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14 Conclusions

14.0 Chapter Overview

This chapter summarizes the development plan evaluation results from previous chapters and integrates these results using Development Plan Implementation Pathways to draw the Needs For and Alternatives To (NFAT) conclusions. Sections 14.2, 14.3 and 14.4 summarize the economic, financial and multiple-account evaluations of the main development plans. Section 14.5 provides a qualitative description of factors affecting the relative attractiveness of the plans but which are not included in the evaluations. Section 14.6 groups the development plans into five pathways to assist integration of results and assist in drawing conclusions on each of the commitment choices that must be made in June 2014 regarding future development. These commitment choices, and the concept of pathways, are introduced in Section 14.1. The development plan pathways are compared in Section 14.7, assuming the 300 MW Wisconsin Public Service (WPS) Sale negotiations conclude successfully, and secondly, assuming they do not conclude successfully. Section 14.8 provides the overall conclusion of the NFAT submission, which is extracted below.

Manitoba Hydro should proceed with the Preferred Development Plan and its associated pathways. Embarking on the Preferred Development Plan would not preclude modifying its scope if future conditions suggest that it is prudent to do so.

The immediate commitments in June 2014 are:

- start construction of Keeyask for a 2019 in-service date (ISD)
- proceed with the 250 megawatt (MW) export agreement with Minnesota Power (MP)
- proceed with the 100 MW export agreement with Wisconsin Public Service (WPS)
- proceed with the 750 MW U.S. interconnection subject to regulatory approvals
- proceed with the 300 MW export agreement with WPS subject to satisfactory conclusion of negotiations currently still underway.

In addition, the plan would include Conawapa Generating Station (G.S.), 1,485 MW, with an earliest ISD of 2026 (decisions on whether to construct Conawapa and timing would be made over the next few years).

Activities would continue by Manitoba Hydro to protect an ISD for Conawapa as early as 2026, but conditions will be continually monitored to determine if such continued investments are worthwhile and, ultimately, to determine if Conawapa should be constructed and for what ISD. These decisions will be influenced by factors such as the 300 MW WPS export agreement, other export agreement possibilities, energy prices, capital cost and load growth. The early ISD of 2026 for Conawapa could be protected with a modest investment (approximately $50 million) up to the filing of the Environmental Impact Statement in the summer 2015 after which the amount of investment would increase. A final decision on construction of Conawapa for an ISD of 2026 must be made by 2018.

14.1 Supporting Background

Additional electricity resources are needed in and around 2023 to meet domestic load growth. This is the case even with no new firm export commitments and with continued investment in demand side management (DSM or Power Smart). The 2023 forecast requirement date is based on the 2013 load forecast and assumes retirement of the coal generation at Brandon but that all the existing gas generation at Brandon and Selkirk continues to operate virtually indefinitely. Manitoba's need for new electricity resources could be somewhat earlier or later depending on factors such as increases or decreases in load growth, early retirement of existing gas generation and/or derates of the existing generation (***Chapter 4 – The Need for New Resources***).

Demand Side Management

Manitoba Hydro is continuing and, where economically feasible, expanding its commitment to DSM. Expansion of DSM was screened in as a primary resource option for inclusion in the

development plan. However, the DSM Market Potential Study was not available in time to evaluate different levels of DSM in the development plans for this submission. For this NFAT submission, economic evaluation sensitivities in ***Chapter 12 – Economic Evaluations - 2013 Update on Selected Development Plans*** demonstrated that increasing the DSM within even an extreme range for this analysis did not change the conclusion that the plans with 750 MW or 250 MW interconnections are clearly more economic compared to a plan without new exports or new interconnection. Based on these results, it was not necessary to further include different levels of DSM in the detailed evaluations of the development plans to be able to assess the attractiveness of the plans with the new interconnections and exports. Manitoba Hydro will update its Power Smart Plan, in consultation with government as required by *The Energy Savings Act*, by March 31, 2014, which will incorporate the information contained in the DSM Market Potential Study. In the process of updating the DSM plan, Manitoba Hydro will evaluate the possibility of a higher level of DSM. Manitoba Hydro's Power Smart staff have already been assessing emerging new energy efficiency opportunities (e.g. LED lighting, street lighting, etc.) and the corporation intends to pursue these opportunities at the appropriate time. The updated Power Smart plan will be included in future Power Resource Plans as part of whichever development plan and pathway is pursued by Manitoba Hydro at the conclusion of the NFAT process.

Other Resource Options

Manitoba Hydro has evaluated a wide range of technologies and specific resource options for meeting the new supply requirements starting in or around 2023. Options such as solar, nuclear, coal and biomass were screened out as not sufficiently attractive to consider as primary supply contenders in the development plans (***Chapter 7 – Screening of Manitoba Resource Options*** and ***Chapter 8 – Determination and Description of Development Plans***). Keeyask and Conawapa are the most attractive of the new hydro options. While wind farms have successfully been established in Manitoba and will continue to be considered, wind generation as a major generation supply in Manitoba was determined not to be economic at

this time. (***Chapters 9 – Economic Evaluations – Reference Scenario*** and ***Chapter 10 – Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***).

Gas generation, Keeyask, Conawapa and imports were short-listed as the most attractive options to consider in detail through the development plan evaluations. These options are combined with the export sale and interconnection options to form specific development plans (***Chapter 8 – Determination and Description of Development Plans***). The development plans were chosen as being representative of future electrical resource development options in Manitoba. It is fully recognized that, once initiated, any plan timing and selection of future resources will unfold differently than originally planned. Load growth will not be precisely what is forecast. Timing of new resources will certainly evolve. Levels of DSM will be different than assumed. Different additional export opportunities will present themselves. Other resources not specified as being included may well be added (e.g. customer self-generation, wind, biomass, solar and additional enhancement of existing Manitoba Hydro generation.) Existing gas generation in Manitoba is assumed in the plans to continue in operation until the end of the study period; instead, they may be retired earlier for reasons of equipment ageing, economics or environmental impacts such as emissions. In part because the development plans are flexible and include many possibilities, Manitoba Hydro is satisfied that the plans are representative of what will generally occur and that the evaluation conclusions will be valid for the decisions required over the next several years.

Recognizing the need for flexibility as to how any development plan will unfold over the long-term after the initial decisions are made at the completion of the NFAT process next year, Manitoba Hydro has grouped the development plans into “Development Plan Implementation Pathways”. The pathways are representative of the outcomes flowing from the choices that will be decided upon as the next step in Manitoba’s electricity future. These choices can be summarized as below, while the pathways are defined in Table 14.1:

- 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?)

Table 14.1 Development Plan Implementation Pathways

Pathway	Description	First New Generation	Inter-connection	Export Pathway	Subsequent Generation
1	Gas 2023 only for domestic load. Later gas generation or hydro (or other)	Gas 2023	None	None	Gas, Keeyask or Conawapa
2	Keeyask 2023 only for domestic load	Keeyask 2023	None	None	Conawapa or Natural Gas
3	Keeyask 2019, 250MW Interconnection, MP Sale, 125 MW NSP extension, 100 MW WPS sale but not 300 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
4	Keeyask 2019, 750MW Interconnection, MP Sale, 125 MW NSP extension 100 MW WPS sale but not 300 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
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 up to 2018

(ISDs are based on the 2013 Load Forecast and related assumptions)

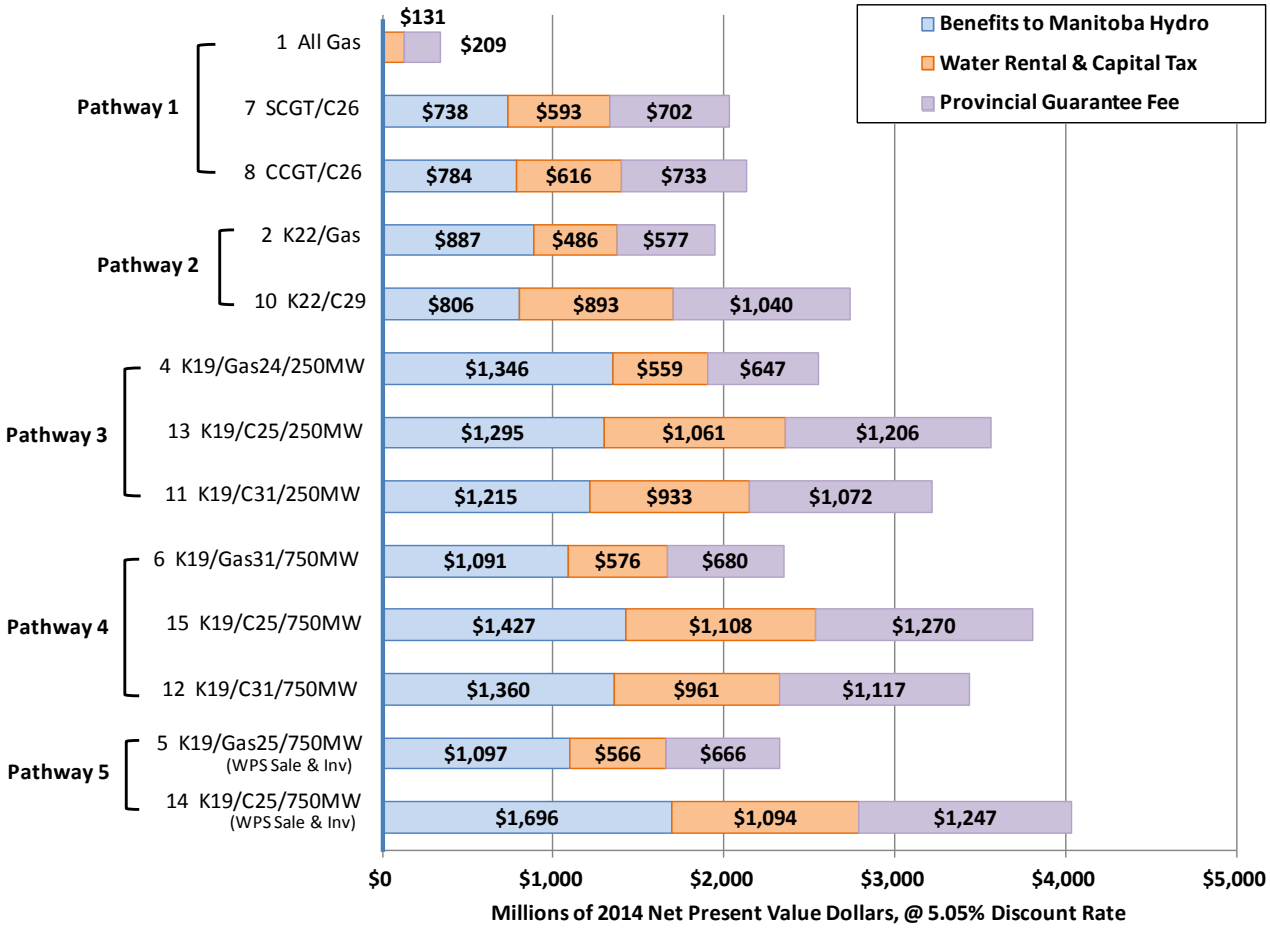
Both Pathways 4 and 5 are associated with the Preferred Development Plan because, compared to the other pathways, the defining feature of the Preferred Development Plan is the 750 MW interconnection. The main difference between Pathways 4 and 5 is that in Pathway 5 it is assumed there is a WPS investment and transmission development agreement linked to the WPS Sale, while in Pathway 4 there is no such WPS investment and transmission agreement and no WPS sales agreement. Both Pathways 4 and 5 include the 250 MW MP sale and MP investment and transmission agreement. Manitoba Hydro and MP are each assumed to have a larger investment and ownership in Pathway 4 in response to the assumption WPS will not invest. ***(Chapter 8 – Determination and Description of Development Plans)***

14.2 Economic Evaluation of Development Plans Incorporating Gas Generation, Keeyask, Conawapa and Imports

Figure 14.1 and Table 14.2 list the main development plans evaluated and summarize the economic evaluation results from ***Chapter 9 - Economic Evaluations – Reference Scenario*** and ***Chapter 10 – Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***. Due to the main evaluations, having started before the 2013 information was available these evaluations are based on the 2012 Load Forecast and related assumptions. Section 14.5 includes sensitivities to the 2013 Load Forecast and related information.

Figure 14.1 and the first row of results in Table 14.2 summarize the Net Present Value (NPV) benefits of each development plan relative to the All Gas plan, based on the Reference Scenario (Ref-Ref-Ref) with reference energy prices, capital costs and discount rate.

Figure 14.1 Development Plan NPVs– Including Potential Cash Transfers to the Province @ 5.05% Real Discount Rate



Cash Transfers to the Provincial Government

In addition to the economic benefits to Manitoba Hydro, Figure 14.1 also depicts the potential cash transfers to the provincial government in the form of provincial water rentals, capital tax and debt guarantee fees. These transfers are generally available to the government to benefit Manitobans.

Under the reference scenarios, the Preferred Development Plan is expected to be $1,696 million (2014 NPV) more beneficial than an all gas generation plan when considering only benefits to Manitoba Hydro and $3,697 million (2014 NPV) more beneficial when also considering cash 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 (2020 being the first year after the Keeyask ISD) or about $600 per year for each of the approximately 500,000 Manitoba residential households.

Aboriginal Income Sharing

The economic evaluations are of the costs and benefits related to proceeding with different selections of projects in the plans; the majority of the net benefit flows to Manitoba ratepayers but a portion flows to the aboriginal communities benefitting from the income-sharing associated with Keeyask and Conawapa. Thus, the net benefit flows entirely to Manitobans. The financial evaluations consider only the benefits to ratepayers net of the aboriginal income sharing.

Table 14.2 Development Plan Economic Evaluation Summary

Pathway	Pathway 1			Pathway 2		Pathway 3			Pathway 4			Pathway 5	
	All Gas with no new interconnection			Keeyask with no new interconnection		Keeyask with 250 MW new interconnection (MP Sale)			Keeyask with 750 MW new interconnection (MP Sale)			Keeyask with 750 MW new interconnection (WPS & MP Sales)	
Development Plan	1	7	8	2	10	4	13	11	6	15	12	5	14
	All Gas	SCGT/C26	CCGT/C26	K22/Gas	K22/C29	K19/Gas24 /250MW	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
												WPS Sale & Investment	
	Millions of 2014 NPV dollars												
Ref-Ref-Ref NPV	0	738	784	887	806	1346	1295	1215	1091	1427	1360	1097	1696
Expected Value Difference From All Gas	0	525	529	634	418	1041	782	806	776	830	891	842	1155
90th Percentile - "Reward"	1905	1956	2070	2007	2601	2479	3180	2953	2215	3360	3220	2256	3377
10th Percentile -"Risk"	-3502	-1217	-1424	-1249	-1692	-898	-1988	-1362	-1181	-2186	-1594	-828	-1429

"Ref-Ref-Ref" = benefits with reference scenario assumptions for energy prices, capital costs and discount rate (relative to All-Gas result)

"EV"= Expected Value= probabilistic weighted average of results for each of the 27 scenarios (relative to All-Gas Expected Value)

"90th Percentile-Reward"= 90th percentile probability upside benefit potential of that plan (relative to All-Gas reference scenario result)

"10th Percentile-Risk"= 10th percentile probability downside risk of that plan (relative to All-Gas reference scenario result)

The Table 14.2 second row of results summarizes the expected-value benefits, which are a probabilistic weighted-average NPV of the results for each of the 27 scenarios evaluated in the submission (***Chapter 10 – Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities***). Both the reference scenario benefits and the expected-value benefits are relative to the All Gas Plan benefits.

The third and fourth rows provide the 10th and 90th probabilistic measures of NPV from the analysis of the 27 scenarios. The 90th percentile (P90) indicates the upside benefit potential of the plans. The P90 upside benefit is the NPV benefit that occurs at the 90% probability level when considering the 27 scenarios; there is a 10% probability the benefits could be this high or higher. The P10 downside risk is the resulting NPV benefit that occurs at the 10% probability level when considering the 27 scenarios; there is a 10% probability the benefits could be this low or lower. For a fuller explanation of the probabilistic evaluation with scenarios and the P10 and P90s, refer to ***Chapter 10 – Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities***. Both the P90 and P10 values are presented relative to the reference scenario value for the All Gas Plan. When comparing differences between plans, a larger quantum difference is required when comparing P90 or P10s than when comparing the expected value or reference scenario benefits.

14.2.1 All Gas Plan with No New Interconnection (Pathway 1)

The All Gas Plan has the lowest reference scenario benefits, expected value benefits and upside benefits of all the plans in this comparison. The greatest P10 downside risk occurs with the All Gas plan (-$3,502 million), which is much greater than for any of the other plans in this table.

14.2.2 Plans with No New Interconnection (Pathway 2)

Of the plans with no new interconnection, the Keeyask 2022 Gas Plan has the greatest reference scenario benefits and expected-value benefits, with the second-smallest downside risk but a much lower upside benefit than Keeyask/Conawapa plans.

14.2.3 Comparing Plans with New Interconnections (Pathways 3,4 & 5) to Plans Without a New Interconnection (Pathways 1 & 2)

When comparing the plans with either a 250 MW or 750 MW new interconnection to the All Gas Plan, the plans with interconnections have much greater reference scenario expected value and upside benefits, and much smaller downside risk.

When comparing the plans with a new interconnection to the hydro or gas-hydro plans without a new interconnection, the plans with interconnections have much higher reference scenario expected value and upside benefits but in some cases a higher downside risk. This is true for either a 250 MW or 750 MW new interconnection.

14.2.4 Comparing 750 MW Interconnection and No WPS Sale Plans (Pathway 4) with 250MW Plans (Pathway 3)

The economic evaluation comparisons of the Pathways 3 and 4 development plans indicate one plan is economic in some comparisons, the other plan is economic in some comparisons and often the differences are small enough that the plans can be considered to be approximately equal. Extra detail is provided on comparisons of Pathways 3 and 4 than of other pathway comparisons because these comparisons are less conclusive than the others and because this likely represents the main set of choices should the WPS sale negotiations not conclude successfully and there are no alternate sale opportunities. The section below provides the comparisons between the more relevant sets of Pathways 3 and 4 plans.

Comparing Greatest Reference Scenario Benefit 750 MW Plan to 250 MW Plan

Table 14.3 750 MW Conawapa 2025 Plan vs. 250 MW Gas Plan

	A	B	A-B
Pathways	Pathway 4	Pathway 3	
Development Plan	**15**	**4**	
	K19/C25/750 MW	**K19/Gas24/250 MW**	
	$2014 NPV (millions)		
Ref-Ref-Ref	1427	1346	81
EV Difference from All Gas	830	1041	-211
90th Percentile - "Reward"	3360	2479	881
10th Percentile -"Risk"	-2186	-898	-1288

The particular relevance of this set of plans is that these plans are each the most economic plans in their pathway when considering the reference scenario benefits. The 750 MW interconnection plan with Conawapa 2025 has higher reference scenario and upside benefits but greatly lower expected-value benefits, and greater downside risk than the 250 MW gas plan; overall, the 250 MW interconnection plan is significantly more economic in this comparison.

Comparing Greatest Expected Value 750 MW Plan to 250 MW Plan

Table 14.4 750 MW Conawapa 2031 Plan vs. 250 MW Gas Plan

	A	B	A-B
Pathways	Pathway 4	Pathway 3	
Development Plan	**12**	**4**	
	K19/C31/750 MW	**K19/Gas24/250 MW**	
	$2014 NPV (millions)		
Ref-Ref-Ref	1360	1346	14
EV Difference from All Gas	891	1041	-150
90th Percentile - "Reward"	3220	2479	741
10th Percentile -"Risk"	-1594	-898	-696

The particular relevance of this set of plans is that these plans are each the most economic plans in their pathway considering the expected-value benefits. The 750 MW interconnection plan with Conawapa 2031 and the 250 MW interconnection gas plan have similar reference

scenario benefits. The 750 MW plan with Conawapa 2031 has a significantly lesser expected value, larger downside risks but larger upside benefits. As discussed in ***Chapter 10 – Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***, the 750 MW plan has greater upside potential than the 250 MW plan in scenarios where the energy prices factor is high (regardless of whether capital cost or discount rate factors are at low, reference or high values) because in this plan there is surplus power from the Conawapa G.S. to take advantage of the higher energy prices. But the 750 MW plan requires a higher capital investment in generation and in the U.S. interconnection when compared to the Keeyask/Gas/250 MW plan; in addition, there is more exposure to higher discount rates and lower energy prices.

Comparing K19/C25/750MW Plan to 250MW Plan

Table 14.5 750MW Conawapa 2025 Plan vs. 250MW Conawapa 2025 Plan

	A	B	A-B
Pathways	Pathway 4	Pathway 3	
Development Plan	**15**	**13**	
	K19/C25/750 MW	**K19/C25/250 MW**	
	$2014 NPV (millions)		
Ref-Ref-Ref	1427	1295	132
EV Difference from All Gas	830	782	48
90th Percentile - "Reward"	3360	3180	180
10th Percentile -"Risk"	-2186	-1988	-198

The particular relevance of the sets of plans in Table 14.5 and 14.6 is that each set of plans assumes the same ISD for Conawapa, thus providing a comparison between pathways that is not affected by relative advancement of Conawapa with respect to each other. The 750 MW interconnection plan with Conawapa 2025 has higher reference scenario, expected value and upside benefits but greater downside risks than the 250 MW plan with Conawapa 2025.

Comparing K19/C31/750MW to 250 MW Plan

Table 14.6 750MW Conawapa 2031 Plan vs. 250MW Conawapa 2031 Plan

	A	B	A-B
Pathways	Pathway 4	Pathway 3	
Development Plan	**12**	**11**	
	K19/C31/750 MW	**K19/C31/250MW**	
	$2014 NPV (millions)		
Ref-Ref-Ref	1360	1215	145
EV Difference from All Gas	891	806	85
90th Percentile - "Reward"	3220	2953	267
10th Percentile -"Risk"	-1594	-1362	-232

Similar to Table 14.5, the 750 MW interconnection plan with Conawapa 2031 has higher reference scenario expected value and upside benefits but greater downside risks than the 250 MW interconnection plan with Conawapa 2031. Of importance is that Pathway 4 still shows benefit over Pathway 3 even though Conawapa does not come into service until 2031.

Comparing Keeyask Gas 750 MW Plan to 250 MW Plan

Table 14.7 750MW Gas Plan vs. 250MW Gas Plan

	A	B	A-B
Pathways	Pathway 4	Pathway 3	
Development Plan	**6**	**4**	
	K19/Gas31/750MW	**K19/Gas24/250 MW**	
	$2014 NPV (millions)		
Ref-Ref-Ref	1091	1346	-255
EV Difference from All Gas	776	1041	-265
90th Percentile - "Reward"	2215	2479	-264
10th Percentile -"Risk"	-1181	-898	-283

The particular relevance of this set of plans is that they both have Gas following Keeyask: this could be considered representative of futures wherein Conawapa is never developed or developed so far out in time that its effects are negligible. The 750 MW interconnection plans have lesser reference scenario, expected value, and upside benefits and greater downside risk

than the 250 MW interconnection plans when assuming the only new generation after Keeyask is gas generation.

14.2.5 750 MW Interconnection and WPS Sale Plans (Pathway 5)

Of the two Pathway 5 plans with the WPS Sale and WPS Transmission Agreement, the plan with Keeyask followed by Conawapa in 2025 rather than by Gas is clearly more economic, although it has a greater downside risk. This plan is referred to as the Preferred Development Plan.

When comparing the Preferred Development Plan with the 250 MW interconnection plans, the Preferred Development Plan has higher reference scenario, expected value and upside benefits but also significantly higher risk than the 250 MW plan with Keeyask followed by Gas. Under scenarios where energy prices are low, the Preferred Development Plan, as compared to the 250 MW plan with Keeyask-Gas, yields lower incremental NPVs, with the exception of those scenarios where both energy prices and discount rate are low. At low energy prices, the surplus energy from the Preferred Development Plan does not result in sufficient revenues to offset the higher capital cost of the Conawapa G.S. and larger interconnection.

When comparing the Preferred Development Plan with the plans with no new interconnection, the Preferred Development Plan has much higher reference scenario value, expected value and upside benefits. The Preferred Development Plan downside risk is lesser, similar or only moderately higher. The most relevant situation of higher risk is in comparison with the plan involving Keeyask 2022 followed by Gas and with no interconnection. The Preferred Development Plan has approximately $500 million greater P10 downside risk, but this is much more than offset by approximately $500 million greater expected value benefits; furthermore, the Preferred Development Plan has over $1,300 million higher P90 upside potential.

14.2.6 Summary of Economic Evaluations

Considering the above discussion of economic evaluations and the more detailed and comprehensive discussion in ***Chapters 9 - Economic Evaluations - Reference Scenario*** and ***Chapter 10 – Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***, the following summarizes the economic evaluations:

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.

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) is more economic than the most economic plan with the 750 MW interconnection (Pathway 4).

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.

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.

14.3 Financial Evaluations of Development Plans

This section summarizes ***Chapter 11 – Financial Evaluation of Development Plans***. The financial evaluation was performed on 8 development plans that provide a representative sample of the range of potential plans with respect to the economics as well as mix of generation resources. The financial evaluation was prepared using information from pro forma financial statements that utilize the same framework for scenario uncertainty analysis that is used in the economic uncertainty analysis. This resulted in 27 (3 x 3 x 3) scenarios for each of the 8 plans, for a total of 216 pro forma financial statements. The financial evaluation focused on the comparative impact on future customer rates and Manitoba Hydro's comparative exposure to financial risk of the various development plans.

Recognizing that during the capital investment period associated with new generation there will be downward pressure on the corporation's financial ratios, the financial evaluation assumes even-annual rate increases in order to achieve the targeted debt/equity ratio of 75:25

by the end of 2031/32. Once the debt/equity target is reached, the projected annual rates for the remainder of the 50-year financial forecast period are calculated to maintain the corporation's interest coverage ratio target of 1.20. The financial evaluation has not been designed to establish specific rate strategies but to compare impacts on rates and on Manitoba Hydro's financial strength among alternative plans.

Table 14.8 sets out the projected key financial metrics for the 8 development plans evaluated, including cumulative nominal rate increases by 2061/62 - compared to All Gas, projected even-annual rate increases (2014/15 to 2031/32), equivalent even-annual rate increases over the forecast period (50-years), the nominal balances of net fixed assets, net debt and retained earnings as at 2031/32 and 2061/62. The projected financial metrics are summarized from the pro forma financial statements using reference assumptions.

Table 14.8 Financial Evaluation Summary under Reference Scenario

Pathway	Interconnection	Plan #	Development Plan	(A) Cumulative Nominal Rate Increases by 2061/62 - Compared to All Gas	(B) Projected Even-Annual Rate Increases (2014/15 to 2031/32)	(C) Equivalent Even-Annual Rate Increases over the Forecast period (50 Years)	(D) Net Fixed Assets	(E) Net Debt	(F) Retained Earnings	(G) Net Fixed Assets	(H) Net Debt	(I) Retained Earnings
							As at 2031/32 in Billions of Nominal Dollars			As at 2061/62 in Billions of Nominal Dollars		
1	No New Interconnection	1	All Gas	-	3.43%	2.07%	$20.2	$14.7	$4.8	$31.8	$15.5	$10.7
		7	Gas C26	-42%	3.86%	1.72%	$28.1	$20.4	$6.7	$34.4	$14.6	$13.7
2		2	K22 Gas	-36%	3.49%	1.77%	$25.3	$18.4	$6.0	$33.9	$15.3	$12.8
3	250 MW Interconnection	4	K19 Gas 250MW	-33%	3.42%	1.80%	$24.8	$18.1	$5.9	$34.0	$15.6	$12.6
		13	K19 C25 250MW	-65%	3.98%	1.50%	$32.7	$23.8	$7.9	$36.7	$15.0	$15.6
4	750 MW Interconnection	12	K19 Imp C31 750MW	-65%	3.80%	1.50%	$35.2	$25.7	$8.5	$38.6	$15.6	$16.8
		6	K19 Imp Gas 750MW	-33%	3.50%	1.79%	$25.0	$18.2	$6.0	$33.6	$15.2	$12.6
5		14	K19 Sales C25 750MW	-70%	3.95%	1.44%	$32.9	$24.0	$7.9	$36.8	$15.1	$15.7

A primary observation is that the pathway analysis under the financial evaluation is generally consistent with the findings presented in the economic evaluation. For the plans evaluated, the following key conclusions are provided for the comparative customer rates and financial risk analysis.

Future Customer Rates

- Rate increases are required for all evaluated alternatives in each pathway (Table 14.8, Columns B and C).
- There is a preference of hydro/gas options over gas options. For example in Table 14.8 (Column A), K22/Gas (Pathway 2) shows lower cumulative rates by the end of the study period compared to All Gas (Pathway 1) and almost the same cumulative rates compared to Gas/C26 (Pathway 1).
- All-hydro options that include both Keeyask and Conawapa show a clear preference over hydro/gas options. As illustrated in Table 14.8 (Column A), K19/C25/250MW (Pathway 3) or K19/Imp/C31/750MW (Pathway 4) show lower cumulative rates compared to either K22/Gas (Pathway 2), K19/Gas/250MW (Pathway 3) or K19/Imp/Gas/750MW (Pathway 4).
- In the development plans along Pathways 3 and 4 that differ in the size of the interconnection, the projected cumulative rates in the long-term are similar. K19/Gas/250MW (Pathway 3) and K19/Imp/Gas/750MW (Pathway 4) show the same long-term cumulative rates increases under the reference scenario. K19/C25/250MW (Pathway 3) and K19/Imp/C31/750MW (Pathway 4) also show the same long-term cumulative rates increases.
- From a long-term rate perspective, the Preferred Development Plan (Pathway 5) has the lowest projected cumulative rates compared to all other plans under the reference scenario.
- In the medium-term, the capital intensive plans that include both Keeyask and Conawapa have projected even-annual rate increases that are generally higher than other alternatives as indicated in Table 14.8 (Column B).

- Column C expresses the cumulative rates from column A as equivalent even-annual rates over the entire study period and supports the aforementioned conclusions.

Financial Risk

- Hydro/gas options exhibit a stronger balance sheet as compared to the All Gas plan. For example in Table 14.8 (Column G and I), K22/Gas (Pathway 2) shows higher fixed assets and retained earnings by the end of the study period compared to All Gas (Pathway 1) and is similar compared to Gas/C26 (Pathway 1).
- All-hydro options that include both Keeyask and Conawapa exhibit a stronger balance sheet over hydro/gas options in the long-term. As illustrated in Table 14.8 (Column G and I), K19/C25/250MW (Pathway 3), K19/Imp/C31/750MW (Pathway 4) or the Preferred Development Plan (Pathway 5) show higher fixed assets and retained earnings compared to either K22/Gas (Pathway 2), K19/Gas/250MW (Pathway 3) or K19/Imp/Gas/750MW (Pathway 4).
- In the medium-term, while net debt levels are the highest with the development plans that include both Keeyask and Conawapa, as these plans have the overall highest capital investment, they also have the highest fixed assets and retained earnings (Table 14.8, Columns D, E and F). Consequently, in the medium-term and extending through to the end of the study period, development plans with both Keeyask and Conawapa are the most robust in their ability to absorb adverse financial impacts.

Summary of Financial Evaluations

Considering the above discussion of financial evaluations and the more comprehensive discussion in ***Chapter 11 – Financial Evaluation of Development Plans***, the following summarizes the financial evaluations:

Future Customer Rates

- Rate increases are required for all evaluated alternatives. The financial evaluation shows that higher rates are required in the medium-term under all of the development plans,

regardless of whether the plan is gas-based or hydro-based. New energy supply cannot be provided at the same current low rates that Manitoba Hydro customers have enjoyed over the last two decades.

- In the long-term, development plans with both Keeyask G.S. and Conawapa G.S. are projected to have the lowest cumulative rate increases which range between 65% to 70% lower than the All Gas plan under the reference scenario. Development plans with both Keeyask G.S. and Conawapa G.S. provide incremental dependable and surplus energy which translate to savings for Manitoba customers in the long run.
- In the medium-term, the capital intensive plans that include both Keeyask G.S. and Conawapa G.S. are projected to have cumulative rate increases that are generally higher than other alternatives. Cumulative rates under the Preferred Development Plan "cross-over" compared to all other plans and begin to provide benefit to customers in a relatively short timeframe (10-15 years) following the ISD of the Conawapa G.S.
- The Preferred Development Plan is projected to have the lowest overall rates to Manitoba customers in the long-term.

Financial Risk

- In the long-term, development plans that include Keeyask G.S. and Conawapa G.S. have the strongest projected balance sheet with high levels of fixed assets and retained earnings. By the end of the study period, retained earnings are projected to be between $4.9 billion to $6.1 billion higher than the All Gas plan.
- Net debt levels converge towards the end of the study period for all development plans.
- In the medium-term, while net debt levels are the highest with the development plans that include both Keeyask G.S. and Conawapa G.S., as these plans have the overall highest capital investment, they also have the highest fixed assets and retained earnings.
- Development plans with both Keeyask G.S. and Conawapa G.S. are more robust in their ability to absorb adverse financial impacts, in the medium-term and extending through

to the end of the study period, given their comparatively higher level of retained earnings.

14.4 Multiple Account Summary and Evaluation of Development Plans

This section summarizes Chapter 13 - Integrated Comparisons of Development Plans - Multiple Account Analysis which present the results of a multiple account benefit-cost analysis (MA-BCA) of Manitoba Hydro's Preferred Development Plan compared to a plan with a smaller interconnection and less firm export sales (K19/Gas 24/250MW), and two plans without a new interconnection and firm export sales, one with Keeyask (K22/Gas) and one assuming all gas to meet growing Manitoba requirements.

MA-BCA is a variant of traditional cost-benefit analysis. It extends Manitoba Hydro's economic evaluation of the different plans to take into account consequences and net benefits or costs for customers, taxpayers, workers and the economy, the environment, affected communities and Manitobans generally that are not reflected in the NPV of the different plans from the perspective of Manitoba Hydro and its project partners. The MA-BCA is intended to assist in addressing the question of the overall socio-economic benefit of the preferred and alternative plans, and more specifically the relative advantages and trade-offs they entail.

MA-BCA recognizes that not all consequences can be monetized in order to calculate a 'bottom line'; as well there are important distributional consequences that need to be considered in the assessment of the relative advantages or disadvantages and trade-offs that the different plans entail. The results of the MA-BCA are presented under a disaggregated set of evaluation accounts:

- market valuation,
- customers,
- government,
- Manitoba economy,

- environment,
- social
- risk.

The market valuation indicates that the Preferred Development Plan and small interconnection alternative are very similar in terms of their overall NPV and offer greater net benefits for Manitoba Hydro and its project partners (lower net system costs) than the two plans without a new interconnection and firm export sales. The all gas plan exhibits the lowest net benefits (highest net costs).

The customer account, based on the same cash flows as the market valuation but taking into consideration Manitoba Hydro's actual cost of capital and the partner cash flows, indicates that the Preferred Development Plan offers the lowest cumulative rate impacts over the long-term, but the highest in the short-to medium-term. The three alternative plans have similar rate impacts in the short-to medium-term, but over the long-term, the all gas exhibits the highest cumulative rate increases – much higher than the two alternatives with Keeyask.

The Preferred Development Plan not only results in the lowest rate increases over the long-term it also provides customers with the greatest degree of system reliability. This confers a net benefit by reducing the expected cost of the infrequent but nonetheless very costly interruptions to system supply that can occur as a result of combinations of extreme weather, forced outage and other contingencies.

The government account indicates that all of the plans generate significant revenues for government, but the net benefits are greatest with the Preferred Development Plan, followed by the two alternative plans with Keeyask. The net benefits to government are conservatively measured by only the water rentals and capital taxes paid by Manitoba Hydro on the assumption that the large debt guarantee fees serve to offset the risks government incurs with the guarantee it is providing, and that other taxes, for example income taxes paid by workers, are not incremental or, with in-migrants, largely offset by greater government expense.

The Manitoba economy account indicates that the Preferred Development Plan, followed by the two alternatives with Keeyask, generate the largest amount of capital spending and largest amount of employment and incremental income or net benefits for Manitoba workers.

The environmental account indicates that the Preferred Development Plan exhibits the lowest greenhouse gas (GHG) emissions within Manitoba, followed by the two alternatives with Keeyask. The estimated social cost of the GHG emissions net of the carbon charges Manitoba Hydro is assumed to pay, in other words the external GHG cost, is consequently lower with the Preferred Development Plan than the others. It is highest in the all gas plan. The Preferred Development Plan also offers the greatest benefit in terms of contributing to the global reduction of GHG emissions because of its impact on thermal power production in the U.S.

With respect to local air pollutants, the amount of NO_x and particulate emissions is lowest with the Preferred Development Plan. While the estimated health and other damage costs from these emissions would be low in all of the plans, they are least with the Preferred Development Plan and greatest with the all gas alternative.

With respect to biophysical impacts, there would be a wide range of aquatic and terrestrial effects with the hydro and other projects in the different plans. Subject to the findings in detailed environmental hearings for these projects, the residual effects are expected to be relatively small as a result of the design, planning, extensive monitoring and mitigation that would be implemented.

The social account indicates that the Preferred Development Plan offers the greatest employment, contract award, income-sharing and investment benefits for partner Cree nations, followed by the two alternative plans with Keeyask.

With respect to local and regional effects, there would be impacts on the local economy; resource use; population, infrastructure and service; and family and community well-being.

Again, subject to the findings in detailed project hearings, the residual effects are expected to be minimized and generally limited in duration with the extensive planning and monitoring, mitigation and compensation that would be implemented.

As for Manitobans as a whole there is the potential for significant bequest values, greatest for the Preferred Development Plan, because of the hydro assets created by the plan. The hydro assets offer very significant long-term benefit to future generations that may not be fully reflected in the calculation of the discounted present value of the assets remaining at the end of the planning period.

Table 14.9 present a summary of the findings based on the NFAT Reference Scenario set of assumptions, with monetized values reported relative to the Preferred Development Plan (positive values indicating a net advantage relative to the Preferred Development Plan and negative values a net cost disadvantage). As shown in the Table, the overall monetized net benefits are greatest for the Preferred Development Plan, some $680 million in present value greater than the small tie alternative; $1.0 billion in present value greater than the Keeyask alternative with no new interconnection and $1.9 billion greater than the all gas alternative. The main trade-off is the short-to medium-term rate increases that are generally higher with the Preferred Development Plan than the alternatives.

Table 14.9 Summary of Reference Scenario Assessment
(NPVs @ social discount rate of 6.0% not private rate of 5.05% for Chapters 9 and 10)

	Preferred Development Plan	K19/G24/250MW	K22/Gas	All Gas
Market Valuation				
• Net revenues (cost) to MH and partners	--	17.0	(270.5)	(654.1)
Customer Account	Preferred Development Plan has highest rate increases in first 20 years but has lowest rate increases over long-term.			
• Cumulative rate increase				
• Reliability	Preferred Development Plan and to lesser extent the alternative with the smaller interconnection provides greater load carrying capability, lower expected loss of unserved energy and greater ability to manage extreme drought			
Government				
• Incremental revenues net of costs/risk	--	(353.5)	(395.9)	(674.2)
Manitoba Economy				
• Employment net benefits	--	(123.7)	(150.0)	(260.3)
Environment				
• Manitoba GHG external cost	--	(208.6)	(174.3)	(320.3)
• Global GHG impact	Preferred Development Plan and to lesser extent the two plans with Keeyask would contribute to a reduction in global emissions by displacing thermal generation in US.			
• Manitoba CAC damage cost	--	(8.6)	(7.1)	(13.3)
• Residual biophysical	Aquatic and terrestrial impacts with hydro projects in Preferred Development Plan and plans with Keeyask; subject to detailed environmental hearings, residual effects and local external cost expected to be relatively small with initial design, extensive mitigation, monitoring, compensation and benefit-sharing arrangements.			
Social				
• Partner net return	Significant net returns from up to 25% interest in Keeyask and income benefits from Conawapa in Preferred Development Plan; significant benefits from up to 25% interest in two alternatives with Keeyask, greater with new sales and interconnection.			
• Community impacts	Wide range of potential impacts on local employment and business; population, infrastructure and service; social and community well-being; owners of land needed for rights of way and easements; major commitments and plans to minimize adverse residual effects with extensive mitigation, monitoring, compensation and partnership arrangements.			
• Other Manitoba	Potentially significant bequest value from the hydro assets remaining at end of planning period; greatest with Preferred Development Plan and to a lesser extent in the alternatives with Keeyask.			
Overall Monetized Net Benefit (Cost)	**--**	**(677.4)**	**(997.4)**	**(1922.2)**

(2014 Present Value in millions 2014$)

There is considerable uncertainty and risk for all of the plans. The analysis of the probability distribution of the NPV to Manitoba Hydro and its project partners indicates that Preferred Development Plan has the greatest upside potential; the all gas plan has the greatest downside potential. The downside for all of the plans can be mitigated by 'pathway' adjustments as new information unfolds. What differentiates the plans is the upside potential, which is greatest with the plans that start with Keeyask and a new interconnection. The analysis of the probable range of cumulative rate impacts reinforces the trade-off found with the reference scenario assumptions. In the long-term the Preferred Development Plan still shows the lowest rates; however the cumulative rate impact with the Preferred Development Plan by year 20 is higher and more uncertain than with the other plans

Overall, the main conclusions of the MA-BCA are as follows:

- Developing Keeyask to meet domestic load offers significant net benefits relative to the all gas plan not only for Manitoba Hydro but also more broadly to society as a whole; it offers significant tax, employment, GHG and social benefits that go beyond the benefits to Manitoba Hydro.
- Plans that include a new interconnection offer significant net benefits to those that don't. They significantly enhance the net benefits for Manitoba Hydro and its partners.
- The alternative with the 250 MW interconnection and the development of Keeyask but not Conawapa offers the same expected net benefit to Manitoba Hydro and its partners as the Preferred Development Plan, without the short-to medium-term rate trade-off that the Preferred Development Plan gives rise to. At the same time it doesn't offer the same long-term legacy value or upside potential as the Preferred Development Plan. Nor does it offer the long-term rate, tax, employment, GHG and social benefits as the Preferred Development Plan.
- The Preferred Development Plan offers the lowest rate impacts for the long-term and significantly greater benefits to society as a whole than the smaller tie alternative. It does, however, require higher and more uncertain rate increases in the short-to medium-term than the other plans. The more weight one places on the broader public

interest consequences and the longer term effects, the more one would favour this plan.

14.5 Factors Not Currently Included in Economic, Financial and Multiple-Account Evaluations

The quantitative evaluations summarized in section 14.2 (economic), section 14.3 (financial) and section 14.4 (multiple accounts) were mainly based on information associated with the 2012 Load Forecast and information generally available over the winter 2012/13. Some factors that could affect these evaluations are evolving in a manner that could significantly affect the results and the overall NFAT conclusions. This section highlights the more pertinent of these evolving factors.

2013 Update to Forecasts and Related Assumptions

The evaluations discussed above were based on the 2012 Load Forecast and other related planning assumptions, except that the export price forecast was reduced. ***Chapter 12 – Economic Evaluations – 2013 Update on Selected Development Plans*** contains sensitivities with 2013 updates: the load forecast has become slightly lower; export price forecasts have become slightly higher than used in the ***Chapter 9 – Economic Evaluations – Reference Scenario*** and ***Chapter 10 - Economic Uncertainty Analysis - Probabilistic Analysis and Sensitivities***; the real discount rate has increased from 5.05% to 5.4%; and the GRE Diversity Exchange has been extended to end in 2030 instead of 2025. The next generation ISD requirement for domestic load growth without any new firm export contracts has been deferred from 2022 to 2023. The Conawapa ISD in the Preferred Development Plan has been deferred from 2025 to 2026. The NPV benefits of the 750 MW Interconnection with WPS Plan relative to the All Gas Plan are now $1,462 million at a 5.4% discount rate and considering the reference scenario. The NPV benefits of the 750 MW Interconnection without WPS Plan relative to the All Gas Plan are now $1,204 million at a 5.4% Discount Rate and considering the reference scenario.

Table 14.10 Impact of 2013 Load Forecast and Related Assumptions

Load Forecast and Related Assumptions except discount Rate	Real Discount Rate	NPV Benefits of the 750MW Interconnection with WPS Plan and Conawapa earliest ISD relative to the All Gas Plan	NPV Benefits of the 750MW Interconnection without WPS Plan and Conawapa deferred ISD relative to the All Gas Plan
2012 (Chapters 9 & 10)	5.05%	$1,696	$1,360
2013 except discount rate	5.05%	$2,125	$1,763
2013 (Chapter 12)	5.40%	$1, 462	$1,204

Decrease in Capital Cost Estimates for U.S. Portion of 750 MW Interconnection

Recent more detailed cost estimates are indicating that the costs of the U.S. portion of the 750 MW interconnection will be less than originally estimated. This would improve the economics of the interconnection in Pathways 4 and 5.

Enhancements to the New Interconnection Projects

The 250 MW interconnection has some potential of increasing the import capacity and possibly the export capacity beyond the current assumptions; this increase is under continuing study. On the other hand, the 750 MW interconnection is expected to ultimately benefit from future improvements into the Wisconsin transmission network at the terminus of the 750 MW interconnection, which would increase the export and import capacity to 1,100 MW at no additional capital cost to Manitoba Hydro. These two factors are judged to approximately offset each other when comparing the 250 MW and 750 MW interconnection plans, but both improve over the plans with no new interconnections .

WPS Export Sale and Transmission Investment Agreement Status

WPS recently advised that an investment in the 750 MW Interconnection Transmission does not match their current business objectives and that they will not invest in the line. They also advised that they will continue to negotiate the 300 MW Power Purchase Agreement; as of this writing that negotiation is proceeding under the auspices of the term sheet agreed to previously. In order to avoid becoming a majority owner in a U.S. transmission line, Manitoba

Hydro will only enter into an arrangement where it will not own more than 49% of the interconnection facilities in the U.S. In return for investing in the U.S. portion of the transmission interconnection, Manitoba Hydro will benefit by having the right to use and/or sell its proportionate share of the U.S. transmission service associated with the new interconnection. Manitoba Hydro will also have the right to sell its share in the future. In the development plans without the WPS sale but with a 750 MW interconnection, a conservative assumption has been used whereby Manitoba Hydro will be responsible for approximately two-thirds of the capital and ongoing operating costs associated with the U.S. portion of the 750 MW interconnection facilities.

Concurrently, negotiations are proceeding between MP and Manitoba Hydro to revise the arrangement with MP to increase their investment in and ownership of the 750 MW interconnection.

It should be noted that, unlike the 300 MW WPS Sale, the 250 MW MP Sale Power Purchase Agreement is final, has been signed and has been approved by MP's state regulator, but is still subject to other regulatory approvals in the U.S. and Canada.

Manitoba Hydro Investment in 750 MW Interconnection

The evaluations of Pathways 4 and 5 assume Manitoba Hydro will be investing in and owning a portion of the U.S. segment of the 750 MW interconnection and that the percentage amount owned stays constant for the life of the interconnection asset. It is Manitoba Hydro's intent to arrange for some or all of the Manitoba Hydro ownership to be transferred to another owner for the economic benefit of Manitoba Hydro as soon as an appropriate opportunity can be developed.

Other Firm Export Sales: U.S. and Canada

The MP sale will utilize 250 of the 750 MW export capacity, leaving 500 MW (or more) available for long-term export contracts for additional sales to Wisconsin, Minnesota and other utilities. In addition, an early Conawapa would enable the extension of the 375/500 MW NSP sale, which

currently ends in 2025. This extension, if requiring advancement of Conawapa, would benefit the economics of the 750 MW interconnection; the 250 MW interconnection would not benefit as much because the 250 MW interconnection would be already utilized by the 250 MW MP Sale.

Manitoba Hydro is in active negotiations with SaskPower regarding long-term export sale possibilities up to 500 MW, along with Saskatchewan interconnection transmission additions required to enable the sale. A sale would require an early Conawapa; a situation where Conawapa has been advanced would benefit the economics of the 750 MW interconnection because an early Conawapa would increase the amount of firm and non-firm energy well in excess of what the additional Saskatchewan transmission could accommodate— thus increasing the amount of total exports over the U.S. 750 MW interconnection.

Additional firm exports have the potential to increase the economics of the plans with interconnections, depending on what the export contract prices are relative to the forecast prices; in addition, such firm contracts would reduce the downside risks concurrently with reducing the upside opportunities.

New Interconnection Increasing Export Market Diversity and Prices

The 750 MW interconnection has been specifically designed, ultimately, to provide additional firm transmission access into Wisconsin. To date, Manitoba Hydro's firm access into Wisconsin has been limited to 100 MW. The balance of Manitoba Hydro's existing access has been into Minnesota, North and South Dakota. Increased firm access to utilities in Wisconsin who serve customers using in excess of 60,000 gigawatt-hour (GWh) annually will diversify Manitoba Hydro's customer base and will increase competition for Manitoba Hydro's renewable resources, thereby strengthening export prices and reducing price risk. While the modeling has captured the impacts of a larger interconnection export/import capacity and export market, the modeling has been conservative in not modeling an overall improvement in prices.

14.6 Comparison of Development Plan Implementation Pathways

The economic, financial and multiple accounts evaluations in the earlier chapters by necessity considered mainly plans with specific choices of generation options and timing. For example, the Preferred Development Plan was put forward as "Keeyask ISD 2019 followed by Conawapa ISD 2025" while the Natural Gas Plan was put forward as "Natural Gas Generation in 2022 followed only by Natural Gas Generation in subsequent years" Clearly, in reality, such choices are not rigidly frozen; rather, long-term decisions respond over time to the evolving supply requirement, economic parameters and societal expectations.

Over time, the uncertainties inherent in today's evaluations of the plans for new generation will evolve. Load growth forecasts, Power Smart plans, new export contracts, natural gas price forecasts, export price forecasts, capital cost estimates, retirement of existing gas generation and other parameters will be continually monitored and reviewed. Forecasts of these types of factors will continue to be just as uncertain in the future as they are now. However, there are certain circumstances under which the passage of time will make additional information or learnings available to reduce uncertainty and allow decisions to be made more confidently at a future date. For example, a commitment decision to start construction of Conawapa would have to be made 8 ½ years before the Conawapa ISD; and forecasts pertaining to economic and other aspects in play at the selected ISD would be equally uncertain regardless of whether the ISD is 2026 or 2036 and the decision is being made in 2018 or 2028, respectively. However, deciding in 2018 about the start of Conawapa construction in that year for a 2026 ISD would have 4 years of less uncertainty than if that decision were taken in 2014, i.e., 12 ½ years in advance of the ISD.

Thus, if circumstances warrant, the selected development plan will be modified over time. A current example of such modification is that the planned Conawapa ISD was recently deferred from 2025 to 2026 in association with a drop in the Manitoba load growth forecast.

Two other major examples of such responsiveness to evolving parameters are:

Preferred Development Plan

For example, if the Preferred Development Plan is adopted but then natural gas and export prices were found in a few years to be following a low price trajectory, Conawapa could be deferred or could be completely displaced with other new generation such as natural gas. Similarly, Conawapa could be delayed if there were a major reduction in forecast load growth or a major increase in power savings resulting from the DSM Market Potential Study and subsequent DSM program design and evaluation**.**

Natural Gas Plan

If the Natural Gas Plan is committed to, but then natural gas and export prices were identified to be following a high price trajectory a new hydro project could be committed to rather than continue to develop further gas generation.

14.6.1 Development Plans and Development Pathways

The long-term flexibility to respond to events or the trajectory of critical parameters as they unfold over time is fundamental to managing risks and dealing with fundamental uncertainties. It is useful to consider the evaluations, therefore, not as leading to a choice between fixed plans with fixed ISDs, but rather a choice between different pathways.

A key decision that is represented in the various pathways is that the decision to build a 750 MW interconnection, a 250 MW interconnection, or not to build an interconnection, must be made by June 2014 as such a date affects the options which are available.

Five general approaches for development plan pathways can be identified as representative of the choices to be decided upon as the next step in Manitoba's electricity future. Each pathway contains a grouping of related development plans and associated decision points, and identifies points where decisions can be changed as conditions warrant. The pathways have been listed in

Table 14.2, depicted in the pathway decision tree in Figure 14.2 and discussed in detail further below. The pathway timing and discussions are based on the 2013 Load Forecast and related information. Quantitative results for economic evaluations of plans and pathways are provided based on 2012 information unless otherwise specified.

Each of the five different pathways have followed specific branches of a decision tree. As depicted in Figure 14.2, the first pathway is based on a June 2014 decision to not construct a new interconnection, and to develop Gas for a 2023 ISD. Resource options after the 2023 Gas include more Gas, Keeyask or Conawapa.

The second pathway is also based on a June 2014 decision to not construct a new interconnection, but to develop Keeyask for a 2023 ISD to meet increases in Manitoba load. Resource options after Keeyask would include Conawapa or Gas. Having decided not to construct an interconnection, the choice of which branch to follow — Pathway 1 or Pathway 2 — must be made by 2018 to allow for a 2023 ISD for the next generation.

The third pathway is based on a June 2014 decision to build a 250 MW interconnection for the 250 MW MP Sale, which then necessitates Keeyask in 2019. Keeyask can be followed by either Gas or Conawapa. The decision of Gas or Conawapa must be made by 2022 to allow Conawapa to be in service by 2030.

The fourth pathway is based on a June 2014 decision to build a 750 MW interconnection, possibly without a contract with WPS. This pathway still includes the 250 MW MP Sale, and thus still necessitates Keeyask in 2019. Keeyask can be followed by either Gas or Conawapa in 2033 for Manitoba load, or facilities could be advanced to as early as 2026 if opportunities exist to do so. Opportunities would need to be identified by 2018 to allow Conawapa to be advanced to 2026, and a decision between Gas or Conawapa would need to be made by 2025 to allow Conawapa to be in service by 2033.

The fifth pathway is based on a June 2014 decision to build a 750 MW interconnection, having a firm contract with WPS and having WPS invest in the new interconnection. This pathway is similar to Pathway 4, but requires new resources in 2026 after Keeyask. New resources can be Conawapa, a Gas plant in 2026 followed by Conawapa in 2030, or just Gas plants after Keeyask, but a decision between Gas or Conawapa needs to be made by 2018 to protect a Conawapa 2026 ISD.

Pathways 1 to 4 identify various points where choices can branch from the Preferred Development Plan should conditions warrant. Pathway 5 offers variations of the Preferred Development Plan, reflecting choices that do not need to be made in June 2014, but can be made later as conditions change.

Of course, in reality there are many other possible plans that could occur in each of these five pathways, resulting, for example, from inclusion of other options such as wind generation, more DSM and earlier retirement of existing Manitoba gas generation. As discussed earlier in the submission, it is expected inclusion of these other options would not substantially alter the comparison of these pathways and the associated development plans.

The following considerations are common to all the pathways:

- If Keeyask is to be pursued for 2019, it is assumed to have received its environmental approvals by June 2014. Once construction is started in July 2014, the ISD would be December 2019. If Keeyask construction does not start in 2014 but is delayed for as long as 5-years (e.g. due to a decision to follow Pathway 1 and develop natural gas generation first), the existing licences and aboriginal arrangements likely would still be applicable as long as some minor investments were undertaken to monitor and update environmental information and to maintain partnership communications. Within that 5-year time period, if a decision is made to start construction it would take approximately 6 years from that point to the Keeyask ISD; modest investments would also have been made beforehand to secure and maintain the camp/road infrastructure and then restart

the construction preparations. Once Keeyask construction has fully started, it would not be feasible to cancel construction.

- A separate Keeyask issue is that a decision on a construction start of June 2014 for a 2019 ISD may not yet have sufficient information yet on whether or not Lake Sturgeon will be listed as endangered under SARA and what the resulting impacts would be on Keeyask. Without sufficient confidence that Lake Sturgeon on the Nelson River will not be listed, it may be necessary to delay start of construction. The MP and WPS sales agreements have provisions allowing for up to 2 years of regulatory delay without voiding the contracts.
- Conawapa is an option for 2026 new supply only if expenditures continue to be undertaken in the period up to 2018. At that time, if a decision is made that Conawapa should proceed, construction commitments and major expenditures would be required. The expenditures for the first year after June 2014 are relatively modest. The Environmental Impact Statement (EIS) would be filed mid-2015 and construction preparations would ramp up and expenditures intensify. It is assumed for the pathway discussion that protection of an ISD for Conawapa to provide future flexibility would occur up to the point of filing the EIS, which occurs approximately 10-11 years before the ISD. Furthermore, expenditures beyond filing the EIS would become increasingly substantial and could only be incurred if the Conawapa ISD was being actively planned for. In that situation, a decision to cancel or defer Conawapa could be made up to the construction start, which would be 8-9 years before the ISD. Once Conawapa construction has fully started it would not be feasible to cancel construction.
- A decision on a new interconnection needs to be made by June 2014 to allow Keeyask to be constructed in time to meet the terms of the MP Sale, and to allow the design of the interconnection to be ready for a start of construction in 2017. The 750 MW interconnection licensing and approvals process is expected to result in approvals for construction in both Canada and the U.S. in 2017. Such timing would provide for a 2020 ISD of the interconnection. Should the 750 MW interconnection option be stopped to be replaced by the 250 MW interconnection option in 2014, a similar transmission Right Of

Way would be sought and a portion of the studies and consultations would still be useful. The 250 MW interconnection may be able to achieve a 2020 ISD but there is risk it would be later.

Pathway 1 - Natural Gas Generation

This is a choice to count on natural gas generation to meet only domestic load requirements starting in or around 2023 and to forgo developing new hydro for the 2023 time frame. Thereafter, as the Manitoba load continues to grow and the need for further new supply arises, there would be at least two future options to decide between: i) continue with natural gas generation expansion or, ii) develop new hydro. If at that time the gas and export price forecasts indicate a low price trajectory then the choice to meet the 2026 requirement might be natural gas. If instead the gas and export price forecasts indicate a high price trajectory then the choice for 2026 might be hydro.

Figure 14.2 depicts this pathway. The plan commits to gas for 2023 and continues in 2015 with minor investment to continue protection of Keeyask and Conawapa 2029. After 2018 the Conawapa protection expenditures would rise significantly. If in 2018 gas and export price forecasts indicate a low price trajectory or if other conditions are not favourable to Conawapa, then the choice can be assumed to be a decision to stop work on Conawapa along with a decision to proceed instead with natural gas or Keeyask for 2029 requirements. Keeyask would continue as an early ISD option without major expenditures. If 2018 conditions were instead sufficiently favourable to Conawapa then the choice could be Conawapa for 2029. In 2021, a decision would be required whether to meet the 2029 requirements for new resources by committing construction of Conawapa or reverting to gas or Keeyask.

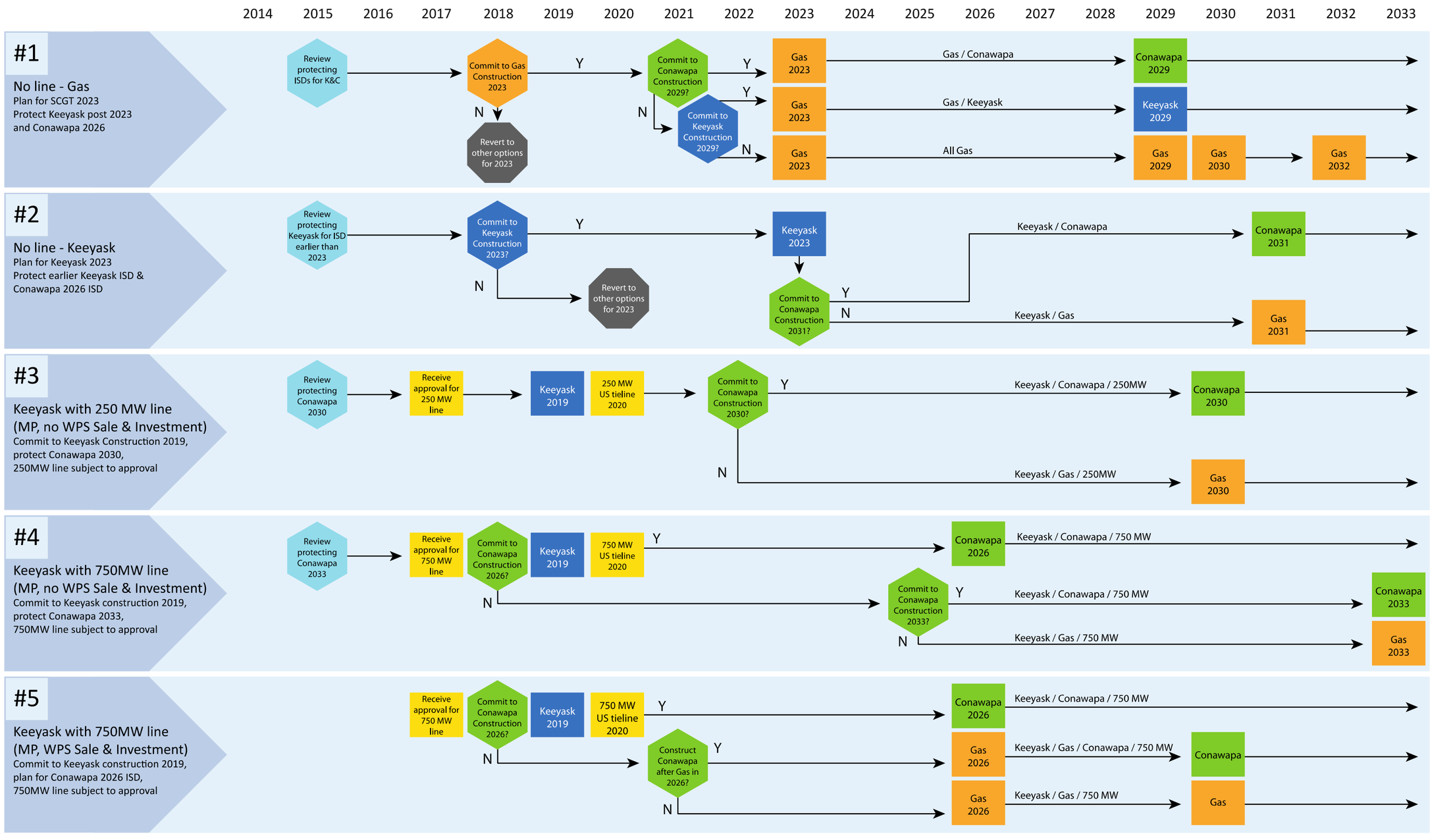
Deciding in June 2014 on gas generation for supply in and around 2023 foregoes development of the U.S. interconnection options and foregoes the 250 MW MP sale and 300 MW WPS sales. In effect Pathways 3, 4 and 5 would be closed off in June 2014 but the option to change to Pathway 2 would remain a possibility until 2017 or 2018.

The Gas Pathway involves the least initial capital cost of the five pathways and consequently the lowest medium-term borrowing requirements and rate increases. The All Gas Plan associated with this pathway is evaluated over the widest range of scenarios and found overall to have the greatest net costs to Manitoba Hydro and, therefore, the highest long-term electricity rates for Manitobans and least social, environmental and provincial benefits. ("Lower net cost to Manitoba Hydro" is another means to express "higher benefit to Manitoba Hydro" as was reported in the in the economic evaluation sections earlier; it is expressed as "net cost" here for sake of clarity.)

However, the Gas Pathway can lead to other plans than all gas. After the 2023 requirement is met and should the trajectories for energy price and other factors such as capital costs and economic indicators prove favourable, the next resource requirement for 2029 could be met by Keeyask or Conawapa rather than continued development of natural gas. (Such future choices for development could also include other resources such as wind or more DSM; discussion here and in other pathways will not continue to explicitly mention this possibility but will take it as a given.) On the other hand, future conditions may be favourable to continued development of gas. Aside from deferral of capital investment, this pathway would allow some of the current uncertainties, such as the amount of influence on energy prices of societal initiatives to reduce GHGs or of shale gas production, to evolve for several years. However, while some uncertainties will reduce, typically other uncertainties will present themselves.

Plans within this pathway that choose gas followed by hydro are likely more beneficial than all gas, but they will still be less beneficial than the plans in other pathways. Part of the reason for this is that this pathway foregoes taking advantage of the current window of opportunity to develop a new major interconnection and its associated import and export benefits. In addition, the deferred development of new hydro delays its associated provincial, environmental and societal benefits.

Figure 14.2 Pathway Decision Tree - ISDs based on 2013 Load Forecast and related assumptions



Pathway 2 - Keeyask, No New Interconnection, No New Export

This is a choice to count on Keeyask to meet only domestic load requirements starting in or around 2023 and a choice not to proceed with development of a new U.S. interconnection or associated long-term export contracts. Keeyask is the only hydro option that can be constructed for the 2023 time frame. As depicted in Figure 14.2, a final decision to commit Keeyask construction would be required in 2018 to be able to meet the 2023 ISD. The choices for next generation after Keeyask would again depend on the situation at that time and could include generation options such as hydro or natural gas.

Under this pathway, the development of a new interconnection is foregone and Pathways 3, 4 and 5 would be closed off in June 2014; however, plans could revert to Pathway 1 until 2018.

By only committing to Keeyask, the corporation has more flexibility to spread out capital investment and not increase the annual borrowing requirements to such a high degree as with overlapping development of Keeyask followed by Conawapa and a new interconnection. The prior construction of Keeyask would provide some additional information and confidence as to the capital costs of Conawapa to assist in future development decisions.

The plans within Pathway 2 generally have greater economic, long-term rate, environmental, social benefits and provincial revenues than the plans in Pathway 1 but less than those in Pathways 3, 4 and 5. Compared to plans with new interconnections, Pathway 2 clearly entails higher net costs and long-term rates for Manitobans and lower social and environmental benefits. A major part of the reason for this is that this pathway foregoes taking advantage of the current window of opportunity to develop a new major interconnection and the import and export benefits associated with the interconnection.

This pathway would not result generally in a reduction in risks, except that the Keeyask construction commitment date would be sufficiently later in time compared to the other

Keeyask pathway—so that there would be more confidence about the status of Nelson River Lake Sturgeon listing under *SARA* and resulting impacts.

Pathway 3 - Keeyask, 250 MW Interconnection, Small Export

This is a choice to count on Keeyask to meet domestic load requirements and to proceed with a new 250 MW interconnection and the 250 MW MP Sale and the 125 MW NSP extension, but not the 300 MW WPS sale. In this pathway it is assumed that investments would continue up to 2018 to protect a Conawapa ISD of 2031. As depicted in Figure 14.2, decisions would be required in 2022 as to whether to meet the 2031 requirement for new resources by either Conawapa or by gas. (This 2031 date is based on the 2013 load forecast and is deferred from 2029 to 2031 by the dependable energy imports available with the 250 MW interconnection.)

This pathway involves start of Keeyask construction in July 2014. Should there be a delay in Keeyask regulatory approvals the sale contract provides for up to a 2-year delay but only on the basis of regulatory requirements.

Pathway 3 means that the development of a new 750 MW interconnection would be foregone and Pathways 4 and 5 would be closed off. The 250 MW interconnection and MP sale could be cancelled should the interconnection and sale not receive regulatory approvals in Canada or the U.S., as scheduled for 2017. With the exception of circumstances involving denial of regulatory approval for the MP export contract or for the interconnection, this pathway closes off Pathways 1 and 2 in June 2014.

Similar to Pathway 2, by initially only committing to Keeyask the corporation gains flexibility to spread out capital investment and not increase the annual borrowing requirements to such a high degree as with overlapping development of Keeyask followed by Conawapa and a new interconnection. The early capital requirements in Pathway 3 are only slightly increased compared to Pathway 2, but Pathway 3 gains the benefits of having a moderate increase in interconnection import and export capability. The prior construction of Keeyask would provide

some additional information and confidence as to the capital costs of Conawapa to assist in future development decisions.

The plans within Pathway 3 consistently have greater economic, environmental, social benefits and provincial tax revenues than the plans in Pathways 1 and 2, along with lower or comparable risks. Pathway 3 plans with Conawapa have lower long-term rates than plans in Pathway 1 and 2. The economic evaluations undertaken indicate no clear preference between Pathways 3 and 4.

The Pathway 3 plans provide less benefits than some of the Pathways 4 and 5 plans because in this pathway the development of the 250 MW interconnection foregoes development of the larger interconnection in 2020. Benefits will also be likely less in future years because:

- The 250 MW interconnection will significantly reduce the future export benefits available from building an additional 750 MW interconnection at a later time.
- The 250 MW plan, at a cost of about $300 million, does not reduce the cost of a 750 MW interconnection upgrade. An additional $1,000 million (approximate) investment would be needed to construct a new line to increase the transfer capability from 250 MW to 750 MW. The total investment needed is therefore $1,300 million for two lines compared to $1,000 million if the 750 MW line had been built originally.
- Requesting approvals for the second line shortly after the first line has been constructed is not recommended: the Minnesota state regulator may look on the second new line application unfavourably. It may also be difficult to get a U.S. Transmission Owner to champion a second line.

Pathway 3 can involve plans which advance the development of Conawapa to 2026—similar to the Pathways 4 and 5 plans with Conawapa 2026—but the benefits of such advancement in Pathway 3 are not as great due to the smaller interconnection.

Pathway 4 - Keeyask, 750 MW Interconnection, Small Export (No WPS Sale or Investment)

This is a choice to count on Keeyask to meet domestic load requirements and to proceed with a new 750 MW interconnection, the 250 MW MP sale and the 125 MW NSP extension, but not the 300 MW WPS sale. (The 100 MW WPS sale from 2021-2027 would still proceed.)

This pathway involves start of Keeyask construction in July 2014. Should there be a delay in Keeyask regulatory approvals the MP sale contract provides for up to a 2-year delay but only on the basis of regulatory delay.

With the additional dependable energy imports available over the expanded interconnection, and without the 300 MW WPS sale or any other new firm sales, new generation after Keeyask would not be required until 2033 according to the 2013 Load Forecast. A decision would be required in 2015 whether to undertake further investments to continue to protect a Conawapa ISD of 2026 or for some other date prior to 2033. Decisions could be made to defer Conawapa beyond the 2026 ISD and/or switch to gas up to 2018. The decision to construct Conawapa for the 2033 date can be deferred up to 2025.

In June 2014, this pathway foregoes development of the 250 MW U.S. interconnection option because Manitoba Hydro will need to choose between these two options and the development work is fundamentally different between the options. The interconnection and MP sale could be cancelled should the 750 MW interconnection not receive environmental regulatory approvals in Canada or the U.S. It is considered unlikely, but possible, that after denial of regulatory approvals for the 750 MW interconnection that a 250 MW interconnection would be pursued and approved. With the exception of circumstances involving denial of regulatory approval for the MP export contract or for the interconnection, this pathway closes off Pathways 1 and 2 in June 2014.

With the 750 MW interconnection, Pathway 4 provides the benefits of the large interconnection but without the WPS sale driving a requirement to undertake significant

generation investment overlapping with Keeyask—this spacing of investment intervals is representative of plans which have the next generation for 2033 being either Conawapa or gas, depending on the conditions at that time. Should energy price trajectories, new export contract opportunities, capital costs and corporate ability to incur additional borrowing be favourable, Conawapa could be advanced from 2033 to as early as 2026. The prior construction of Keeyask would provide additional information and confidence as to the capital costs of Conawapa to assist in future development decisions.

Plans within Pathway 4 consistently have greater economic, provincial, environmental and social benefits than the plans in Pathways 1 and 2, but in some instances less benefits than plans in Pathways 3 and 5. Pathway 4 plans with Conawapa have lower long-term rates than plans in Pathways 1 and 2. Pathway 4 has higher expected-value economic benefits than Pathways 1 and 2 and somewhat lower expected economic benefits than Pathway 5. The economic evaluations undertaken indicate no clear preference between Pathways 3 and 4. Compared to Pathway 3, the Pathway 4 benefits are slightly higher, unless it is assumed that Conawapa will not be built for decades.

Pathway 5 - Keeyask, 750 MW Interconnection, Large Export (WPS Sale and Investment)

Pathway 5 is a choice to count on Keeyask to meet domestic load requirements and to proceed with a new 750 MW interconnection, the 250 MW MP Sale and the 300 MW WPS sale. This pathway involves start of Keeyask construction in July 2014. Should there be a delay in Keeyask regulatory approvals, the sale contract provides for up to a 2-year delay but only on the basis of regulatory delay.

The choices for next generation after Keeyask most likely would be Conawapa for an ISD in or around 2026, in which case this pathway results in the Preferred Development Plan. But again the choice would depend on the situation at that time. If in 2018 gas and export price forecasts indicated a low price trajectory, or if there were other conditions not favourable to Conawapa, Conawapa could be displaced by other resources such as gas for the 2026 ISD. Similarly, if load

growth were slower than expected or a much higher DSM level were achieved, a decision to defer the Conawapa ISD could be made as late as 2018.

The results of the economic evaluations of Pathway 4 and 5 are similar, but Pathway 5 has the advantage of the higher revenues and investment and greater certainty of revenue due to the WPS agreements; also, the WPS sale provides expansion and diversification of the Manitoba Hydro market and customer base not only with WPS but also, potentially, many other counterparties in the Wisconsin market.

Approval of this pathway would entail a firm commitment in June 2014 to Keeyask construction for a 2019 ISD, a 750 MW interconnection, the 250 MW MP Sale, and the 300 MW WPS sale. The interconnection and sales could be cancelled should the interconnection not receive environmental regulatory approvals in Canada or the U.S., or should the MP and WPS sales not receive regulatory approvals. With the exception of the above circumstance—involving denial of regulatory approval for the exports or interconnection—this pathway closes off all the other pathways in June 2014.

Preferred Development Plan

The Preferred Development Plan associated with this pathway has been evaluated in comparison to all the other plans and, over the range of scenarios, demonstrates the greatest beneficial impacts overall with regard to economics, long-term rates, the environment, social issues and provincial tax revenues. However, there are scenarios wherein other plans are more economic and result in lower rates, such as under scenarios with low energy prices and/or high capital costs. This downside risk is more than offset by upside potential. The Preferred Development Plan also has one of the highest initial capital investments and total corporate borrowing requirements of all the plans due to the overlapping schedules for Keeyask, large interconnection and Conawapa. During the capital intensive period involving both Keeyask and Conawapa, projected net debt and cumulative rate increases are generally higher than other alternatives, but are lower in the long-term. Development plans that include Keeyask and

Conawapa have the strongest projected balance sheets, with high levels of fixed assets and retained earnings, and provide the most robust ability to absorb adverse financial impacts over the entire study period.

Intergenerational Equity- Pathways 4 and 5

Compared to the other pathways without Conawapa, Pathway 4 or 5 with Conawapa provide major cost savings to Manitoba Hydro and customers in the long-term, but with higher shorter-term costs—which raises the issue of intergenerational equity between the current generation of Manitobans and subsequent generations. Fundamentally, projects like Keeyask and Conawapa share the same up-front cost/long-term benefit pattern exhibited by Manitoba Hydro's existing hydro-electric generating stations. Today's customers are benefitting from the investment decisions of years and decades past and this cycle is expected to repeat with new hydro development. The use of present-value analysis, which discounts these future benefits, is an important tool that assists in addressing this issue by enabling alternative development plans to be compared on a common basis. Multiple-account analysis (as performed in ***Chapter 13 - Integrated Comparisons of Development Plans - Multiple Account Analysis***) further examines the wide variety of benefits associated with the Preferred Development Plan; many of these benefits from hydro development and increased interconnection capability are expected to accrue during the next 30 years and benefit the current generation of Manitobans, e.g. enhanced energy security and system reliability, employment, economic stimulus. These intergenerational benefits would also be true for other Pathways 4 and 5 plans with Conawapa.

Pathway 4 and 5 plans with the 750 MW interconnection provide overall the most flexibility to manage risks such as higher or lower load growth, uncertainty in level of future DSM, severe drought and increases and decreases in river flows due to climate change and to take advantage of future opportunities such as other export sales in addition to or instead of WPS.

The plans within Pathways 4 and 5 are the most responsive plans to increases in the load forecast. If Manitoba load were to experience load growth that is significantly larger than

forecast, there is the ability to use some of the expected surplus generation or increased import capability to meet the increased Manitoba load growth.

Conversely, if Manitoba load growth proved significantly less than expected, Pathway 4 (or 5 with Conawapa 2026 could respond with decisions to defer or displace Conawapa as late as 2018. In the short-term before the Conawapa ISD, increased surplus generation due to the reduced load growth could be marketed using the larger interconnection. Should it be too late to defer Conawapa, then the larger interconnection and increased market access to Wisconsin would assist in selling Conawapa surplus into the export market as either firm or opportunity. In plans where Conawapa has been delayed or replaced with gas, the larger interconnection would again assist in selling the surplus. As is presented in Section 10.3.3, the positive net cost impacts for higher load growth are greater than the negative impacts for lower load growth, overall favouring the larger interconnection.

Similarly Section 10.3.2, demonstrates that, compared to the All Gas Plan, the Preferred Development Plan with the larger interconnection and Conawapa 2025 is more likely to be affected positively from climate change impacts on stream flows than negatively. Generally plans with more new hydro and greater interconnection capacity will also tend to show the same pattern.

Optionality

The risks of scenarios wherein the Preferred Development Plan underperforms other plans can be partly mitigated through the flexibility provided by being able to modify the plan in response to changed circumstances; for example, the decision to defer the Conawapa ISD or to displace Conawapa with other resources such as gas and/or more DSM could be made as late as 2018. This flexibility also would be available should the corporation conclude in 2018 that, with the then-current financial outlook, it could not comfortably manage the total corporate debt requirements that would result with Conawapa being built in addition to Keeyask and the interconnection. This optionality allows Manitoba Hydro to mitigate the downside risk, while

preserving the upside potential, and thus would increase the overall expected value. Such optionality would particularly benefit pathways with increased interconnection capability.

There is a risk that the 750 MW interconnection may not be approved; however, this also can be offset because the Conawapa construction commitment in 2018 falls one year after the scheduled approval date for the interconnection. Conawapa could then be deferred or cancelled should the interconnection approval be delayed or denied.

14.7 Preferred Development Plan Pathways

Section 14.7 discusses the Preferred Development Plan Pathways from two perspectives, one in which the 300 MW WPS Sale negotiations conclude favourably (Pathway 5) and one in which the 300 MW WPS Sale negotiations do not conclude favourably (Pathway 4).

Pathways 3, 4 and 5 with new interconnections are clearly superior to Pathways 1 and 2 with no new interconnections because they have lower net cost to Manitoba Hydro, lower long-term rates for Manitobans, higher transfers to the Province, higher social and environmental benefits and greater enhancement of reliability of supply and energy security to Manitoba electricity users.

Pathway 5 (and Pathways 3 and 4) with Keeyask in 2019 have a risk compared to Pathways 1 and 2 in that a construction decision in June 2014 for the 2019 ISD may not have sufficient confidence concerning information about whether Lake Sturgeon on the Nelson River will be listed under SARA and the impacts of such a listing. The risk mitigation for this situation would be to delay the construction decision; the MP and WPS sales have provisions to allow up to 2-years delay for regulatory reasons without voiding the contracts.

Keeyask 2019, 750 MW Interconnection, Large Export Pathway (Pathway 5)

Pathway 5 is preferred over other pathways, assuming the WPS Sale negotiations conclude favourably, because it includes the Preferred Development Plan, which has lower net cost to

Manitoba Hydro, lower long-term rates for Manitobans, much higher transfers to the Province, higher social and environmental benefits and greater enhancement of reliability of supply and energy security to Manitoba electricity users. Pathway 3 has a lower downside risk, but this is partly offset by the ability of Pathway 5 to displace Conawapa with gas generation should the conditions not be favourable to Conawapa. Pathway 5 with Conawapa 2026 has noticeably higher medium-term net debt balance and medium-term electricity rate increases, but these are judged to be manageable. Pathway 4 does not have the export price certainty that is provided with the proposed 300 MW WPS Sale contract nor the additional export market and customer diversification associated with it.

Should the WPS Sale negotiations fail to conclude successfully over the next year, or should the sale not receive all the required U.S. and Canadian approvals, Pathway 5 could evolve to either Pathway 3 or 4. Pathway 4 with the 750 MW interconnection and Conawapa 2031 is preferred when compared to Pathway 3 as per the following discussion.

The following paragraphs will focus on comparing Pathways 3 and 4 to each other.

Section 14.2.6 concludes that 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 within 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) is more economic than the most economic plan with the 750 MW interconnection (Pathway 4).

The medium-term net debt balances and medium-term rate increases are not significantly different between the 250 MW and 750 MW plans if the plans both have the same ISD for Conawapa. The financial evaluations do significantly differ when comparing plans with different

ISDs for Conawapa. If a Keeyask/Conawapa plan with 750 MW interconnection is compared to a Keeyask/Gas plan with 250 MW interconnection, the results generally are that the 750 MW plan would involve:

- rate increases in the medium-term (around 15 years into the future) which will be higher for a relatively short period of time but lower for all years after 2035
- long-term corporate financial parameters (such as debt/equity ratios and borrowing) which are similar to the other plans but involve higher retained earnings, which provide enhanced protection against adverse events such as severe drought
- in the medium-term, the total net debt balance would be a significant but manageable challenge.

While net costs of the 250 MW and 750 MW interconnection plans are competitive with each other depending on the situation, Pathway 4 plans with the 750 MW interconnection have more flexibility to respond to changing circumstances and to take advantage of new sales or other opportunities and provide greater cost savings as well as providing greater enhancements to other benefits as outlined below.

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

Pathway 5 is preferred assuming the WPS Sale negotiations conclude favourably because it includes the Preferred Development Plan which results in overall highest net benefits to Manitoba Hydro and lowest long-term domestic rates for Manitobans compared to the other alternatives over a wide range of reasonable future scenarios of energy and export prices, capital costs and economic parameters. Under the reference scenario, rate increases in the medium-term (around 2030) will be higher for a relatively short period of time but lower for all years after 2035.

- Pathway 4 plans result in overall lowest net costs to Manitoba Hydro and lowest long-term domestic rates for Manitobans compared to the alternatives without interconnections over a wide range of reasonable future scenarios of energy and export prices, capital costs and economic parameters. Net costs of the 250 MW and 750 MW interconnection plans are competitive with each other depending on the situation. However, Pathway 4 plans with the 750 MW interconnection have more flexibility to respond to changing circumstances and to take advantage of new sales or other opportunities and provide greater cost savings, compared to Pathway 3 as well as providing greater enhancements to other benefits.

Supports Manitoba Hydro's Long-Term Fiscal Health

Pathways 4 and 5, with Conawapa, in addition to having lower long-term rates, will result in a strong balance sheet with high levels of fixed assets and retained earnings, which provide enhanced protection against adverse events such as severe drought. In the medium-term, although net debt levels are the highest with the development plans that include both Keeyask and Conawapa, due to their significant capital investment, they also have the highest net fixed assets and retained earnings.

Protects Customer Service

By having increased access to imports and by having increased domestic generation, Pathways 4 and 5 provide the highest level of system reliability to address generation or major transmission outages or unexpectedly high load peaks, and the highest level of energy security to mitigate unexpectedly severe droughts or unexpectedly high energy consumption. Over the 20 years starting with the 2019 Keeyask ISD, Pathways 4 and 5 provide up to 1,200 MW additional load carrying capacity to deal with equipment outages and load forecast uncertainty compared to the All Gas Plan and up to 900 MW more than the Keeyask 2022 Gas Plan. Over the same 20-year period, should Manitoba experience a drought significantly more severe than experienced to date and/or planned for, Pathways 4 and 5 provide significant additional

emergency energy imports to meet Manitoba domestic load compared to the All Gas Plan and compared to the Keeyask 2022 Gas Plan.

Supports Risk Management and Flexibility

Pathways 4 and 5 provide the overall best means to respond to changing conditions such as higher or lower load growth, uncertainty in level of future DSM, increases and decreases in river flows due to climate change and additional export market opportunities. The large new interconnection to the Wisconsin region reduces export revenue risk by providing enhanced market and customer diversification. The 750 MW interconnection has also been designed to increase firm import capability. During times of lower than average water flows the additional import capability will provide Manitoba Hydro with access to an additional 2,000 GWh of low-cost off-peak energy which will significantly reduce Manitoba Hydro's financial exposure to drought. The same import capacity also provides protection against a delayed Keeyask ISD caused by unexpected events during its construction.

Should conditions not be favourable to constructing Conawapa for a 2026 ISD, a decision could be made as late as 2018 to displace Conawapa by other resources such as gas or to defer its ISD. Displacing Conawapa by an alternate resource would modify some of the benefits associated with the plan as described in this section; but this would be offset by the reduction in downside risk.

Provides the Highest Financial Benefit to the Province and to Manitobans

Pathways 4 and 5 have the highest transfers to the Province in the form of provincial debt guarantee fees, water rentals and capital taxes.

Under the reference scenario, the Preferred Development Plan is expected to be $1,696 million (2014 NPV, using 2012 assumptions) more beneficial than an all gas generation plan when considering only net costs to Manitoba Hydro, and $3,697 million (2014 NPV) when also considering cash transfers to the provincial government in the form of provincial debt

guarantee fee, water rentals and capital tax. These transfers are generally available to the government to benefit Manitobans. This total corporate and provincial economic NPV is equivalent to almost $300 million per year every year (2020 $) for 60 years starting in 2020 (the first year after the Keeyask ISD). This is equivalent to $600 per year per household for the estimated 500,000 residential households in Manitoba.

Under the reference scenario, Pathway 4 with Conawapa in 2031 is expected to be $1,360 million (2014 NPV, using 2012 assumptions) more beneficial than an all gas generation plan when considering only net costs to Manitoba Hydro and $3,098 million (2014 NPV) more beneficial when also considering cash transfers to the provincial government. The total corporate and provincial economic NPV is equivalent to approximately $250 million per year (2020$) for 60 years starting in 2020 or equivalent to $500 per year per household for the estimated 500,000 residential households in Manitoba.

Offers the Highest Level of Socio-economic Benefits to Manitobans

Pathways 4 and 5 provide the highest employment, provincial economic growth and the above-noted financial transfers to the provincial government. In terms of employment alone, the construction of Keeyask and Conawapa will result in a combined 22,400 person-years in direct, indirect and induced employment.

Provides the Most Beneficial Package of Socio-economic Impacts and Benefits to Northern and Aboriginal Communities

Pathways 4 and 5 provide for training, employment, business opportunities, income sharing and participation in environmental and socio-economic protection.

Capitalizes upon Manitoba's Valuable Endowment of Renewable Hydropower

Pathways 4 and 5 rely on renewable hydropower in Manitoba rather than non-renewable resources imported from outside the province.

Supports Manitoba's Clean Energy Strategy and Sustainable Development Principles

Pathways 4 and 5 support Manitoba's Sustainable Development Principles by providing clean renewable energy, (e.g. reducing global GHG emissions by displacing thermal generation in Manitoba and to a larger degree in the export jurisdictions) and by providing an infrastructure legacy for future generations.

Manitoba Hydro Conclusions

In summary, the conclusions of this submission are that Manitoba Hydro should proceed with the Preferred Development Plan and its associated pathways. Embarking on the Preferred Development Plan would not preclude modifying its scope if future conditions suggest that it is prudent to do so.

The immediate commitments in June 2014 are:

- start construction of Keeyask for a 2019 ISD
- proceed with the 250 MW export agreement with MP
- proceed with the 100 MW export agreement with WPS
- proceed with the 750 MW U.S. interconnection subject to regulatory approvals
- proceed with the 300 MW export agreement with WPS subject to satisfactory conclusion of negotiations currently still underway.

Decisions over the next few years for Conawapa protection and ISD will be influenced by the 300 MW WPS export agreement and ongoing evaluations, considering factors such as other export agreement possibilities, energy prices, capital cost and load growth.

Activities should continue to protect an ISD for Conawapa as early as 2026, but conditions which are pertinent to this schedule will be continually monitored to determine if such continued investments are worthwhile and ultimately to determine if Conawapa should be constructed and for what ISD. Should conditions not favour the construction of Conawapa, it could be deferred or displaced by other resources such as gas generation. The early ISD of 2026

for Conawapa could be protected with a modest investment up to the filing of the EIS in the summer 2015 (approximately $50 million) but the amount of investment required thereafter would increase. A decision to commit to Conawapa construction for a 2026 ISD would be required no later than 2018.