

The Future of Nuclear Energy in Saskatchewan

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Uranium Development Partnership

- UDP was created in Nov 2008 to make recommendations to the govt on value-added opportunities in the uranium industry:
 - Exploration and mining
 - Conversion
 - Enrichment
 - Reactor fuel manufacturing
 - Nuclear reactors for electricity

Uranium Development Partnership

- Chaired by Richard Florizone
- Industry dominated
 - Hawthorne, Grandey, Laferrere
- UDP report released in March 2009
- Identified a number of priorities
 - Nuclear power generation was one of them

Drivers of UDP

- Increasing electricity demand
- Mitigating the effects of climate change
- Increasing uranium value-added
- Political support

Drivers: Electricity Demand

- 812-2,230 MW of new electricity by 2020 (Bruce Power)
- SaskPower
 - 3,300 MW by 2030 due to replace and new
 - Electricity demand has risen by 2.1% through 2007
 - Electricity demand will rise by 2.9% until 2020

Drivers: Climate Change

- Over 60% of Sask's electricity comes from coal and natural gas.
- SaskPower “with new environmental regulations imminent reliance on conventional coal-fired generation is unlikely to be feasible”

Drivers: Climate Change

- Sask is a major fossil fuel producer
 - Trails only Ontario, Quebec, and Alberta in total GHG emissions
 - Sask has the highest GHG emission growth rate in Canada
 - Four times the national average
 - Higher than Alberta

Drivers: Climate Change

- Bruce Power
 - A 1, 000 MW reactor would reduce Sask GHG emissions by 1.7 mega tonnes annually.

Drivers: Uranium value-added

- Leverage Sask's uranium reserves
- Wall "the next ounce of yellowcake that we add any value to at all will be the first"
- Purpose of UDP

Drivers: Political Support

- Brad Wall is the most nuclear-friendly politician in Canada
- UDP vision
- Canadian Neutron Centre proposal
- \$30M commitment to Fedoruk Centre
- “replace coal plants with small nuclear facilities”



Drivers: Political Support

- 60 years of largely All-Party Support
- 1940-1950s
 - CCF initiated uranium mining
- 1960s
 - Liberals established Rabbit Lake mine
- 1970s-1980s
 - NDP created Sask Mining Development Corp
 - Forerunner to Cameco
 - Approved two new uranium mines
 - Supported Warman Refinery


Drivers: Political Support

- 1980s-1991
 - PCs pursued CANDU-3
- 1991-2007
 - NDP opened up five new uranium mines
 - Sought out value-added uranium production
 - Lorne Calvert welcomed “private investment” for “uranium refining”

Public Consultation Process

- Dan Perrins headed public consultation process
- April 6-July 31, 2009
- Stakeholder conference
- Public hearings
- Oral/written submissions
- Special opportunities for First Nations/Metis
- Website
- 2,600 people attended public hearings
- 1,300 letter/email responses

URANIUM DEVELOPMENT PARTNERSHIP - (UDP)
"The Future of Uranium in Saskatchewan"



PUBLIC HEARINGS

The UDP report recommends building nuclear reactors, a uranium enrichment facility and a nuclear waste dump as a way to "add value" to Saskatchewan's uranium resource. This is a major decision that will affect future generations and limit our options for developing renewable energy. The government is holding public meetings through the month of June to gather input from citizens on this important issue. Read the report and check out the workbook available at www.saskuranium.ca Get more information at www.cleangreensask.ca

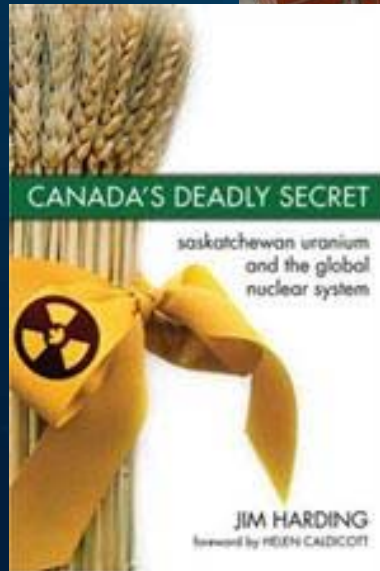
MAKE YOUR VOICE HEARD !

June 15, 2009 Travelodge Hotel
7:00 - 9:30 pm 106 Circle Dr W
Saskatoon, SK

Everyone Welcome & Encouraged to Attend

Anti-nukes mobilized against UDP

- Clean Green Saskatchewan
- Saskatchewan Environmental Society
- Inter-Church Uranium Committee Educational Co-Operative
- Saskatchewan Union of Nurses



Anti-Nuclear Policy Beliefs

- Nuclear reactors are unsafe (Chernobyl)
- The entire fuel cycle creates radiation which causes cancer
- Reactors produce nuclear waste that lasts for hundreds of thousands of years
- Nuclear energy is not a solution to climate change, and instead resources should be devoted to conservation and renewable energy sources
- There is a clear link between civilian nuclear energy and military nuclear bombs
- Nuclear energy is uneconomical and is highly subsidized by the government

Public Consultation

- The Future of Uranium released Sept 2009
- Perrins was only to summarize feedback
- No advocacy role either pro or anti
 - 85% opposed to nuclear power generation
 - 70% opposed to uranium upgrading
 - 86% opposed to nuclear waste storage
 - 42% opposition to nuclear r & d
 - 88% opposition to UDP strategy
 - 98% support for renewable energy
 - 95% support for reducing energy consumption

Public Consultation

- Not statistically representative sample of public opinion
- But a wide range of opposition
 - Environment, labour unions, peace, religious
 - Geographic scope across province
 - Range of arguments
 - Economic, health, safety, environmental, peace
- Opponents participated more than supporters
- This illustrates higher intensity

Outcome of UDP/Public Consultation Process

Sask govt Dec 2009
“directing SaskPower to continue including nuclear power in the range of energy options available for additional baseload generation capacity in the medium and long term after 2020”



Outcome of UDP/Public Consultation Process

- How can we reconcile Dec 2009 decision (and subsequent announcements) with the results of the public consultation?
 1. Wall govt is “massively pro-uranium industry and pro-development”
 - Wall govt delayed reactor decision solely due to cost, not other factors

Outcome of UDP/Public Consultation Process

- Explaining the gap between Wall's vision and public concern over nuclear energy
- Wall believed Public Consultation was flawed
 - 85% responders were opposed to nuclear energy, not 85% of Saskatchewanians
 - Perrins “no statistical reliability”
 - Govt “recent independent polling has shown support for nuclear industry”
 - Methodological problems
 - Coding
 - Factual accuracy of responses

Outcome of UDP/Public Consultation Process

2. Policymakers must “somehow balance expertise with democracy.”
3. Wall govt accepted arguments from nuclear scientists (academy and industry) and discounted public opinion.

Outcome of UDP/Public Consultation Process

- Dec 2009 decision was followed up by other pro-nuclear announcements
- January 2011, Wall announces nuclear agenda
 - Nuclear medicine
 - Nuclear research & development
 - **Small** reactors for electricity (less than 500 MW)

Political Impact of Japan's Nuclear Crisis

- March 2011 Japan was hit by a trio of disasters
 - 9.0 earthquake
 - Massive Tsunami
 - Loss of electricity
- Fukushima Daiichi Nuclear Power Plant was hit
 - 150 KM NE of Tokyo
 - Edge of Pacific Ocean



Political Impact of Japan's Nuclear Crisis

- Sask govt has affirmed its nuclear agenda
- Rob Norris, Minister responsible for SaskPower
 - “ethical obligation” to move forward with uranium mining
 - Develop a PPP for small reactors in Sask



Post-Fukushima Developments

- Establishment of Fedoruk Centre
- SaskPower and SMRs
- SMRs at uranium mines

Fedoruk Centre

- Sylvia Fedoruk Canadian Centre for Nuclear Innovation was established in 2011.
 - \$30 million Sask govt commitment over 7 years
- Goal is to place Saskatchewan among global leaders in nuclear research, development and training through investment in partnerships with academia and industry for maximum societal and economic benefit.

Fedoruk Centre

1. Project funding

- Nuclear Medicine
- Nuclear Materials
- Nuclear Energy
- Physical and Social Environment

2. Encourage collaboration

- Scientists and labs outside Sask
- Business sector

3. Nuclear Infrastructure

- Cyclotron

Cyclotron

- a world-class centre for research, training and innovation in nuclear medicine—including radiochemistry, physics and development of new radiopharmaceuticals for medical imaging.



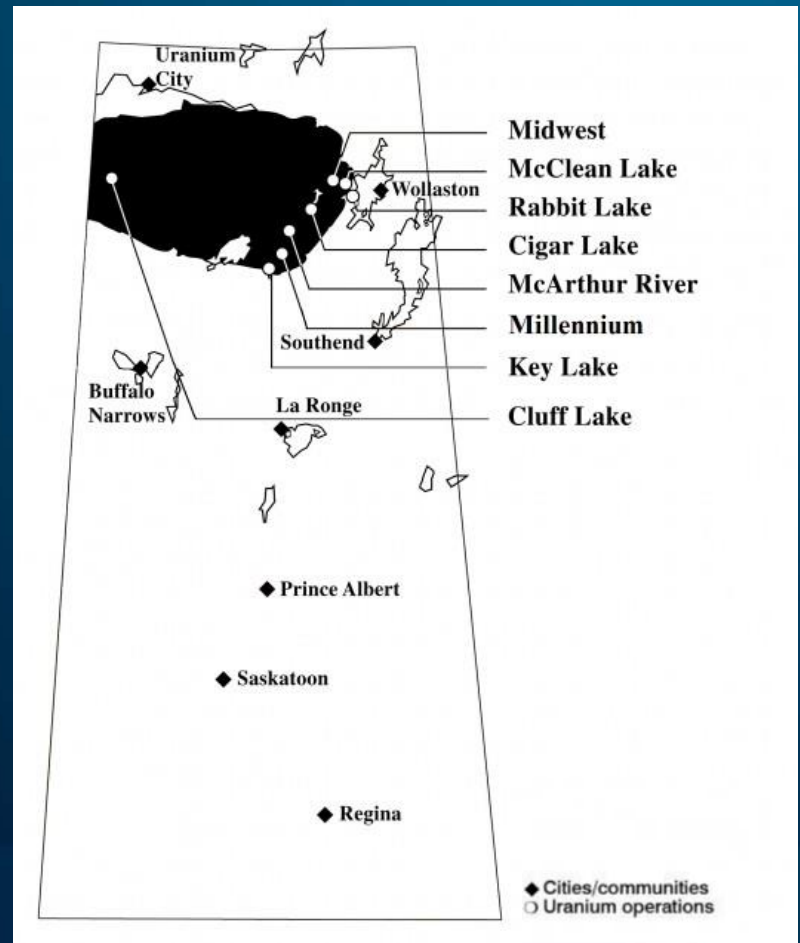
SaskPower and SMRs

- SaskPower CEO Robert Watson (2014)

“If you put a big one 1,000 or 1,500 megawatt power plant in one spot, you have to upgrade the whole transmission grid to handle it. So it’s not just the plant, you have to upgrade the whole grid. But smaller reactors known as SMRs (Small Nuclear Reactors) are now being developed. We’re keeping a watching eye on those – nothing decided, but we’re watching those, because they come in anywhere from 50 megawatt sizes to 300. And for Saskatchewan that’s kind of the perfect size.”

Uranium Mines and SMRs

- One possible location for a SMR is in the uranium mines in Northern Sask



Uranium Mines and SMRs

- Benefits to the mine
 - Reduce the cost of diesel fuel
 - Lessen the emissions from mining
- Benefits to Northern Saskatchewan
 - Better/cheaper way of electrifying the region

SMR Challenges

- Regulation/Licensing
- Prototypes not built
 - NuScale is building one at Oregon State U.
- Who wants to be first in Canada?

Future of Nuclear Energy in Saskatchewan

- Old debate
 - Same issues
 - Same actors
 - Same arguments

Future of Nuclear Energy in Saskatchewan

- New Features
 - Climate Change
 - Political Impact of Fukushima Accident
 - Impact of Fedoruk Centre