation process would include a major stakeholder conference, a series of community meetings, an opportunity for individual stakeholder organizations to provide oral and/or written submissions, and included a special opportunity for presentations from First Nations and Métis groups.<sup>25</sup> A special website was also created that would contain “the full report, presentation materials, online input opportunities, and ultimately, the results of the public input.”<sup>26</sup> The Saskatchewan consultation process was more comprehensive than Alberta due to the website, the major stakeholder conference, and nine community meetings across the province.

In comparing the NPEP and UDP, there were a number of obvious similarities. Both reports included substantial technical discussions on nuclear power and the nuclear fuel cycle. Basic comparisons with other electricity sources (coal, natural gas, hydro, solar, wind) were made in the areas of baseload vs peak sources of electricity, cost, greenhouse gas emissions, and general advantages/disadvantages. There were also a number of findings that were the same: a) there was an increasing need for electricity in Alberta and Saskatchewan; b) nuclear reactors are safe; and c) nuclear reactors do not emit greenhouse gases. Finally, the Alberta and Saskatchewan governments both created extensive, albeit slightly different, public consultation mechanisms based upon the NPEP and UDP reports.

However, it is the key differences between the NPEP and UDP that are most interesting. First, the NPEP was mandated to concentrate solely on nuclear power generation, but the UDP covered the entire fuel cycle from uranium exploration & mining, uranium upgrading (refining, conversion, enrichment, fuel fabrication), power generation, and waste disposal. Second, the NPEP was designed to provide the Alberta government with objective and technical knowledge about nuclear power, but the mandate for the UDP was to assess the economic opportunities of the uranium value chain for the Saskatchewan government. This meant that the UDP made specific recommendations, but the NPEP did not. Third, the NPEP emphasized the role of spent fuel reprocessing as “an attractive option for maximizing the fission energy from mined uranium” and also leaves “a much smaller volume of shorter-term waste products to deal with” (pp. 32-33). But the UDP discouraged it because “reprocessing CANDU fuel based on current technology is commercially unattractive for private investment, given the high capital and operating costs that offset potential economic benefits from recycling potential economic benefits from recycling plutonium and reducing the volume of high-level waste for disposal” (p. 71). The explanation for this difference is that the NPEP was looking at the broad technology of spent fuel reprocessing which is done for light water reactors in France, the United Kingdom, and Japan. However the UDP focused on CANDU fuel reprocessing because, currently, CANDUs are the only reactors that are in operation in Canada. It must also be said that the UDP opened the door for a reconsideration of its recommendation if there was either a change in reprocessing economics or a change in federal government policy (p. 73). Fourth, while the NPEP focused solely on the possibility of nuclear power within its own province, the UDP recognized that “significant potential exists for exports” to Alberta (p. 57). The oil sands, which overlaps the Alberta-Saskatchewan border, was singled out as a region/industry requiring substantially more electricity. The UDP recommended that Saskatchewan consider “the development, in co-ordination with Alberta, of a common power generation solution for the two

Provinces by pooling their power needs and building stronger interties between the two provincial grids” (p. 68).

## **2. History of the Nuclear Industry**

The contrast between Alberta and Saskatchewan is at its most stark when their history with the nuclear industry is compared. Alberta, simply put, is virgin territory for the nuclear industry. Outside of some crazy schemes in the 1950s and 1960s to detonate a nuclear bomb in the oil sands<sup>27</sup>, Alberta is bereft of a nuclear history. Saskatchewan, on the other hand, has some of the longest experience with nuclear technology of any province. For example, Cameco, a private company created out of the merger of two crown corporations Eldorado Nuclear (federal) and the Saskatchewan Mining Development Corporation (provincial), is one of the world’s largest uranium mining companies and is headquartered in Saskatoon. This section provides a detailed account of the history of nuclear power in Saskatchewan.

Canada’s first uranium mines were at Port Radium, Northwest Territories (1930s) and, with the world’s largest deposits at the time, at Elliot Lake, Ontario (1950s). Saskatchewan first became involved in uranium mining in the late 1940s. The discovery of the Athabasca basin, located in northern Saskatchewan, has been the site for all of the major uranium discoveries in the last 40 years. Uranium City, along the Saskatchewan-Northwest Territory border, was established in 1952 and it would be joined by additional mines and mills including Beaverlodge (1953-1982), Rabbit Lake (1975-present), Cluff Lake (1980-2003), Key Lake (1983-2001), McClean Lake (1999-present), McArthur River (2000-present), and Cigar Lake (2005-present). Cigar Lake “is the richest uranium deposit in the world, with an average ore grade of 18%.”<sup>28</sup>

Northern Saskatchewan is a perennially poor region with a large native population (over 87% are native people). The uranium industry emerged as one of the few industries to operate in the region. In fact, it has become the economic driver of Northern Saskatchewan. Initially, the mining workforce was almost exclusively non-native, but today the uranium industry has become the single largest native employer (over 80% of all mine workers are native). Moreover, a large native business capacity in mining and support sectors has been developed over the last twenty-five years.<sup>29</sup>

Given that uranium was the key ingredient for nuclear weapons there was a high degree of secrecy with regards to uranium mining in the World War II and Cold War periods. However, by the 1970s, light started to be shined on the industry through a number of public hearings/inquiries.<sup>30</sup> The Berger Inquiry (1974-78) into the Mackenzie Valley Pipeline in the Northwest Territories was not directly related to uranium mining, but because it extended its environmental scope to include socioeconomic, community, and native interests it would be precedent-setting for future public hearings. The Bayda Commission (Cluff Lake Board of Inquiry 1977-78) was a comprehensive examination of uranium mining and held public hearings across the province, especially in the north. It extended the scope of mine assessments to include a number of new aspects: biological effects, environmental considerations, worker health and safety, federal and provincial regulation, social, economic, community and northern benefits, disposal of nuclear waste, nuclear proliferation and terrorism, and moral and ethical issues. Ultimately, the Bayda Commission approved continued uranium development, but subject to increased government regulation. It also sought to clarify the federal and provincial jurisdictions over the environment. The Key Lake Board of Inquiry (1979-1981) continued the pattern of comprehensive public hearings in both large and small northern communities. It approved the Key Lake Project with the addition of stronger socioeconomic performance targets in the form of

quotas and reclamation requirements. It also defined the provincial regulatory framework. There were additional inquiries in the 1990s: the Rabbit Lake Panel (1993-94) and the Joint Federal Provincial Panel on Uranium Mining Development in Northern Saskatchewan (1991-1997). Due to the public scrutiny of these hearings/inquiries, more government regulation was established. In addition, the Saskatchewan public became more aware of the advantages/disadvantages of the uranium industry and a knowledgeable cohort of local experts emerged.

In 1979, the NDP government of Alan Blakeney convinced Eldorado Nuclear (the predecessor to Cameco) to build a refinery at Warman, a small town near Saskatoon, to process uranium. This was the first significant effort by the province to add value to uranium through one of the upgrading procedures. There was significant local opposition to the refinery due to fears of the effects of radiation on human health and agricultural land, as well as the connection between uranium refining and nuclear weapons (especially since Warman had a large Mennonite population that was overtly pacifist). In 1980, the Federal Environmental Assessment Review Office, decided not to support the construction of the facility not on environmental or human health grounds (it authoritatively dismissed these fears), but on social impact considerations.<sup>31</sup>

The result was that the project relocated to Blind River, Ontario (always the first choice for the company). Many Saskatchewanians have subsequently seen this decision as a missed opportunity. The Saskatoon and District Chamber of Commerce has calculated the economic benefits that Saskatchewan was able to avoid: employment opportunities (80-160 workers a year), increased gross provincial product (between \$38 and \$78 million), an increased tax base (\$14 million in municipal taxes and \$21 million in provincial taxes), and spin-off economic benefits.<sup>32</sup> In contrast to the public fears that were perceived in Saskatchewan, the Blind River refinery has been operating for over 25 years with strong community support. It has operated safely – there has not been a lost-time accident since 1990. It can therefore be argued that “the safety and environmental findings over more than a decade of experience at the Blind River facility proves that the environmental and safety objections were unfounded to the extent that the project proceeded in another part of Canada.”<sup>33</sup> The facility is now the world’s largest uranium refinery and now Cameco is considering further expansion. In short, the success of the Blind River uranium refinery was due to Warman’s rejection.

A decade later, the Progressive Conservative government under Premier Grant Devine became involved in another attempt at moving along the nuclear fuel cycle beyond uranium mining, in this case, through electricity generation. In 1991, AECL proposed building a 300 MW power reactor, the CANDU-3, in Saskatchewan. Both AECL and the federal government conducted a concerted lobbying effort to gain support for the CANDU-3. In 1992, the NDP government under new Premier Roy Romanow determined that the project was not economically feasible and that there was sufficient electricity generation in the province, so it was dropped.

Saskatchewan’s nuclear history goes beyond the fuel cycle. The Cobalt cancer treatment, using medical isotopes, was developed by Dr. Harold Johns at the University of Saskatchewan’s Royal University Hospital Cancer Wing in 1951. There were other medical discoveries made by Sylvia Fedoruk who would later become the Lieutenant Governor of Saskatchewan. The slowpoke research reactor has safely operated at the University of Saskatchewan for over 40 years.<sup>34</sup>

### 3. Political Support

There has been an evolution, commiserate with growing public support, in the thinking of leading Alberta politicians towards nuclear power. This can be shown by tracing some of the statements and actions of former Premier Ralph Klein. In 2005, Klein declared that nuclear was the “least acceptable” option for the oil sands.<sup>35</sup> By April 2006, Klein was saying that “we have to consider nuclear power.”<sup>36</sup> Finally, in February 2008, Klein co-authored a think tank study on continental energy that was supportive of nuclear power.<sup>37</sup>

The current Stelmach government has been much more cautious when asked about nuclear power in the province. Initially there were some tentative comments, both in favour and in opposition, from some cabinet ministers. For example, Treasury Board President Lloyd Snelgrove said that nuclear power was “a natural fit” for the oil sands, but Environment Minister Rob Renner responded that he was sceptical and was concerned about the disposal of nuclear waste.<sup>38</sup> But once the NPEP was established a cone of silence went up around the government and no public comments have been made except to say that they are consulting Albertans.

Alberta, because the Progressive Conservatives have been in power since 1971, has been described as a “one party dominant” province. Nevertheless, there is some value in examining the position on nuclear power of the opposition Liberal and NDP parties. The Alberta NDP, like the NDP nationally, is strongly opposed to nuclear power.<sup>39</sup> Meanwhile, the Liberals, like the Stelmach government, have been cautious as they independently investigate the issue and await the results of the public consultation process.<sup>40</sup>

Without a doubt, Saskatchewan has become the most nuclear-friendly province in Canada. Soon after coming to power, Premier Brad Wall of the Saskatchewan Party stated that “we would like to lead. It’s time for the country to have a national vision on nuclear energy—and we want to aggressively pursue that.”<sup>41</sup> Wall’s nuclear activism was quite clear during a major address to the Canadian Nuclear Association in February 2009. During this speech, Wall promised “that the new Government of Saskatchewan is committed to creating the business environment, the research climate, is prepared to partner with real resources and provide the right environment so that we may thoroughly explore the chance for our province to be a leader in value-added opportunities related to this great resource.” Wall, after noting that “the next ounce of yellowcake that we add any value to at all will be the first,” discussed conversion, refinement, recycling, small reactor technology, and enrichment. He also took pains to emphasize repeatedly the medical applications of nuclear technology.<sup>42</sup>

The activism of the Saskatchewan Party is consistent with over 60 years of all-party political support for nuclear power in the province. In the 1940s-1950s, the Cooperative Commonwealth Federation (CCF) initiated the uranium mining sector. The Liberal government in the 1960s established the Rabbit Lake mine. In the 1970s-1980s, the NDP government created a provincial crown corporation (Saskatchewan Mining Development Corporation) to mine uranium, approved two new uranium mines, and supported the Warman Refinery. The Progressive Conservative government of Grant Devine pursued the CANDU-3 to provide electricity for the province. The NDP from 1991-2007 opened up five new uranium mines and began the initiative for value-added uranium production. In a 2004 speech at the World Nuclear Association annual symposium, former NDP Premier Lorne Calvert said that “as the demand for uranium fuel rises there would be an increased need for uranium refining and we would welcome further private investment in the province.”<sup>43</sup>

There has often been internal disagreement within the NDP. Unlike other NDP parties, the Saskatchewan version contains both pro-nuclear supporters who recognize the economic

significance of the uranium mining industry and northern economic development, and anti-nuclear critics who are concerned with its environmental, safety, and military aspects. These two factions have had an uneasy relationship. As John Gormley has commented, “since the 1970s the Saskatchewan NDP has housed a strong contingent of the radical environmental left, the peace movement and the anti-capitalism crowd who are opposed even to uranium mining... This group challenged the NDP in the 1970s when the Allan Blakeney government expanded uranium mining... In 1980, NDP stalwarts were instrumental in leading an excoriating and fear-mongering campaign that killed a uranium refinery proposal north of Saskatoon.”<sup>44</sup> In November 1992, the NDP narrowly adopted, after heated debate, a motion supporting uranium mining. This was a reversal of the anti-nuclear stance that the NDP had taken while in opposition and illustrated the cleavages within the party when it came to nuclear issues. It took Premier Romanow to stare down his anti-nuclear faction, by emphasizing the need for party unity, and push the motion through at the party’s policy convention.<sup>45</sup>

The NDP’s internal debate, dormant for almost two decades, has been reignited with its ongoing party leadership race. Dwain Lingenfelter, the acknowledged front-runner, is pro-nuclear who proclaimed it as “clean, safe and affordable energy to power oilsands development.”<sup>46</sup> He is challenged by Ryan Meili and Yens Pedersen, who both condemn the building of a nuclear reactor in Saskatchewan. Pedersen is even opposed to any further development of uranium mining. The Saskatchewan Party, in an effort to divide the NDP, introduced a motion in the Legislature (a couple of days in advance of the release of the UDP report) in support of the development of nuclear power. The motion stated: “the consideration of further value-added development of Saskatchewan’s uranium industry including nuclear power generation and recognizes the potential benefits to the growth and prosperity of the people in our province.” Pedersen and Meili, who both lack seats in the Legislature, urged the 20 NDP MLAs to vote against the motion. As Pedersen stated “this is not some innocuous statement about considering options. It is a slanted and one-sided motion and supporting it could cause thousands of Saskatchewan people to consider supporting the Green party.” Meili added that “the Wall government’s uranium resolution falsely frames the debate on nuclear energy and uranium development. Nuclear power is being sold to us as a means to provide cheap energy, as a means of addressing immediate energy needs, even as a means of protecting our environment. But none of these sales pitches are based on the facts.”<sup>47</sup> Nevertheless, the motion passed unanimously.<sup>48</sup>

#### **4. Public Support and Knowledge**

In November 2005, Energy Alberta Corporation commissioned Longwoods International to poll on the use of nuclear power in the oil sands: 40% of Albertans supported, 36% of Albertans were neutral, and 23% of Albertans opposed.<sup>49</sup> In January 2007, the Calgary Herald conducted its own poll which found that 45% of Albertans supported nuclear power, 42% were opposed, and 12% were unsure. There was stronger opposition in northern Alberta, home of the oilsands and the likely location of a nuclear power plant, with 53% opposition and only 36% support. The strongest support was found in Calgary, home of the oil sands decision-makers, with 47% support and only 41% opposition.<sup>50</sup>

Public support for nuclear power has been consistently higher in Saskatchewan than in Alberta. Particularly high support exists for uranium for uranium mining, which in May 2007 reached over 80%.<sup>51</sup> However, as the issue moves further and further away from uranium mining the level of support, while still positive, decreases. In three separate polls conducted by Sigma Analytics for the Regina Leader-Post (November 2006, May 2008, and April 2009) support for a

uranium refinery has ranged between 57.2-75.1%. While support for the construction of a nuclear power plant is lower still: support has ranged between 47.8-53.5%, while opposition has ranged between 30.5-33.5%.<sup>52</sup>

In analyzing this polling data, a number of conclusions can be made. First, opinion tends to be polarized between those who strongly support and those who strongly oppose a nuclear power plant in Saskatchewan. Second, respondents on the whole feel uninformed with over 40% of them falling on the poorly informed side of the equation. It is significant to note that those who believe that they are well informed are more likely to support a nuclear reactor, but those that see themselves as poorly informed are more likely to oppose a reactor being built in the province. Third, the largest reason for opposing a nuclear reactor is a concern with safety and waste disposal. Fourth, support for nuclear power is strongly correlated with income as well as gender. If you are male with an income over \$90, 000 you are more likely to be supportive than if you are female with an income under \$30, 000.<sup>53</sup>

## **5. Conclusion**

Through an examination of the four indicators (expert panels, history, political support, and public support) identified in this paper, it is argued that Saskatchewan is a better market for nuclear power. The parallel expert panels that were released within a couple of weeks of each other in Spring 2009 reveal the differences between Alberta and Saskatchewan. The UDP, in contrast to the NPEP, did not just analyze the technical aspects of nuclear power; it provided a number of detailed recommendations about how Saskatchewan could advance its involvement in the nuclear fuel cycle. In particular, it recommended that Saskatchewan build a nuclear reactor. The fact that the release of the UDP report was front page news in Saskatchewan instead of being relatively hidden, as it was in the Alberta media, also shows the different degree of importance of the issue between the two provinces. This is echoed in the public consultation process which is more extensive in Saskatchewan than it is in Alberta.

Given the extensive history of uranium mining in Saskatchewan, there are critical pre-existing stakeholders (Cameco and Areva, the International Brotherhood of Electrical Workers,<sup>54</sup> northern communities, aboriginal groups) that favour the expansion of the nuclear industry. They will be pushing for an expansion of the nuclear sector. In addition, the previous debates over uranium refining and the CANDU-3 have meant that the parameters of the forthcoming public consultation have been established. Many of the same groups, using many of the same arguments, will re-emerge. In addition, the consequences of saying “no” to expansion of the nuclear industry, which has occurred before, can now be measured. The people can determine if saying “no” to the Warman refinery really did have a negative economic cost, or whether, in fact, Saskatchewan missed an environmental bullet when it rejected the refinery.

There is no pro-nuclear political party in Alberta. The governing Progressive Conservatives have been largely agnostic on the issue of developing nuclear power, while the small opposition parties are either silent (Liberal) or vocally opposed (NDP). But in Saskatchewan, the governing Saskatchewan Party has been very vocally supportive of expanding the nuclear sector in the province. They desire everything from uranium upgrading, to a power reactor, to increased research and development, to medical isotopes. This is reflected in the mandate which they gave the UDP, which was not to assess in a neutral fashion the technical aspects of nuclear power, but to consider how to maximize the potential of the nuclear sector in Saskatchewan. Moreover, if the Saskatchewan party was replaced it is likely that the NDP would

follow the same path. This is because the NDP tacks towards its internal anti-nuclear faction while in opposition, but when it is in government it listens to its pro-nuclear wing.

While the public consultations have yet to be completed, a preliminary assessment shows greater public support in Saskatchewan than in Alberta. While there is support for developing nuclear power in Alberta it is softer. This is because of a number of factors: it has not been measured over time, it has shown greater volatility, and the degree of nuclear knowledge is weaker.

The market conditions for nuclear power are probably stronger in Alberta. For example, Alberta requires more additional electricity than Saskatchewan. In addition, while the oil sands – the major location for that additional electricity – straddle both sides of the provincial border, the majority is on the Alberta side. Since the political/public support for nuclear power is substantially stronger in Saskatchewan, it is likely that a reactor will be built in Saskatchewan and the excess electricity exported to Alberta. This is a proposal that has been privately endorsed by private industry.<sup>55</sup> It is unlikely, because of the size of the reactors being proposed, that there is sufficient demand, at least in the next decade or so, to build in both provinces.

This seems like the ideal solution for both provinces, only time will tell whether it will be Saskatchewan or Alberta which will achieve the greater benefits. On the one hand, it could be Saskatchewan because it would be lowering its provincial greenhouse gas emissions, diversifying its energy away from fossil fuels, and developing a high tech industry. Or it might be Alberta if there are significant cost overruns with the reactors or the problem of nuclear waste is not properly handled.

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<sup>1</sup> Government of Alberta, “Expert panel to develop comprehensive research paper on nuclear power,” *News Release* (23 April 2008). This document can be accessed online at <http://www.energy.alberta.ca>

<sup>2</sup> Government of Alberta, *Nuclear Power Expert Panel Order* (23 April 2008). This document can be accessed online at [http://www.energy.alberta.ca/Org/pdfs/MO\\_31\\_Nuclear\\_Expert\\_Panel.pdf](http://www.energy.alberta.ca/Org/pdfs/MO_31_Nuclear_Expert_Panel.pdf)

<sup>3</sup> Alberta Research Council and Idaho National Laboratory, *The Nuclear Energy Option in Alberta* (1 October 2008). This document can be accessed online at <http://www.arc.ab.ca/documents/ARCINL-report-secure.pdf>

<sup>4</sup> Alberta, *Launching Alberta's Energy Future: Provincial Energy Strategy* (2008), 10. This document can be accessed online at <http://www.energy.gov.ab.ca/Initiatives/strategy.asp>

<sup>5</sup> Citizens Advocating the Use of Sustainable Energy (CAUSE), *Nuclear Power in Alberta: An Alternative Perspective* (6 April 2009), 6-7. This document can be accessed online at <http://www.nuclearfreealberta.ca>

<sup>6</sup> Prior to entering politics, Harvie Andre was a Professor of Chemical Engineering at the University of Calgary. This meant that he had a scientific background, albeit not in the nuclear area.

<sup>7</sup> Government of Alberta, *Nuclear Power Expert Panel: Report on Nuclear Power and Alberta* (February 2009). This document can be accessed online at <http://www.energy.alberta.ca>

<sup>8</sup> Hanneke Brooymans, “Nuclear energy safe alternative, says expert panel,” *Calgary Herald* (27 March 2009), A11.

<sup>9</sup> Kerry Diotte, “Nuke power input urged,” *Edmonton Sun* (27 March 2009).

<sup>10</sup> Citizens Advocating the Use of Sustainable Energy (CAUSE), *Response to the Alberta Nuclear Panel Report* (7 April 2009). This document can be accessed online at <http://www.nuclearfreealberta.ca>

<sup>11</sup> *Nuclear Power in Alberta: An Alternative Perspective* (6 April 2009).

<sup>12</sup> Jeff Bell and Tim Weis, *Greening the Grid: Powering Alberta's Future with Renewable Energy* (Pembina Institute: Drayton Valley, Alberta, April 2009). This document can be accessed online at <http://pubs.pembina.org/reports/greeningthegrid-report.pdf>

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- <sup>13</sup> 23 pages including executive summary, table of contents, and title page.
- <sup>14</sup> There is a wide literature on each of these points. For a short analysis, see my report *Prairie Atoms: The Opportunities and Challenges of Nuclear Power in Alberta and Saskatchewan* (Calgary: Canada West Foundation, September 2008). Available at <http://www.cwf.ca>
- <sup>15</sup> Government of Alberta, "Alberta government releases Nuclear Power Expert Panel report: Process to gather views from Albertans begins next month," *News Release* (26 March 2009) and Government of Alberta, *Alberta Nuclear Consultation* (April 2009). These documents can be accessed online at <http://www.energy.alberta.ca>
- <sup>16</sup> Citizens Advocating the Use of Sustainable Energy (CAUSE), *Response to the Alberta Nuclear Panel Report* (7 April 2009). This document can be accessed online at <http://www.nuclearfreealberta.ca>
- <sup>17</sup> Confidential email received by the author.
- <sup>18</sup> "Saskatchewan considers its nuclear options," *World Nuclear News* (21 October 2008).
- <sup>19</sup> Cassandra Kyle, "Environment group questions uranium panel objectivity," *Saskatoon StarPhoenix* (21 October 2008), A7.
- <sup>20</sup> Uranium Development Partnership, *Capturing the full potential of the uranium value chain in Saskatchewan*, (31 March 2009). This document can be accessed online at <http://www.gov.sk.ca>
- <sup>21</sup> Small reactors, which are designed for remote towns and industrial sites, are those that generate between 10-300 MW of electricity.
- <sup>22</sup> Angela Hall and Joanne Paulson, "Long-awaited uranium report released," *Saskatoon StarPhoenix* (4 April 2009).
- <sup>23</sup> Jim Harding, *Canada's Deadly Secret: Saskatchewan uranium and the global nuclear system*, (Fernwood: Halifax and Winnipeg, 2007), 157.
- <sup>24</sup> Jim Harding, "The Sask-Party Government's Uranium Development Partnership (UDP) Report," *Lake Ontario Waterkeeper* (20 April 2009).
- <sup>25</sup> Government of Saskatchewan, "Public Consultation to Follow Release of Uranium Development Partnership Report," *News Release* (3 April 2009). This document can be accessed online at <http://www.gov.sk.ca>
- <sup>26</sup> <http://www.saskuranium.ca>
- <sup>27</sup> For more information on this fantastic story see William Marsden, *Stupid to the Last Drop: How Alberta is Bringing Environmental Armageddon to Canada (and doesn't seem to care)* (Knopf: Toronto, 2007), 2-41.
- <sup>28</sup> Canadian Nuclear Association, "Uranium Mining in Northern Saskatchewan," (2008), <http://www.cna.ca>. It should also be noted that the Cigar Lake mine flooded in October 2006 and is not expected to start up production again until 2011.
- <sup>29</sup> Graham F. Parsons and Ron Barsi, "Uranium Mining in Northern Saskatchewan: A Public-Private Transition," in Gary McMahon and Felix Remy, eds., *Large Mines and the Community: Socioeconomic and Environmental Effects in Latin America, Canada, and Spain* (The International Development Research Center/World Bank: Ottawa, 2001), 263-330.
- <sup>30</sup> Parsons and Barsi, 263-330. For a more critical look see Jim Harding who argues that "the historical chronology of uranium mining in Saskatchewan reveals how public inquiries have served the interests of Crown and private uranium corporations. Harding, *Canada's Deadly Secret*, 57.
- <sup>31</sup> Federal Environmental Assessment Review Agency, *Eldorado Uranium Refinery R.M. of Corman Park, Saskatchewan: Report of the Environmental Assessment Panel* (Ottawa, 1980).
- <sup>32</sup> Saskatoon and District Chamber of Commerce, *The Cost of Saying "No" to Opportunity: Lessons from the Rejection of the Warman Uranium Refinery* (May 2004).
- <sup>33</sup> Saskatoon and District Chamber of Commerce, *The Cost of Saying "No" to Opportunity*, 16.
- <sup>34</sup> For details on the activities of the slowpoke reactor see Jeremy Warren, "Saskatchewan's best-kept secret," *Saskatoon StarPhoenix* (19 May 2009).
- <sup>35</sup> Claudia Cattaneo, "Nuclear 'least acceptable' oilsands power source: Klein," *The National Post* (23 September 2005), FP5.
- <sup>36</sup> Dave Ebner, "Nuclear Pitch for Oil Sands," *The Globe and Mail* (17 August 2006).
- <sup>37</sup> Ralph Klein and Brian Tobin, with Gerry Angevine, *A Vision for a Continental Energy Strategy* (The Fraser Institute: Vancouver, February 2008). This document can be accessed online at [http://www.fraserinstitute.org/commerce.web/product\\_files/ContinentalEnergyStrategy2008.pdf](http://www.fraserinstitute.org/commerce.web/product_files/ContinentalEnergyStrategy2008.pdf)
- <sup>38</sup> Jason Fekete and Tony Seskus, "Nuclear option divides Alberta," *Calgary Herald* (11 February 2007).
- <sup>39</sup> Diotte, "Nuke power input urged."
- <sup>40</sup> Interview by the author with David Swann, Alberta Liberal leader (1 May 2009).

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- <sup>41</sup> Karen Howlett, "With two proposed reactors, Saskatchewan joins Ontario in nuclear renaissance," *The Globe and Mail* (18 June 2008).
- <sup>42</sup> Premier Brad Wall, *Address to the Canadian Nuclear Association*, (Ottawa, 26 February 2009).
- <sup>43</sup> Quoted in Harding, *Canada's Deadly Secret*, 225.
- <sup>44</sup> John Gormley, "NDP's nuclear meltdown," *Saskatoon StarPhoenix* (3 April 2009).
- <sup>45</sup> For a detailed, albeit critical, look at the 1992 NDP motion see Harding, *Canada's Deadly Secret*, 180-190.
- <sup>46</sup> Editorial. "Anti-nukes dragging NDP back to past," *Saskatoon StarPhoenix* (2 April 2009).
- <sup>47</sup> Luke Simcoe, "Nuclear power condemned," *Saskatoon StarPhoenix* (1 April 2009).
- <sup>48</sup> Deb Higgins, a MLA and NDP leadership candidate Deb Higgins was not at the vote.
- <sup>49</sup> Wayne Henuset, "Nuclear's New Frontiers and Canada's Oil Sands," *Presentation to the Canadian Nuclear Association*, (Ottawa, 1 March 2007).
- <sup>50</sup> Fekete and Seskus, "Nuclear Option divides Alberta."
- <sup>51</sup> Areva, "Supporting the Shift," *Annual Report 2007*. This document can be accessed online at [http://www.arevaresources.com/publications/annual\\_report\\_2007/supporting.html](http://www.arevaresources.com/publications/annual_report_2007/supporting.html)
- <sup>52</sup> Regina Leader-Post and Sigma Analytics, "Uranium Development and Nuclear Power Generation," *Survey Report* (April 2009). This document can be accessed online at <http://www.leaderpost.com/pdf/UraniumNuclearTrackingReportApril09.pdf>
- <sup>53</sup> Regina Leader-Post and Sigma Analytics, "Uranium Development and Nuclear Power Generation."
- <sup>54</sup> The International Brotherhood of Electrical Workers (IBEW) signed an agreement with Bruce Power to develop a nuclear power option for Saskatchewan. See the letter of agreement between Neil Collins, Business Manager and Financial Secretary for IBEW Saskatchewan Local 2067 and Duncan Hawthorne, Bruce Power President. This letter can be accessed at <http://www.cbc.ca/news/pdf/sk-ibew.pdf>
- <sup>55</sup> Personal interviews with Hal Kvisle (President of TransCanada) and Armand Laferrere (President of Areva Canada).