Business Case and Risk Assessment

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Manitoba Hydro

Preferred Development Plan

- Manitoba Hydro is seeking government approval for its Preferred Development Plan, which requires the following commitments in June 2014:
  - start construction of the Keeyask generating station (G.S.) for a 2019 in-service date (ISD)
  - proceed with a 250 MW export agreement with Minnesota Power (MP)
  - proceed with a 750 MW U.S. transmission interconnection
  - proceed with a 100 MW export agreement with Wisconsin Public Service (WPS)
  - proceed with a 300 MW export agreement with WPS subject to satisfactory conclusion of negotiations currently still underway.
- In addition, the plan would include Conawapa G.S., 1,485 MW, with an earliest ISD of 2026, although decisions on whether to construct Conawapa and its timing are not required now and would be made over the next few years.
- The benefits and costs of protecting Conawapa ISDs will be monitored and evaluated on an ongoing basis considering updated DSM levels, load forecast, export negotiations, wind costs, energy prices, etc

Development Plan Choices

- Should the next major electrical resource in Manitoba be hydro or gas? (i.e. a choice between Pathways 1 and 2)
- Should a 250 MW interconnection proceed along with the 250 MW MP sale? (i.e. should Pathway 3 proceed?)
- Should a 750 MW interconnection proceed along with the 250 MW MP sale? (i.e. should Pathway 4 proceed?)
- Should a 750 MW interconnection proceed along with the 250 MW MP sale, 300 MW WPS sale and transmission development agreements with both MP and WPS? (i.e. should Pathway 5 proceed?)

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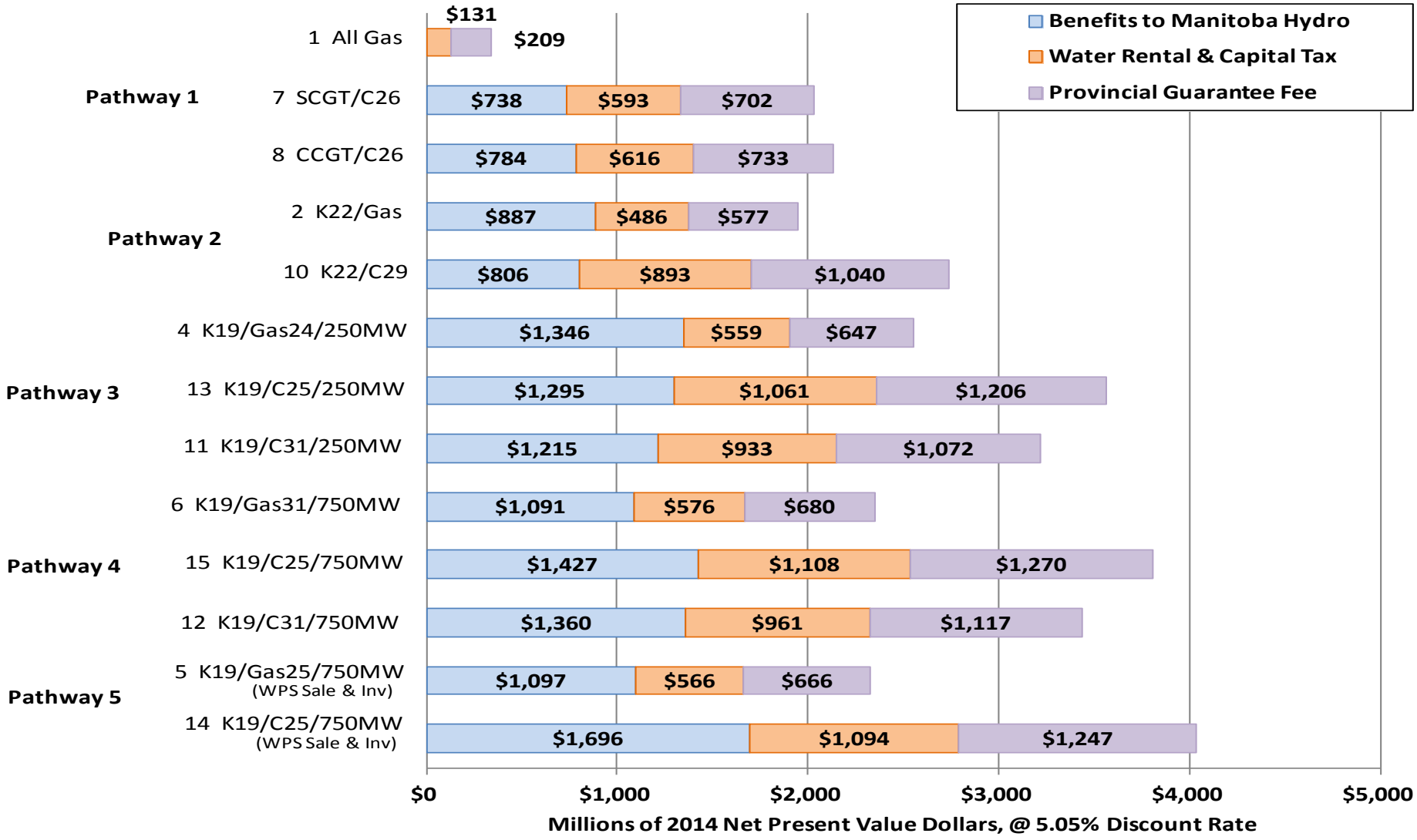
Comparison of Development Plan Net Present Values



Comparison of Development Plan Net Present Values

- Compared to the All Gas Plan, the NPV benefit of the Preferred Development Plan is higher by $1,696 million considering only Manitoba Hydro economics and $3,697 million when also considering Manitoba Hydro transfers to the Province from provincial debt guarantee fees, water rentals and capital taxes.
- The total corporate and provincial economic NPV of $3,697 million is equivalent to almost $300 million (2020 $) per year for 60 years starting in 2020 or about $600 per year for each of Manitoba's approximately 500,000 residential households.

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Development Plan Implementation Pathways

Path-way	Description	First New Generation	Inter-connection	Export Pathway	Subsequent Generation
1	Gas 2023 only for domestic load. Later gas generation or hydro **(or wind or DSM or other)**	Gas 2023	None	None	Gas, Keeyask or Conawapa or wind/ DSM/other
2	Keeyask 2023 only for domestic load	Keeyask 2023	None	None	Conawapa or Gas or wind/DSM/other
3	Keeyask 2019, 250MW Interconnection, MP Sale, 125 MW NSP extension, 100 MW WPS sale	Keeyask 2019	250MW	Small - MP sale and investment, 100 MW WPS sale	Plan on Conawapa 2030 but can advance or switch to gas/wind/DSM/other
4	Keeyask 2019, 750MW Interconnection, MP Sale, 125 MW NSP extension 100 MW WPS sale	Keeyask 2019	750MW	Small - MP sale and investment, 100 MW WPS sale	Plan on Conawapa 2033 but can advance or switch to gas/wind/DSM/other
5	Keeyask 2019, 750MW Interconnection, MP Sale, 125 MW NSP extension & 300 MW WPS Sale	Keeyask 2019	750MW	Large - MP & 300 MW WPS sale and investment	Plan on Conawapa 2026 but can defer or switch to gas/wind/DSM/other

Summary of Economic Evaluation Pathways 1 and 2

- For plans with no new interconnection:
  - Plans with hydro next and no interconnection are clearly more economic than the All Gas Plan.
  - Plans with Keeyask/Gas and no interconnection are more economic than plans with Conawapa next.
  - Plans with either a 250 MW or 750 MW new interconnection are clearly more economic than plans with no new interconnections.

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Summary of Economic Evaluation Pathways 3 vs 4

Comparing plans with a 250 MW new interconnection (Pathway 3) and a 750 MW new interconnection but no WPS (Pathway 4), the economic evaluations indicate no clear overall preference between Pathways 3 and 4 and suggest that:

- If there is an expectation Conawapa will be built in the next two decades, the 750 MW interconnection (Pathway 4) is more economic.
- If there is an expectation Conawapa will not be built for several decades, the 250 MW interconnection (Pathway 3) is more economic.
- The most economic plan with the 250 MW interconnection (Pathway 3, Gas) is more economic than the most economic plan with the 750 MW interconnection (Pathway 4, Conawapa).

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Summary of Economic Evaluation Pathway 5

- The Pathway 5 plan with the WPS Sale and WPS Transmission Agreement and Keeyask followed by Conawapa is generally more economic than the other plans.
- However, under certain scenarios it is less economic. One driver of such cases is when energy prices are low; this can be mitigated by displacing Conawapa with gas generation.

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Summary of Economic Evaluation

The economic evaluations undertaken conclusively demonstrate that Pathways 3, 4 and 5 plans are clearly preferred to Pathways 1 and 2 plans. However, a clear and decisive preference between the 250 MW and 750 MW interconnection plans (Pathways 3, 4 and 5) cannot be established on the basis of only these evaluations, but must consider additional information. Such additional information would include:

- qualitative consideration of factors not currently included in economic (and financial) evaluations, such as updates to interconnection capital costs, outcome of WPS negotiations and possible alternate or additional export agreements
- financial and multiple accounts evaluations
- flexibility and risks
- reliability and energy security
- environmental and socio-economic impacts and benefits.

Submission Rationale for Wind Conclusions

Chapter 9 Evaluation Results (Reference Scenario NPVs $M)	All Gas Plan	No Interconnection Conawapa 2026
No Wind	Only Gas NPV= $0 M	Gas 2022 to 2025 NPV= $784 M
Wind	Wind supported by gas capacity NPV= -$775 M	Wind 2022 to 2025 NPV= $531 M

Wind costs may reduce and thus improve the economics of wind but much improvement required

What if Wind Economics Improve with 750MW Interconnection?

Chapter 9 Evaluation Results (Reference Scenario NPVs)	**All Gas Plan**	**Preferred Plan 750 Interconnection, MP& WPS Sales Keeyask 2019 Gas 2025**	**Preferred Plan 750 Interconnection, MP& WPS Sales Keeyask 2019 Conawapa 2025**
Base Evaluations	$ 0	$1097 M	$1696 M
If wind & gas in Preferred Plan were more economic than adding just gas because 750 interconnection helps wind		$1097 M + ???	

Adding wind to a 750MW Interconnection Plan with Gas either:

1) Is not more economic compared to just gas or
2) instead would improve economics of the Preferred Plan.

Decisions will be made at later time on resources after Keeyask : such as DSM, gas , wind, Conawapa, etc.

Factors not currently included in Economic, Financial and Multiple-Account Evaluations

- 2013 Update to Forecasts and Related Assumptions
- Decrease in Capital Cost Estimates for U.S. Portion of 750 MW Interconnection
- Enhancements to the New Interconnection Capacities
- WPS Export Sale and Transmission Investment Agreement Status
- MH divest investments in 750 MW Interconnection
- Other Firm Export Sales: U.S. and Canada
  - e.g. SaskPower, NSP
- New Interconnection Increasing Export Market Diversity and Prices

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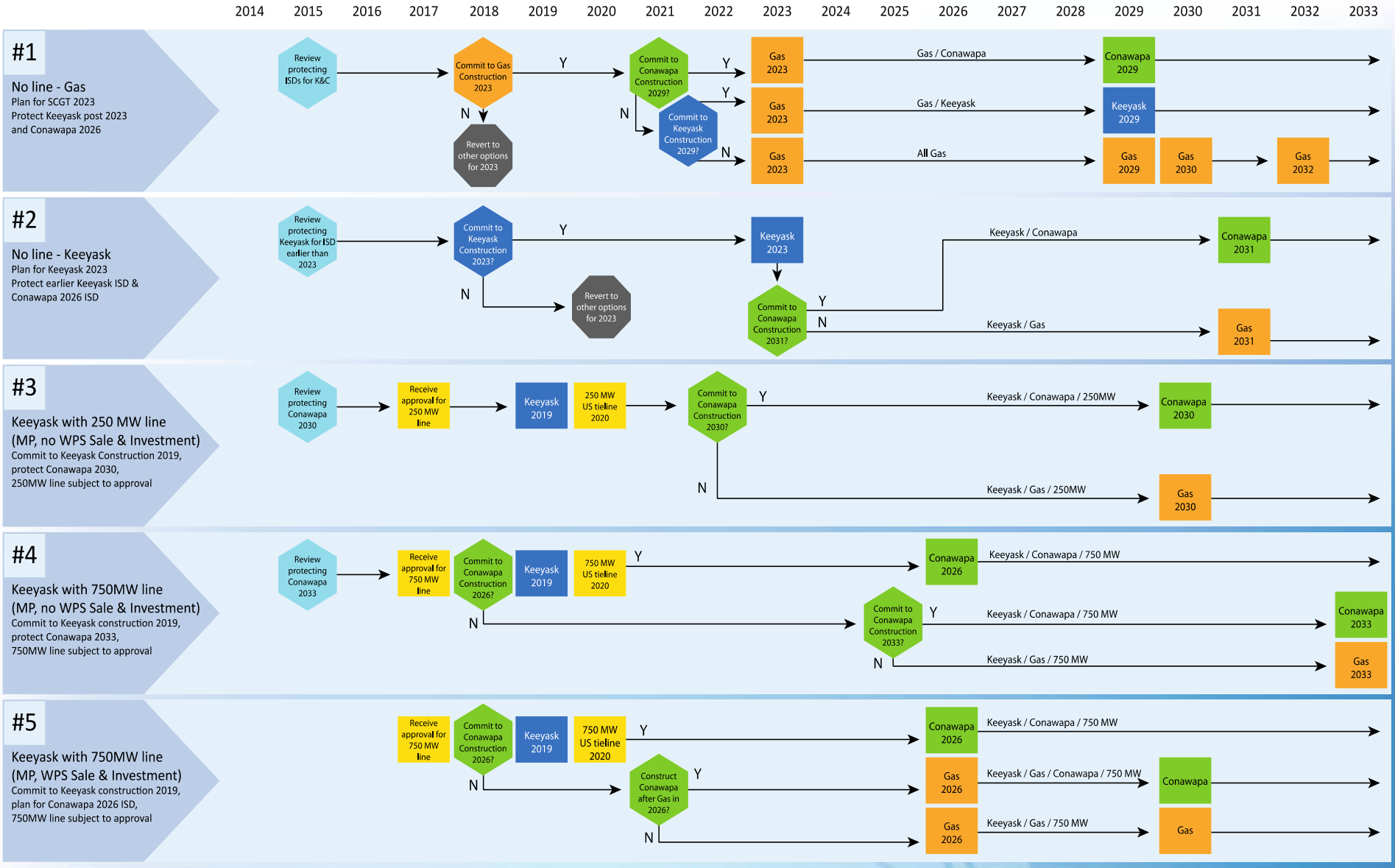
Pathway Decision Tree



Pathway 3 and Pathway 4

- Economic evaluations indicate no clear overall preference between them:
  - If Conawapa is built within 20 years, Pathway 4 is more economic.
  - If Conawapa is delayed beyond 20 years, Pathway 3 is more economic
  - The most economic plan of Pathway 3 (Gas) is more economic than the most economic plan of Pathway 4 (Conawapa).
- Using same Conawapa ISD for Pathway 3 and 4, the medium-term net debt balances and medium-term rate increases are not significantly different.
- Financial evaluations do significantly differ when comparing plans with different ISDs for Conawapa.
- Keeyask/Conawapa with 750 MW Interconnection compared to Keeyask/Gas with 250 MW Interconnection shows:
  - Rate increases in medium term which are higher for a short period but lower post 2035.
  - Long term corporate financial parameters involve higher retained earnings (protecting against adverse effects).
  - Total net debt balance in the medium-term would be a significant (but manageable) challenge.
- Pathway 4 has more flexibility to respond to changing circumstances and take advantage of new sales, opportunities, and provides greater cost savings as well as greater enlargement to other benefits

Summary of Pathways

- Pathway 5 is preferred over other pathways because it has lower net costs, lower long-term rates, higher provincial transfers, greater social and environmental benefits, greater enhancement of reliability of supply and energy security.
- Should the WPS sale negotiations fail to conclude successfully, Pathway 5 could evolve to either Pathway 3 or 4.

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Conclusion: Pathways 4 and 5 are preferred because they:

- Result in the best economic outcomes over a range of scenarios and lowest long-term rates to customers
- Support Manitoba Hydro's long-term fiscal health
- Protect customer service through system reliability and energy security
- Support risk management and flexibility
- Provide the highest financial benefits to the Province and to Manitobans
- Offer the highest level of socio-economic benefits to Manitobans
- Most beneficial package of socioeconomic impacts and benefits to Northern and Aboriginal Communities
- Capitalizes upon Manitoba's endowment of renewable hydropower.
- Supports Manitoba's Clean Energy Strategy and Sustainable Development Principles

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Key Risk Factor - Energy Prices				
Electricity Price Forecast	Lower electricity prices than forecast	Lower export revenues	Utilize a concensus-based forecast of five independent consultants to produce high, expected and low forecasts Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Natural Gas Price Forecast	Lower natural gas prices than forecast	Lower export revenues and lower thermal operating costs in the long run	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
MISO Load	Diminished sale opportunities in the export market (firm and opportunity)	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Carbon Policy	Uncertainty towards implementation, timing and level of carbon pricing	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018
Other U.S. Environmental Policies	Uncertainty towards implementing a series of proposed U.S. environmental policies, their stringency and overall impact. (MATS, ash lagoon, CO2 for new coal, CASPR, US RPS)	Lower export revenues	Negotiate term sheets and contract agreements prior to committing to hydro development	Conawapa development will continue to be re-assessed prior to project commitment in 2018

Extract of Table 15.9 from Chapter 15

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Key Risk Factor - Capital Cost or In-Service Date				
Keeyask and Conawapa	Labour escalation, labour shortages, low productivity rates and associated increased indirect costs.	Higher capital costs and potential for ISD delays	Labour and Escalation Management Reserve Fund created for budgeting purposes High quality camp accommodations to aid in attracting workers, comparable to other northern remote Canadian project camps Modifications to isolation leaves in the BNA Early Contractor Involvement contractor for the General Civil Contract	Increased staff-to-craft ratios and turnarounds relative to Burntwood Nelson Agreement Implementation of labour strategy
	Higher commodity prices, equipment and material costs (direct costs)	Higher capital costs	Escalation Management Reserve Fund created for budgeting purposes	Transfer of portion of commodity price risk to contractors through contract terms
	Delays incurred after start of construction	Higher capital costs, delay to ISD	Utilizing contracting strategies that involve contractors in the design phase and minimize Contractor interfaces	Input from General Civil Contractor to maximize constructability and optimize schedule
	Lack of competitive bidding on contracts	Higher capital costs, limited contractor availability, potential for schedule delays	Consulted with potential bidders for major contracts in the design phase to gauge interest (vendor development) Contract packaging that aligns with prevailing market conditions, attracting contractor interest Improved engineering process	Improved contract management process and coordination
	Contract estimate accuracy	Higher capital costs	Adjusted contract estimates based on Wuskwatim experience and prevailing market conditions	Effective management of contracts and project schedule

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Thermal Generation	Commodity escalation, schedule overruns and environmental legislation	Higher capital costs	Thermal resources have been minimized in the Preferred Development Plan	
Transmission in Manitoba	Final routing, commodity escalation, schedule overruns and environmental legislation	Higher capital costs, lower export revenues if export sales cannot be served	The approval process for the interconnection has been initiated and sale contracts provide for up to two year delay. Community consultations on the Keeyask Generator Outlet Transmission are completed and the licensing process is underway. Planning is underway for North-South Manitoba transmission; signed and proposed firm contracts can proceed without this infrastructure.	Generation ISDs could be adjusted if transmission is delayed.
Key Risk Factor - Economic Factors				
Exchange Rate (CAD/USD)	Future exchange rates	Higher volumes of export sale revenues and U.S. denominated debt exposed to U.S. exchange rate risk	Manitoba Hydro maintains a natural hedge with U.S. dollar cash flows, including outflows from US denominated debt. The U.S. debt portfolio may occasionally be rebalanced in accordance with US dollar cash flows.	
Inflation Rates (U.S. & Cdn)	Future inflation rates	Erosion of export revenues from long term contracted sales due to inflation. High upfront capital investment and commodity / labour cost increases subject to inflation	Price escalators are included in export contract terms and conditions. Construction contracts share escalation risk with the contractor by indexing the supply price of major commodity based materials (e.g. reinforcing steel, copper, cement etc.) to market indices and allowing for pre-purchase of materials to take advantage of lower market prices if and when they exist. Capital costs include an allowance for real escalation as described in Appendix 9.3, Section 2.1.3, Table 2.4.	
Interest Rates	Future interest rates	Interest rates would affect capital cost and finance expense	Manitoba Hydro manages the aggregate level of interest risk rate within the debt portfolio arising from short-term debt, floating rate long-term debt, as well as the amount of long-term debt to be refinanced. When selecting terms for its new borrowing, Manitoba Hydro gives careful consideration to the debt maturity schedule and the total level of annual financing requirements.	

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Specific Risk Factor - Drought				
Multi-year drought	Extended periods of low flows in the hydraulic system	Preferred Development Plan is not sufficient to meet load commitments	Under drought conditions, Manitoba Hydro has the contractual right to curtail firm export deliveries in order to serve Manitoba load first. Retained earnings are being maintained to protect against the financial impact of potential droughts. Equity provides buffer to absorb adverse events so that compensating rate increases can be smoothed out over a period of time.	
Drought worse than drought of record used for system energy planning occurs	Extreme low flows for one season	Preferred Development Plan is not sufficient to meet load commitments		
Specific Risk Factor - Climate Change				
Long-Term Climate Change	Impact on precipitation and temperature	Lower export revenues or inability to meet load commitments	Monitoring potential impacts of climate change scenarios on NPV of Preferred Plan and All Gas plan.	Climate change will continue to be studied. New interconnection capacity will provide enhanced ability to adapt to load changes.
Specific Risk Factor - Manitoba Load/ DSM				
Manitoba Load Growth	Potential for higher/lower than expected load Also potential for large industrial load addition or subtraction	Potential impact to the need date for new resources Higher load could require new thermal generation Lower load would increase surplus energy and capacity which in turn would increase export revenue potential and may defer in-service dates	Manitoba Hydro's NFAT analysis and pre-construction planning consider varying levels of load growth and the Preferred Development Plan provides the most flexibility to adapt to changing load (See Chapter 14)	Utilize imports or may need to build thermal as a short term solution. Conawapa development will continue to be re-assessed prior to project commitment in 2018. New interconnection capacity will provide enhanced ability to adapt to load changes.
Manitoba DSM	Potential for higher/lower than expected load due to Future Power Smart programs and/or customer response		Manitoba Hydro's NFAT analysis and pre-construction planning consider varying levels of load growth and the Preferred Development Plan provides the most flexibility to adapt to changing load (See Chapter 14) Engaged EnerNOC to work with Manitoba Hydro to assess the 20-year potentials of energy efficiency for electricity (See Appendix 4.3)	Continual review and pursuit of new program opportunities and current program effectiveness. Conawapa development will continue to be re-assessed prior to project commitment in 2018. New interconnection capacity will provide enhanced ability to adapt to load changes.

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Other Risk Factors				
Export Contract Terms	Final terms of WPS sale not determined Other future firm contract terms subject to future contract negotiations	Lower export revenues	Firm export contracts signed prior to project commitment including provisions that exempt Manitoba Hydro in the case of regulatory delay or cancellation. New, additional contracts are being pursued with both existing and new customers. Ongoing efforts to maintain existing and establish new relationships to meet customer needs.	Conawapa development will continue to be re-assessed prior to project commitment in 2018.
New U.S. Transmission Interconnection Capacity and Ownership	Final design and capital allocation among proponents	Higher Manitoba Hydro capital cost contribution and higher ongoing operating costs	Minnesota Power is the proponent for the new U.S. portion of the interconnection and sales agreements are contingent on required approvals. Conawapa development will continue to be re-assessed prior to project commitment in 2018.	
Market Access	Potential for legal or regulatory restrictions which would prevent Manitoba Hydro's surplus power from reaching the competitive marketplace free from unreasonable legal, regulatory, structural or tariff barriers	Lower export revenues	Ongoing efforts to maintain existing and establish new relationships to meet customer needs. Pursuing large tie line to expand ability to serve new markets with firm transmission access. Continue participation in MISO tariff task forces. Ensure legal requirements are understood and Manitoba Hydro legal interests are represented in establishing tariffs.	

Summary of Manitoba Hydro's Risk Mitigation Actions for the Preferred Development Plan

Driver	Description	Potential Risk to Preferred Plan	Risk Mitigation Actions	
			Pre-commitment	Post-commitment (Planned)
Species at Risk Act (SARA)	The federal government is considering listing Lake Sturgeon under SARA.	If Lake Sturgeon are listed, the projects could be delayed or cancelled; if the projects proceed, they will require permits	Manitoba Hydro is working with northern communities and resource managers to develop and implement programs to benefit Lake Sturgeon (Appendix 2.1); recent studies have indicated results from these programs, some of which go back two decades.	Manitoba Hydro will continue to work on Lake Sturgeon management and enhancement programs. For the Keeyask and Conawpa Projects, habitant will be enhanced to address the loss of existing sturgeon habitat, and stocking will be implemented to increase regional populations.
Legislation for Environmental Reviews	The federal and provincial legislation require public reviews of the potential environmental effects of the projects	If approval is not receive, the project(s) cannot proceed	A thorough environmental assessment using "Western" science and Aboriginal traditional knowledge has been completed for the Keeyask Project and is underway for the Conawapa Project. During the process, many potential adverse effects are avoided and extensive mitigation measures address other potential adverse effects (section 2.1.3).	Once regulatory approval is received, monitoring will be undertaken to determine if predictions in the assessment are correct and, if not, to help inform the development of adaptive management measures. The Keeyask G.S. will be designed to enable it to be retrofitted should monitoring determine that a fish passage structure is required.
Aboriginal Participation and Support	Manitoba Hydro is seeking Aboriginal support for northern hydroelectric projects	If support is not forthcoming, the projects could face challenges in getting regulatory approval and in marketing product in the U.S.	Negotiate agreements with Cree Nations prior to start of construction. Benefit-sharing (i.e. the Joint Keeyask Development Agreement) and adverse effects agreements have been negotiated with the four Keeyask Cree Nations. Process protocols have been established for negotiating Conawapa agreements (section 2.1.3.1).	While there are risks inherent to a business partnership, the Joint Keeyask Development Agreement incorporates a variety of terms intended to eliminate, mitigate, or provide mechanisms to deal with risks associated with developing the Keeyask Project as a partnership.
Socio-economic impacts to Gillam			Collaboration between Manitoba Hydro, Town of Gillam, Fox Lake Cree Nation, Northern Regional Health Authority, RCMP and others Harmonized Gillam development	


Thank you