

Power Resource Planning, Alternatives and Economic Evaluations

Chapters 4, 7, 8, 9, 10 and 12

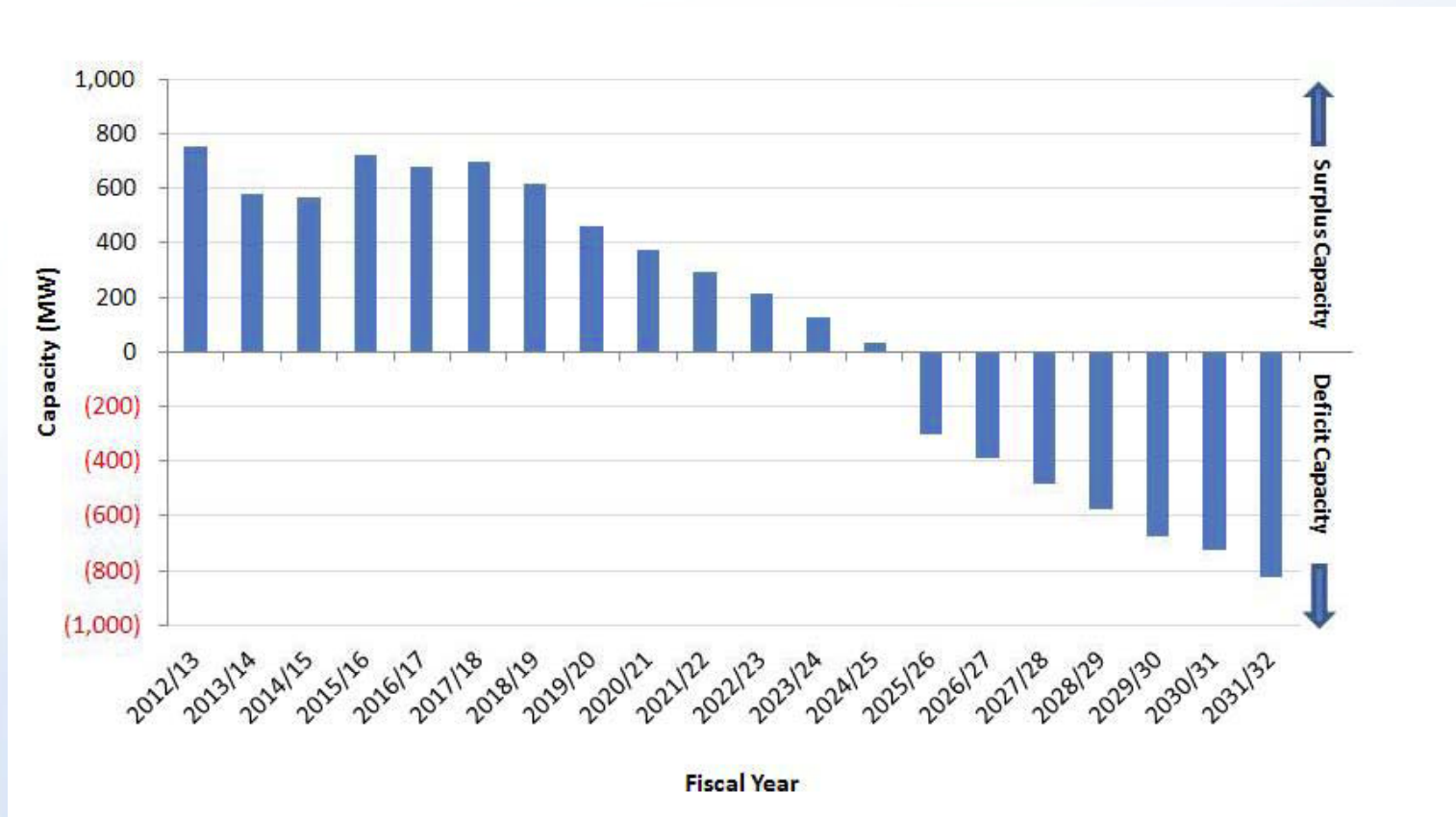
Joanne Flynn

Division Manager, Power Planning



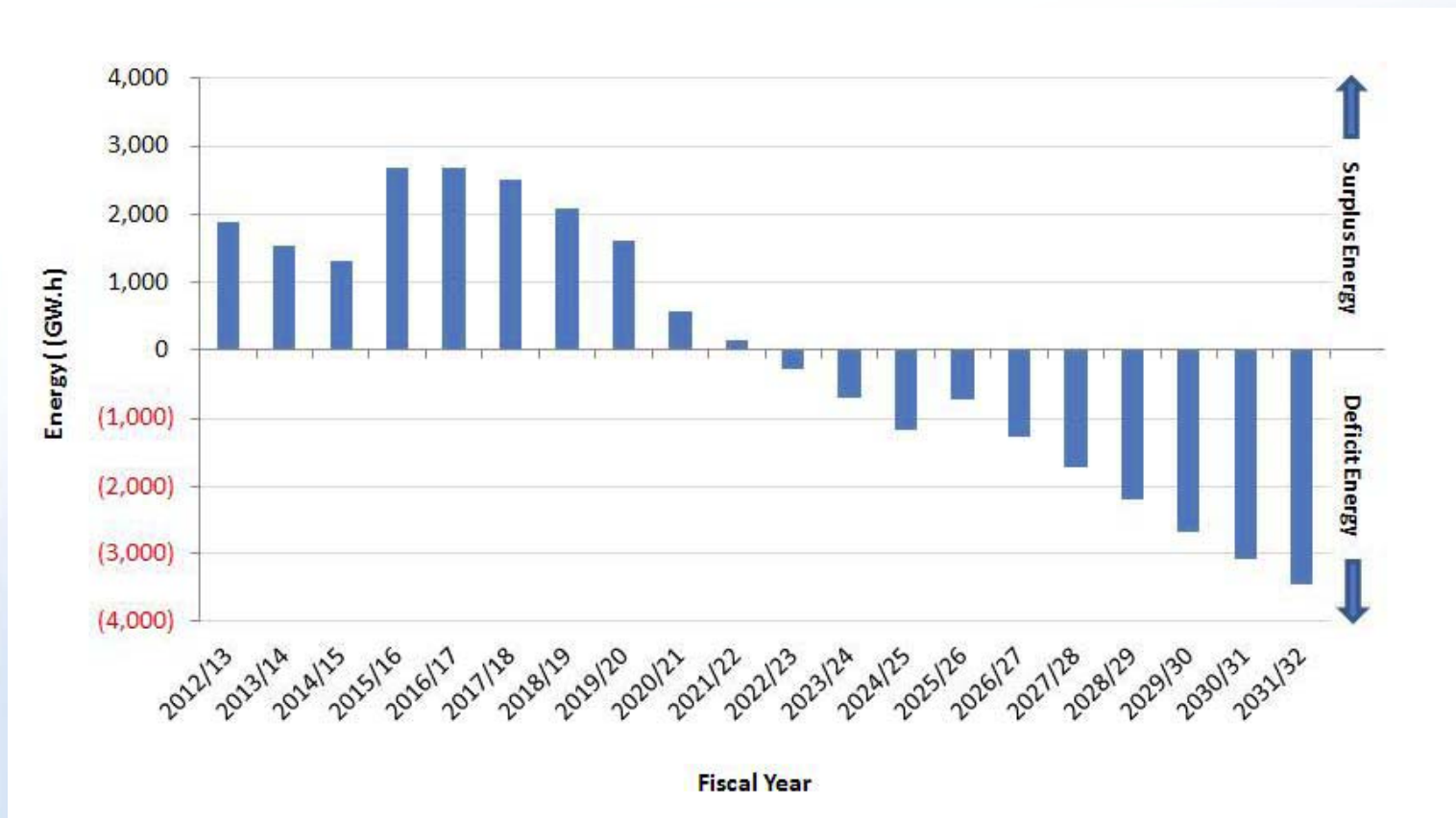
Need for New Resources

Capacity Balance - Winter Peak Capacity (Figure 4.19)



Need for New Resources

Energy Balance - Dependable Energy (Figure 4.21)



Screening of Manitoba Resource Options

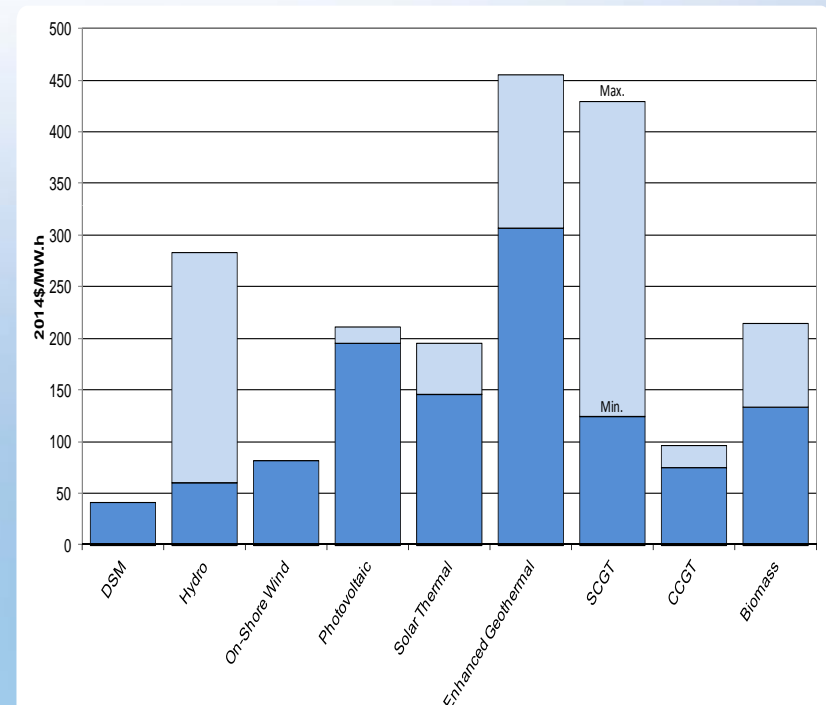
(Chapter 7 – pages 1, 2 and 11)

- 16 resource technologies potentially suitable for utility-scale generation are considered.
- The characteristics are grouped into the following conventional categories: technical, environmental, social and policy, and economic.
- The high-level screening of technologies uses a general characterization to determine whether a technology will proceed to the next stage of evaluation.

Screening of Manitoba Resource Options

(Chapter 7 pages 9-11)

- Levelized cost is a standard measure of the cost of constructing and operating a generating resource over its life. While it is a useful measure for screening of technologies, it should be noted that levelized cost does not indicate the value of the generation but is a relative measure of the cost associated with a unit of energy.



Screening of Manitoba Resource Options

(Chapter 7 page 12)

- The screening process resulted in the following resource technologies advancing to the next stage of evaluation:
 - additional DSM
 - hydro – with Storage and Run-of-River
 - wind – On-Shore
 - natural Gas-Fired – Simple Cycle and Combined Cycle Gas Turbines
 - imports.

Development Plans

(Chapter 8 page 1)

- All development plans must be able to meet Manitoba Hydro's expected domestic load and existing firm export commitments
- Plans are also determined considering various strategic business opportunities

New US Interconnection

(Chapter 8 page 7)

- 2 interconnection projects are considered:
 - 750 MW import/export
 - 50MW import/250 MW export
- A new interconnection will consist of two parts: a portion constructed in Manitoba and a portion constructed in the U.S.
- Manitoba Hydro will not enter into an arrangement in which it owns more than 49% of the proposed U.S. interconnection.

New US Interconnection

(Chapter 8 pages 9, 10)

- 5 plans with 750 MW interconnection
 - Plans 5 and 14 (with WPS) assumed that Manitoba Hydro will be responsible for 40% of the capital cost and ongoing operating costs associated with the U.S. interconnection facilities.
 - Plans 6, 12 and 15 (no WPS) use a conservative assumption whereby Manitoba Hydro will be responsible for approximately two-thirds of the capital and ongoing operating costs associated with the U.S. interconnection facilities

Description of 15 Development Plans

Table 9.3, Chapter 9, page 12

Order of Capital Investment (Plan Number)	Development Plan Short Name	Description of Development Plan
1	All Gas	Natural Gas-Fired Generation starting in 2022/23
2	K22/Gas	Keeyask 2022/23, Natural Gas-Fired Generation starting in 2029/30
3	Wind/Gas	Wind Generation starting in 2022/23 supported by Natural Gas-Fired Generation starting in 2025/26
4	K19/Gas24/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
5	K19/Gas25/750MW (WPS Sale & Inv)	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2025/26, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale

Order of Capital Investment (Plan Number)	Development Plan Short Name	Description of Development Plan
6	K19/Gas31/750MW	Keeyask 2019/20, Imports, Natural Gas-Fired Generation starting in 2031/32, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale
7	SCGT/C26	Simple Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2038/39
8	CCGT/C26	Combined Cycle Gas Turbine in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2039/40
9	Wind/C26	Wind in 2022/23, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2036/37
10	K22/C29	Keeyask 2022/23, Conawapa 2029/30, Natural Gas-Fired Generation starting in 2040/41

Order of Capital Investment (Plan Number)	Development Plan Short Name	Description of Development Plan
11	K19/C31/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2024/25, Conawapa 2031/32, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
12	K19/C31/750MW	Keeyask 2019/20, Imports, Conawapa 2031/32, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale
13	K19/C25/250MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2040/41, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
14 Preferred Development Plan	K19/C25/750MW (WPS Sale & Inv)	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale
15	K19/C25/750MW	Keeyask 2019/20, Conawapa 2025/26, Natural Gas-Fired Generation starting in 2041/42, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale

Economic Analysis Of Development Plans

- **Chapter 9: Economic Evaluations – Reference Scenario**
 - Economic evaluation of 15 development plans
 - Reference scenario represents the “most likely” outcomes for the factors affecting MH’s future
 - Assumptions and forecasts for the reference scenario based on 2012 planning assumptions (with the exception of adjustments, primarily downwards, to the electricity export prices)

Economic Analysis Of Development Plans

- **Chapter 10: Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities**
 - Introduces concept of scenarios
 - Presents extensive probabilistic analysis on 12 of the development plans

Economic Analysis Of Development Plans

- **Chapter 12: Economic Evaluations – 2013 Update on Selected Development Plans**
 - Economic evaluation of select development plans
 - Assumptions and forecasts based on 2013 planning assumptions
 - DSM sensitivity and stress test to demonstrate whether the Preferred Plan remains attractive under higher levels of DSM

Incremental Economics

(Chapter 9, pages 1 and 2)

- Incremental costs and benefits associated with one plan relative to another
- Costs and benefits that are common to all development plans are not included in analysis
- Sunk costs are not included – all costs incurred or estimated prior to June 2014
- Least-capital cost investment alternative identified

Standard Economic Analysis – NPV

(Chapter 9, pages 3 and 4)

- Net Present Value or NPV
- When comparing alternatives, the NPV represents the incremental net benefits or net costs associated with the increment of investment made for a higher cost investment option
- The higher cost option is economically preferable if it provides a positive incremental NPV
- Based on real (constant) dollars
- Use real discount rate which excludes inflationary effects

2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Table 1.1, page 2)

Economic Lives of New Generation Resources

Hydro-electric Generating Stations	67 Years
Wind Generating Stations	20 Years
Simple Cycle Gas Turbines (SCGT)	30 Years
Combined Cycle Gas Turbines (CCGT)	30 Years
Individual turbines and generators for hydro-electric stations	25 Years
Transmission Stations	35 Years
Transmission Lines	50 Years

2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Section 1.2)

Total Study Life

- The total study life is 78 years
- For the total study life, Manitoba Hydro combines two approaches – a 35-year detailed evaluation and a long-life asset evaluation which extends from the end of the 35-year study period to the end of the service life of hydro-electric generation assets, as representing the longest-lived assets.

2012 Reference Scenario Planning Assumptions

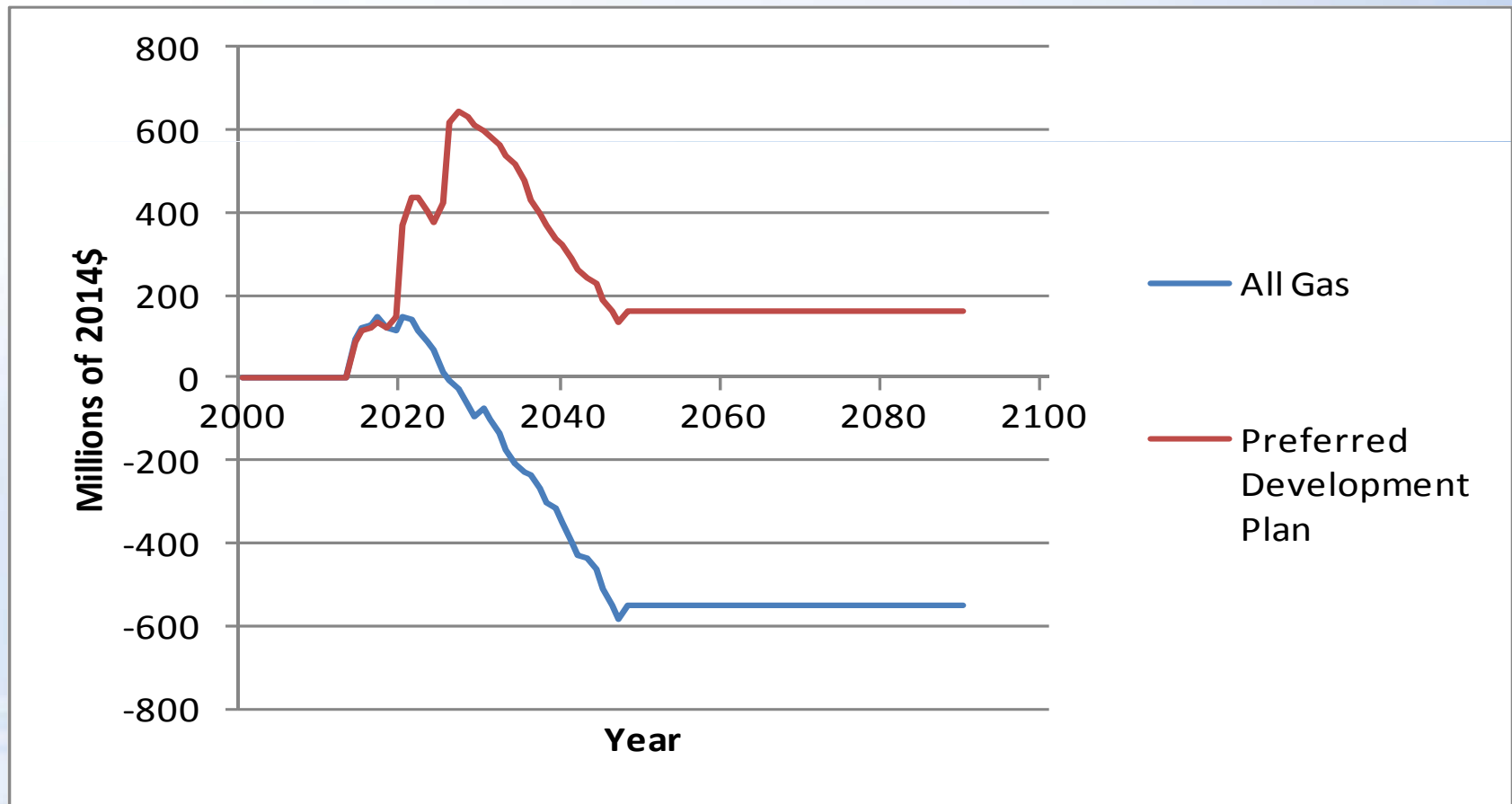
(Appendix 9.3, Section 1.2)

Total Study Life

- Beyond the 35-year study period, replacement capital costs are assumed for assets that reach the end of their economic lives before the end of the long study period (78 years).
- A net production cost approximation is used beyond the 35-year study period
 - including major capital O&M investments for large hydro-electric resources), and
 - extending the average net revenues of the last three years

2012 Reference Scenario Planning Assumptions (Appendix 9.3, Section 1.2)

Total Study Life – Timing and Value of Net Production Costs



2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Table 1.2)

Sunk Costs

	Keeyask 2019	Keeyask 2022	Conawapa 2025	Conawapa 2026	Conawapa 2029	Conawapa 2031
Base Cost (Billions of 2014\$)	\$4.3	\$4.4	\$6.0	\$6.1	\$6.2	\$6.3
Sunk Costs to June 2014	(\$1.0)	(\$1.0)	(\$0.3)	(\$0.3)	(\$0.3)	(\$0.3)
Evaluation Costs	\$3.3	\$3.4	\$5.7	\$5.8	\$5.9	\$6.0

2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Table 1.3)

Manitoba Hydro's Real Weighted Average Cost of Capital (RWACC)

Capital Source	Target Capital Structure	Nominal Rates		Real Rates	
		Rate	Weighted Rate	Rate	Weighted Rate
Long-Term Debt	75%	6.30%	4.73%	4.32%	3.24%
Equity	25%	9.30%	2.33%	7.26%	1.82%
Total	100%	–	7.05%	–	5.05%

2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Section 1.5)

Summary of Export/Import Contracts

- High level details associated with Manitoba Hydro's long-term export/import contracts that are "Common to All Development Plans" and "Contingent upon Development" are provided in Appendix 9.3.
- Details include Supplier, Contract Name, Capacity (MW), Type, Term and Status

2012 Reference Scenario Planning Assumptions

(Appendix 9.3, Section 1.9)

Cash Transfers to the Province

- Economic evaluations of development plans include **capital taxes** and **water rentals** as costs which are paid to the Province of Manitoba
- Included in the calculation of Manitoba Hydro's discount rate used for economic evaluations is the 1% **provincial guarantee fee**
- All rates are held constant over the life of the evaluations

Incremental Economics – K22/Gas Compared to All Gas (Table 9.4, Chapter 9, page 14)

Development Plan	Incremental NPV millions of 2014 Dollars @5.05% Discount Rate
	1 All Gas
1 All Gas	-
Lowest Capital Investment Development Plan	
2 K22/Gas	2 minus 1
	\$887

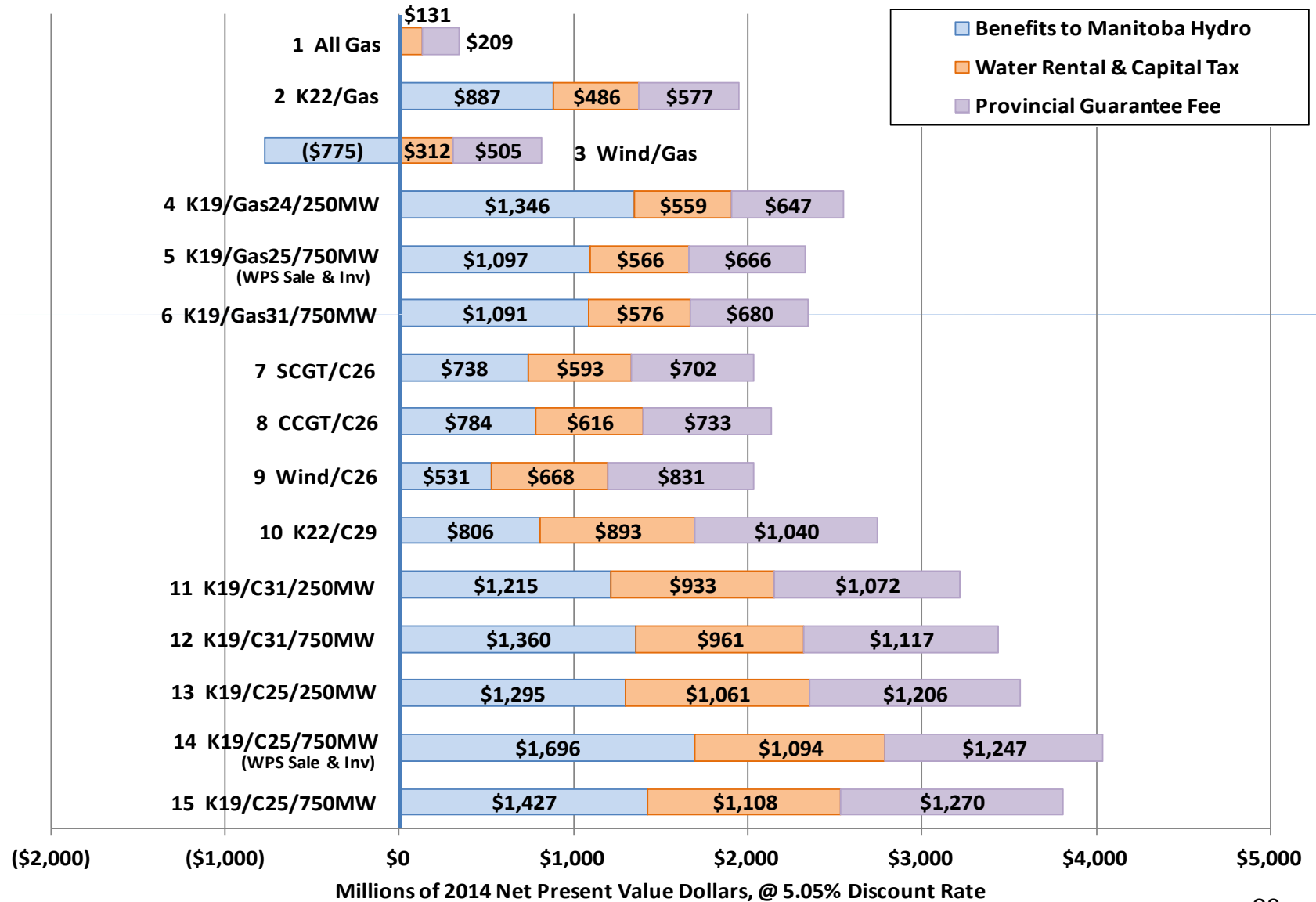
Development Plans with a New U.S. Interconnection

(Table 9.8, Chapter 9, page 23)

Development Plan	Incremental NPV, millions of 2014 Dollars @ 5.05% Discount Rate					
	1 All Gas	4 K19/Gas24/250MW	11 K19/C31/250MW	12 K19/C31/750MW	13 K19/C25/250MW	14 K19/C25/750MW WPS Sale & Inv
1 All Gas						
Lowest Capital Investment Development Plan	-					
4 K19/Gas24/250MW	4 -1					
MP Sale	\$1,346					
11 K19/C31/250MW	11 -1	11 -4				
MP Sale	\$1,215	(\$131)				
12 K19/C31/750MW	12 -1	12 -4	12 -11			
MP Sale	\$1,360	\$14	\$145			
13 K19/C25/250MW	13 -1	13 -4	13 -11	13 -12		
MP Sale	\$1,295	(\$51)	\$80	(\$65)		
14 K19/C25/750MW	14 -1	14 -4	14 -11	14 -12	14 -13	
MP Sale, WPS Sale & Inv Preferred Development Plan	\$1,696	\$350	\$481	\$336	\$401	
15 K19/C25/750MW	15 -1	15 -4	15 -11	15 -12	15 -13	15 -14
MP Sale	\$1,427	\$81	\$212	\$67	\$132	(\$269)

Development Plan Economics

Chapter 9, Figure 9.3



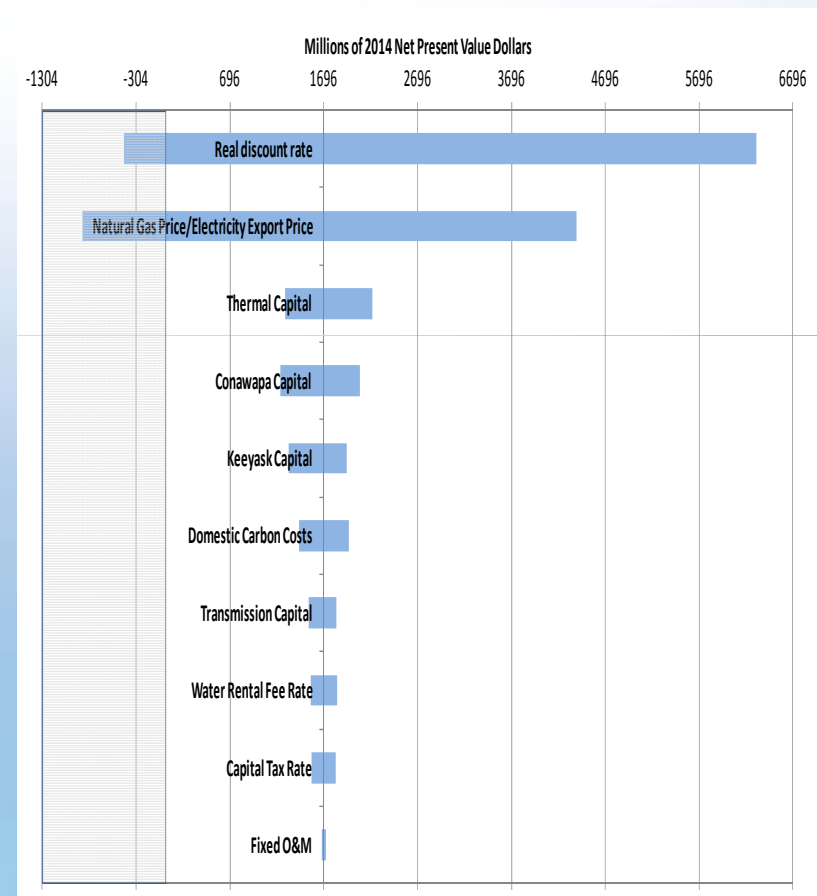
Economic Analysis Of Development Plans

- **Chapter 10: Economic Uncertainty Analysis – Probabilistic Analysis and Sensitivities**
 - Introduces concept of scenarios
 - Presents extensive probabilistic analysis on 12 of the development plans

Highest Impact Factors

(Chapter 10, Figure 10.1)

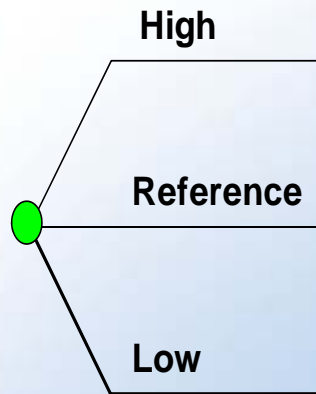
- “High impact” factors are electricity and natural gas prices, discount rate (representative of the cost of capital), and capital costs.
- “Low impact” factors include operating and maintenance (O&M) costs, and changes in water rental and capital tax rates.



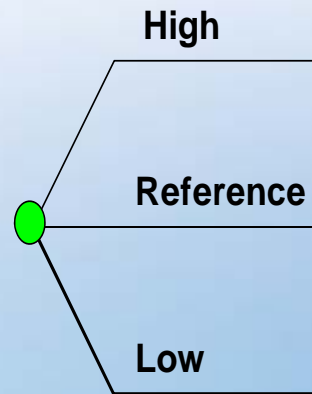
Development of Scenarios

(Chapter 10, Figure 10.3)

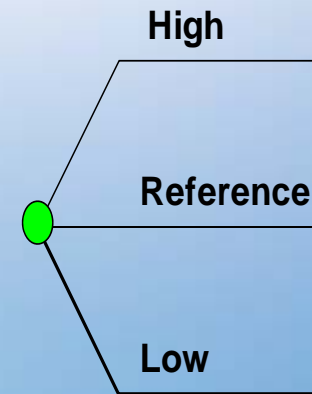
Energy Prices



Discount Rate



Capital Costs

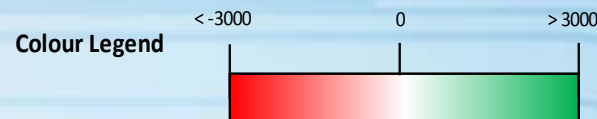


3 Energy Prices x 3 Discount Rates x 3 Capital Costs = 27 scenarios

Probabilistic Analysis – Quilt

(Chapter 10, Table 10.3)

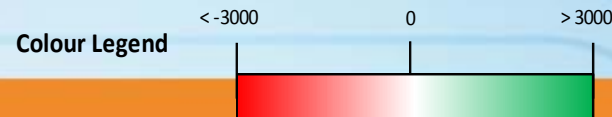
Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	K19/Gas24 /250Mw	K19/C25 /250MW	K19/C31 /250MW	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
			WPS Sale & Investment											
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars											
Low	Low													
	Ref	Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929
	High													
Ref	Low													
	Ref	Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
	High													
High	Low													
	Ref	Ref	-487	-189	1956	1874	2403	3888	3420	2134	4250	3741	1701	4166
	High													



Probabilistic Analysis – Quilt

(Chapter 10, Table 10.4)

Development Plan			1	3	7	2	4	13	11	6	15	12	5	14
			All Gas	Wind/Gas	SCGT/C26	K22/Gas	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											
Energy Prices	Discount Rates	Capital Costs	Millions of 2014 NPV dollars											
Low	Low	H	-4043	-7769	-3309	-3792	-3190	-3459	-3506	-3418	-3642	-3554	-2855	-2841
		Ref	-3049	-5403	-2401	-2532	-1877	-2124	-2166	-2130	-2177	-2138	-1616	-1410
		L	-2247	-3666	-1655	-1590	-890	-1069	-1099	-1175	-1030	-1022	-703	-292
	Ref	H	-463	-3056	-1297	-1212	-911	-2510	-2161	-1191	-2816	-2323	-730	-2155
		Ref	208	-1478	-582	-278	95	-1368	-1050	-185	-1559	-1153	257	-929
		L	750	-323	6	408	837	-473	-176	548	-585	-243	974	20
	High	H	1204	-796	-284	25	117	-2029	-1413	-182	-2383	-1622	203	-1810
		Ref	1708	384	323	785	963	-994	-434	679	-1243	-592	1060	-698
		L	2114	1245	822	1336	1580	-189	327	1297	-364	201	1674	157
Ref	Low	H	-5014	-7167	-1760	-2511	-1796	206	-334	-2041	498	0	-2103	853
		Ref	-4020	-4802	-852	-1251	-482	1541	1006	-753	1963	1415	-865	2284
		L	-3217	-3064	-107	-309	504	2597	2073	202	3110	2531	49	3402
	Ref	H	-671	-2354	23	-46	341	152	104	85	170	190	109	470
		Ref	0	-775	738	887	1346	1295	1215	1091	1427	1360	1097	1696
		L	542	380	1326	1573	2089	2189	2089	1824	2401	2270	1813	2645
	High	H	1308	-82	879	1091	1258	109	391	998	2	366	1041	268
		Ref	1812	1098	1487	1851	2104	1144	1370	1859	1143	1396	1898	1380
		L	2218	1959	1986	2402	2721	1949	2132	2478	2022	2189	2512	2235
High	Low	H	-6435	-6719	-355	-1499	-692	3819	2796	-1006	4455	3410	-1694	4372
		Ref	-5441	-4353	552	-239	621	5154	4135	282	5921	4826	-456	5803
		L	-4638	-2616	1298	703	1607	6210	5203	1237	7068	5941	458	6922
	Ref	H	-1158	-1767	1241	941	1398	2746	2308	1127	2993	2571	713	2940
		Ref	-487	-189	1956	1874	2403	3888	3420	2134	4250	3741	1701	4166
		L	55	966	2543	2560	3146	4783	4293	2867	5225	4652	2417	5115
	High	H	1210	533	1956	2017	2246	2170	2127	1993	2236	2228	1691	2203
		Ref	1713	1712	2563	2777	3092	3206	3106	2854	3377	3259	2549	3315
		L	2120	2573	3063	3328	3709	4010	3867	3473	4256	4051	3163	4170



Approach for Establishing Probability Weightings

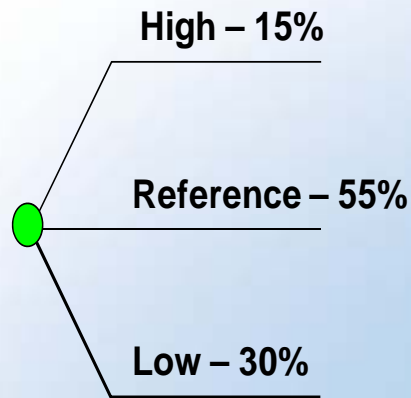
(Appendix 9.3 Section 2.3)

- **Relationships among Variables** - develop a formal understanding or model of the relationships among the individual variables in each area.
- **Probability Assessment** - the state of information draws upon the best possible historical data, expert judgment or both.
- **Input Development** - develop the specific probabilities that best match the probabilistic assessment (given constraints on the type of inputs used in the economic and financial models)

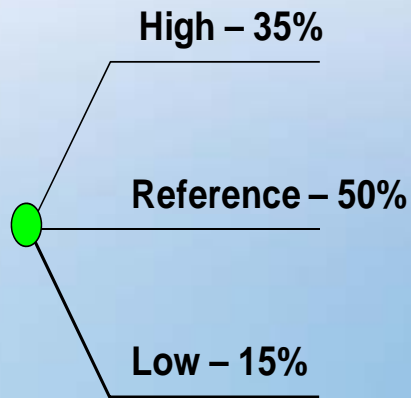
Probabilities for Highest Impact Factors

(Chapter 10 Figure 10.4)

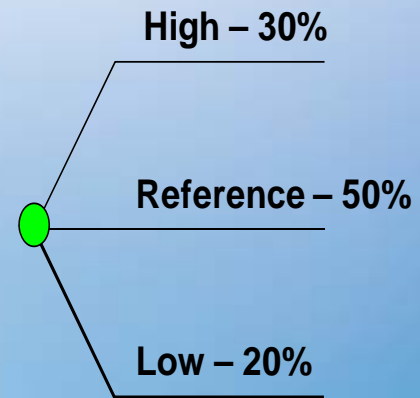
Energy Prices



Discount Rate



Capital Costs



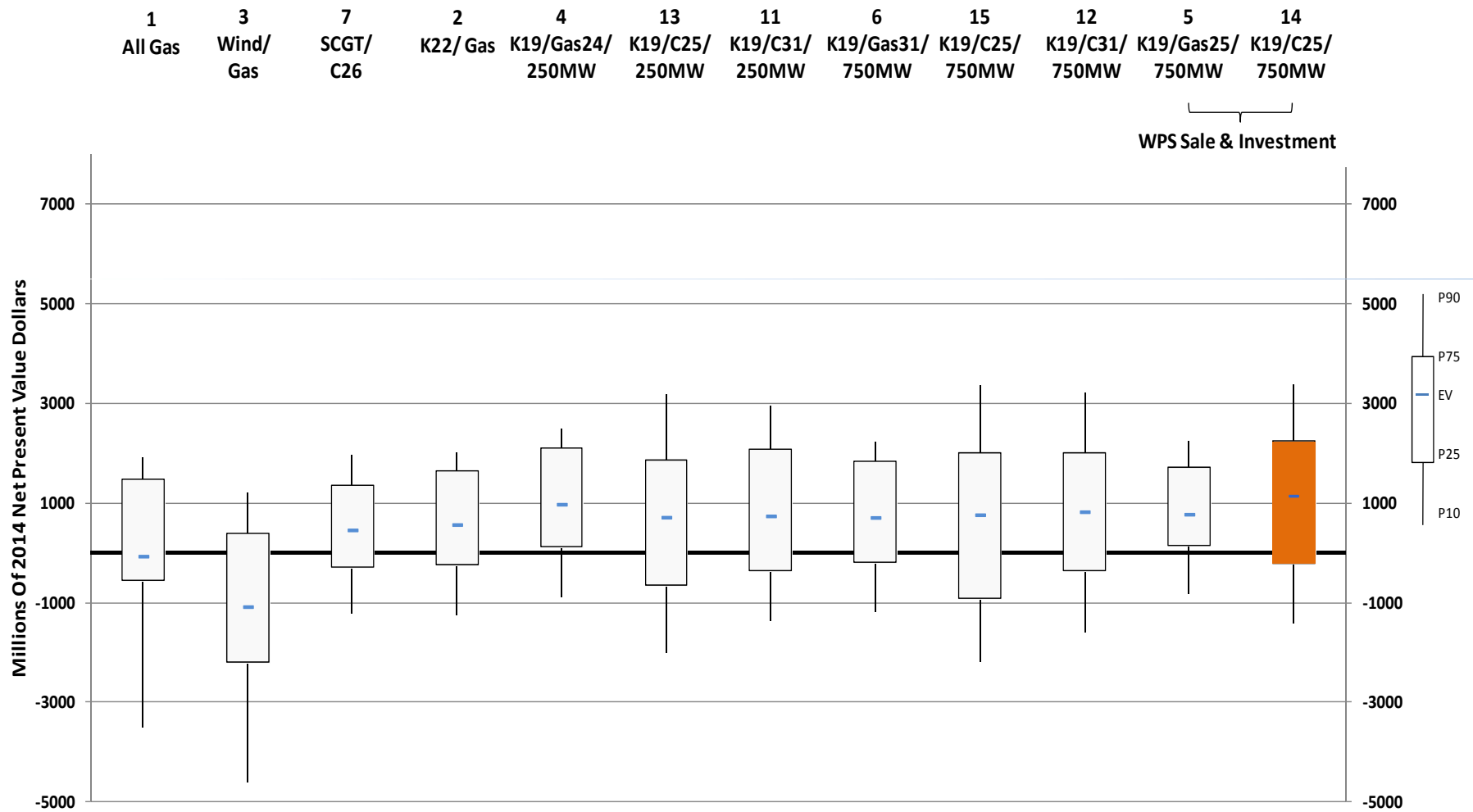
Probabilistic Analysis – Expected Value

Development Plan	6	15	12	5	14
	K19/Gas31 /750MW	K19/C25 /750MW	K19/C31 /750MW	K19/Gas25 /750MW	K19/C25 /750MW
				WPS Sale & Inv	WPS Sale & Inv
Millions of 2014 NPV dollars					
Ref-Ref-Ref NPV	1091	1427	1360	1097	1696
P10 - "Risk"	-1181	-2186	-1594	-828	-1429
P90 - "Reward"	2215	3360	3220	2256	3377
Expected Value	706	760	821	772	1085

- The expected values, or weighted-average NPVs, incorporate the uncertainty associated with the highest impact factors represented in the scenarios.

Probabilistic Analysis – Box Plot

(Chapter 10 Table 10.7)

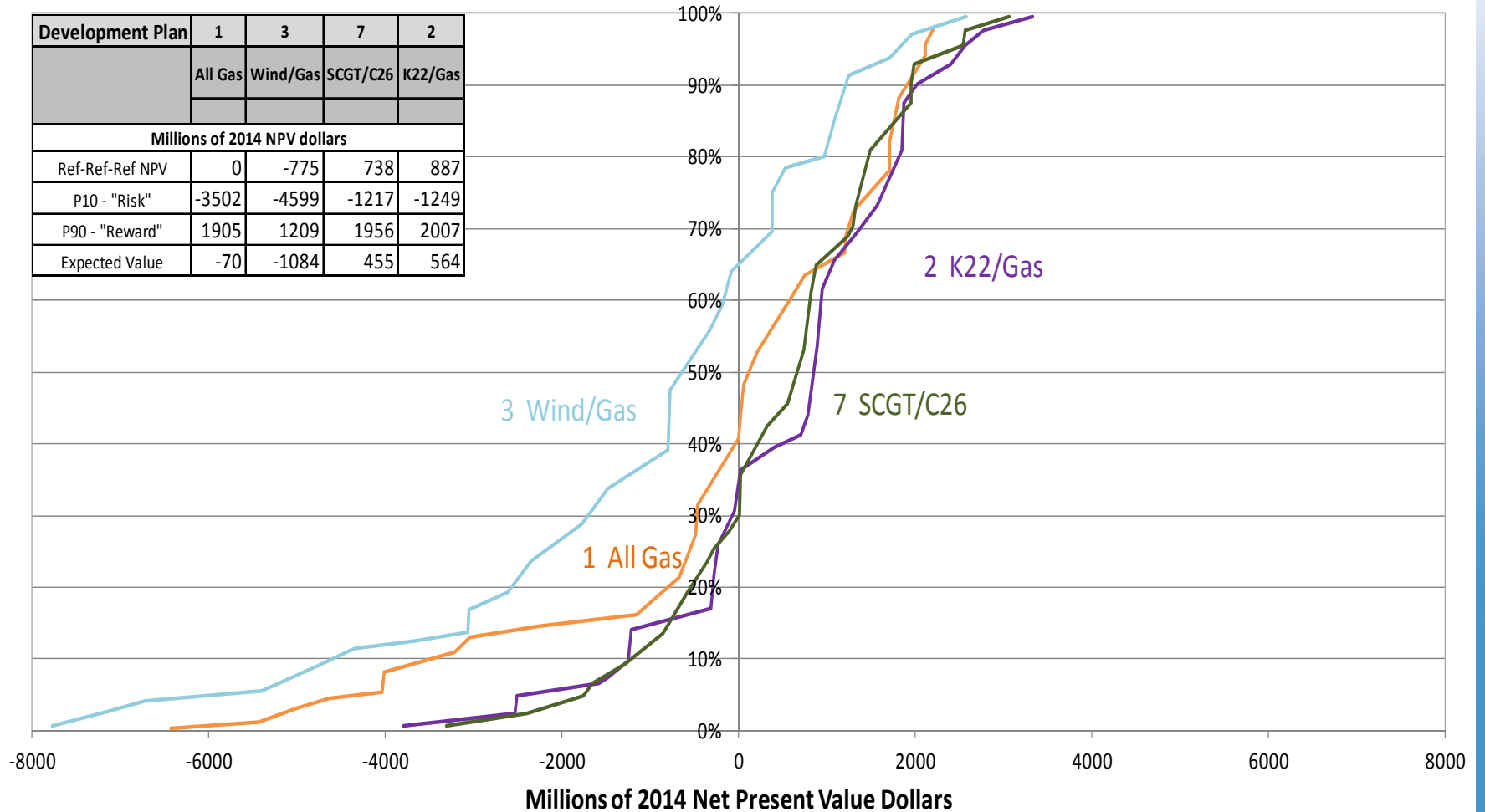


S-Curve – Cumulative Probability Distribution

- Probabilistic information is often displayed in the form of a cumulative distribution function, called an s-curve or risk profile.
- The s-curve displays the range of possible outcomes associated with a development plan (the 27 NPVs)
- The points are connected linearly to preserve the actual scenario values recognizing that the resulting lines are not smooth
- The rank of a particular scenario will not be the same in all development plans

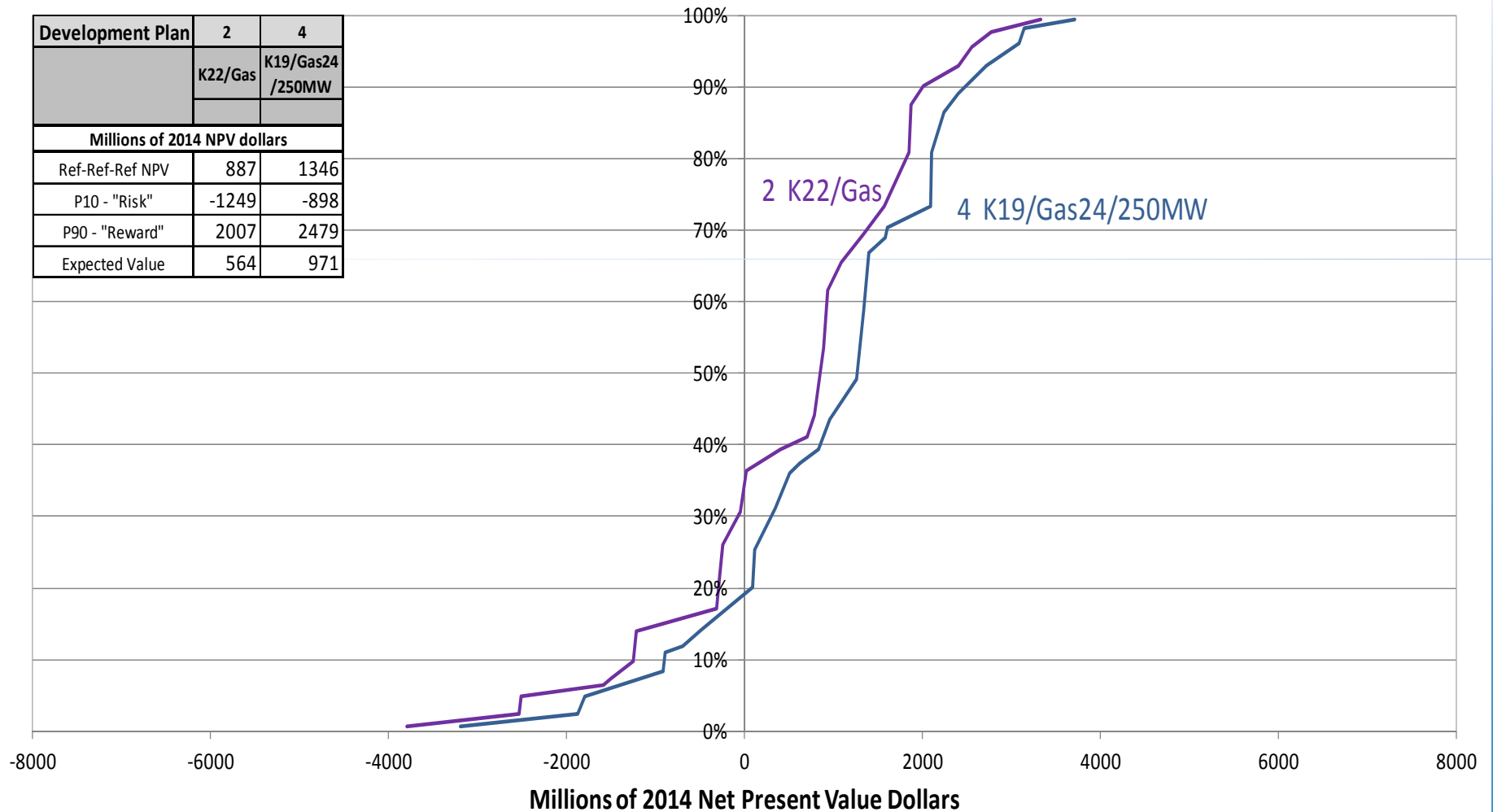
Probabilistic Analysis – Plans with No New Interconnection (Chapter 10 Figure 10.11)

Development Plan	1	3	7	2
	All Gas	Wind/Gas	SCGT/C26	K22/Gas
Millions of 2014 NPV dollars				
Ref-Ref-Ref NPV	0	-775	738	887
P10 - "Risk"	-3502	-4599	-1217	-1249
P90 - "Reward"	1905	1209	1956	2007
Expected Value	-70	-1084	455	564



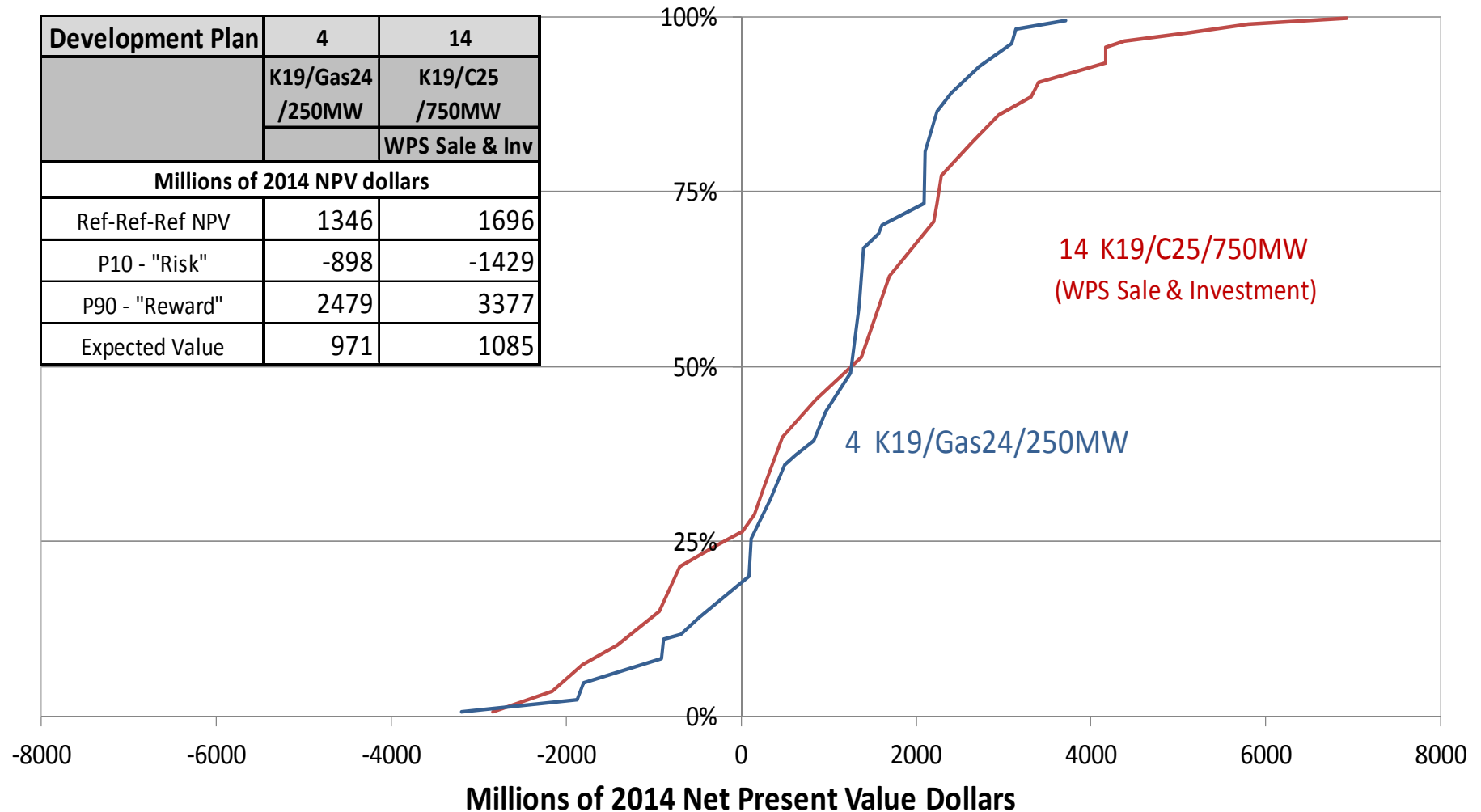
Probabilistic Analysis – K22/Gas and K19/Gas24/250MW (Chapter 10 Figure 10.18)

Development Plan	2	4
	K22/Gas	K19/Gas24/250MW
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	887	1346
P10 - "Risk"	-1249	-898
P90 - "Reward"	2007	2479
Expected Value	564	971



Probabilistic Analysis – K19/Gas24/250MW and Preferred Plan (Chapter 10 Figure 10.21)

Development Plan	4	14
	K19/Gas24 /250MW	K19/C25 /750MW
		WPS Sale & Inv
Millions of 2014 NPV dollars		
Ref-Ref-Ref NPV	1346	1696
P10 - "Risk"	-898	-1429
P90 - "Reward"	2479	3377
Expected Value	971	1085



2013 Reference Scenario Planning Assumptions

(Chapter 12 pages 1 and 2)

- Load forecast decreased for both energy and peak demand
- Next generation ISD for Manitoba load and existing firm commitments deferred from 2022/23 to 2023/24
- Great River Energy Diversity Exchange Agreement extended to end in 2030/31 rather than 2025/26
- New 5 year 50 MW Term Sheet with Minnesota Power beginning in 2015/16
- 2013 reference electricity export prices higher than those used in the main NFAT submission
- Real WACC = 5.40%; increase from 5.05%
- Earliest ISD for Conawapa is 2026/27 rather than 2025/26

List of 2013 Development Plans

(Chapter 10 Table 12.3)

Order of Capital Investment (Plan Number)	Development Plan Short Name	Description of Development Plan
1	All Gas	Natural Gas-Fired Generation starting in 2023/24
2	K23/Gas	Keeyask 2023/24, Natural Gas-Fired Generation starting in 2031/32
4	K19/Gas30/250MW	Keeyask 2019/20, Natural Gas-Fired Generation starting in 2030/31, 250 MW Export/50 MW Import U.S. Interconnection 2020/21, 250 MW MP Sale
12	K19/C33/750MW	Keeyask 2019/20, Conawapa 2033/34, Natural Gas-Fired Generation starting in 2045/46, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale
14 Preferred Development Plan	K19/C26/750MW (WPS Sale & Inv)	Keeyask 2019/20, Conawapa 2026/27, Natural Gas-Fired Generation starting in 2045/46, 750 MW Import/Export U.S. Interconnection 2020/21, 250 MW MP Sale, Proposed 300 MW WPS Sale

Table 12.5, Chapter 12, page 12

Impact of 2013 Updates

Development Plan	Incremental NPV Relative to All Gas, millions of 2014 Dollars		
	2012 Assumptions 5.05% Discount Rate	2013 Assumptions 5.05% Discount Rate	2013 Assumptions 5.40% Discount Rate
2 K23/Gas	\$887	\$960	\$728
4 K19/Gas30/250MW			
MP Sale	\$1,346	\$1,437	\$1,133
12 K19/C33/750MW			
MP Sale	\$1,360	\$1,763	\$1,204
14 K19/C26/750MW			
MP Sale, WPS Sale & Inv Preferred Development Plan	\$1,696	\$2,125	\$1,462

- The economic ranking of development plans remains the same and the incremental economics between the development plans has narrowed.

2013 Economics of 1.5 and 4.0 Times DSM

(Chapter 12, Section 12.4)

Table 12.7 DSM Sensitivity and Stress Test - Potential Energy Efficiency

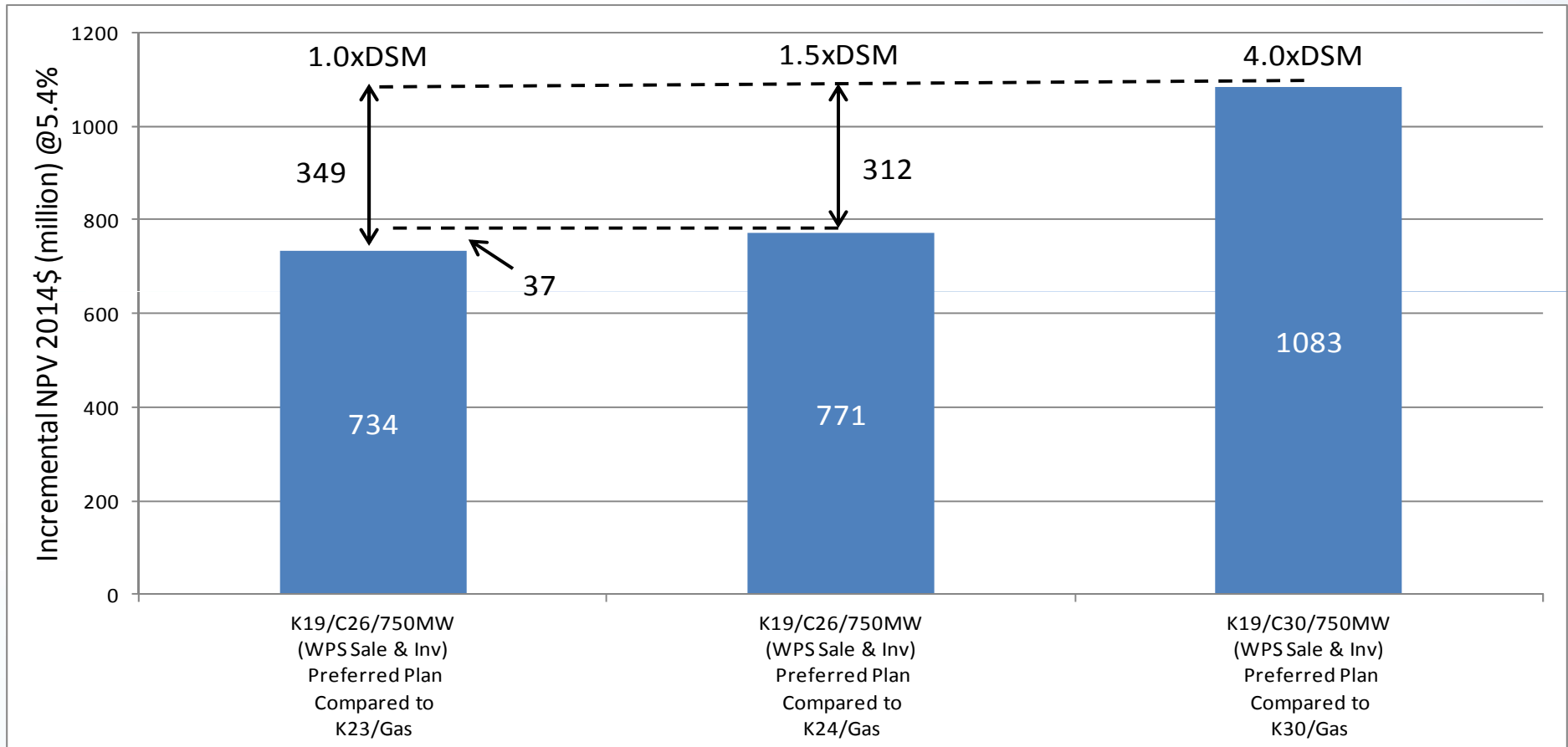
Fiscal Year	Dependable Energy, GWh			
	2014/15	2022/23	2027/28	2033/34
2013 Base DSM Forecast	204	667	773	665
1.5x DSM Sensitivity	306	1,000	1,159	998
4.0 x DSM Stress Test	815	2,667	3,090	2,661

- DSM quantities per year were derived by increasing the Base DSM Forecast by 1.5 times and 4.0 times respectively

2013 Economics of 1.5 and 4.0 Times DSM

(Chapter 12, Section 12.4)

Figure 12.5 DSM Sensitivity and Stress Test - Potential Energy Efficiency compared to K23/Gas

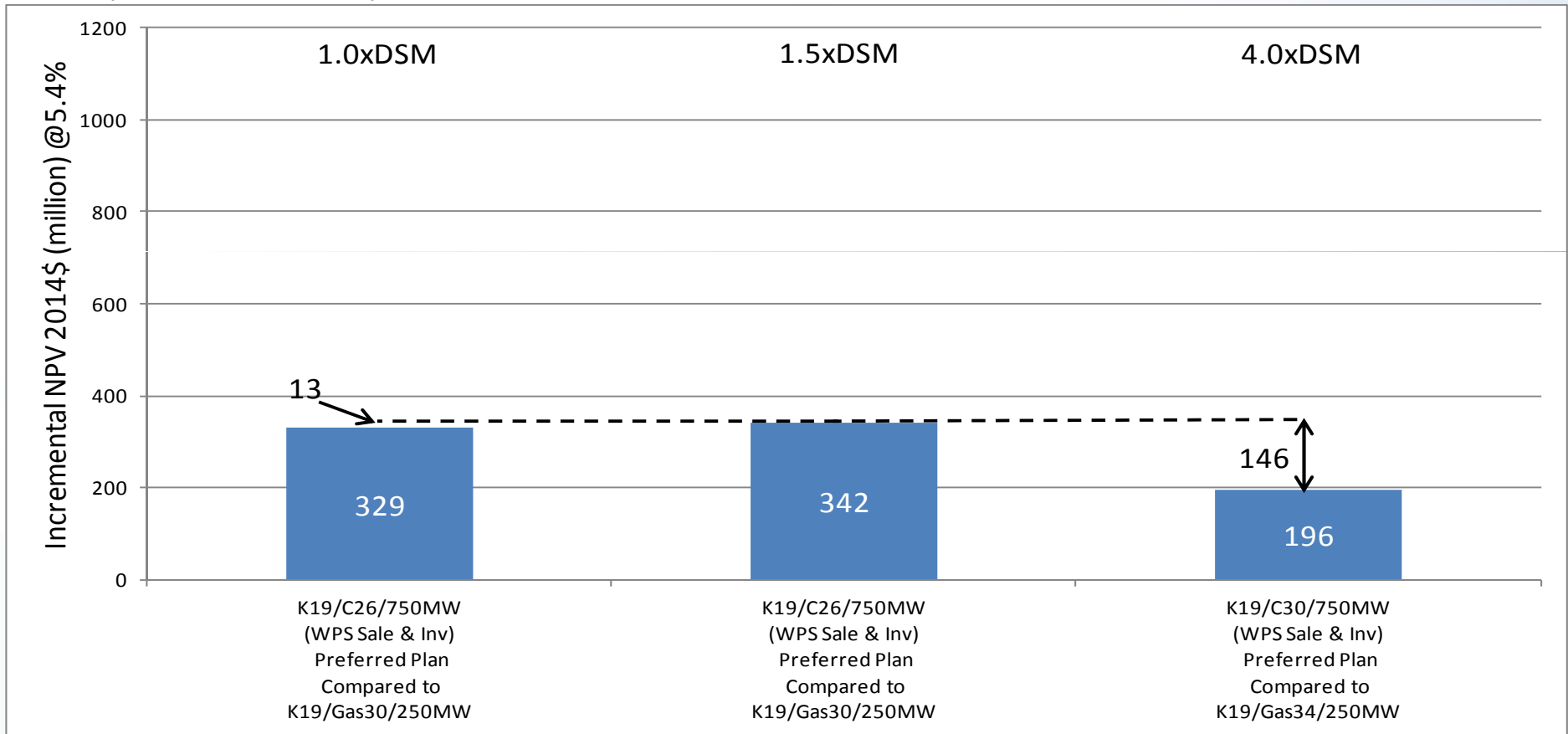


- The incremental NPV of the Preferred Development Plan is greater when compared to Plan 2 under both 1.5 and 4.0 times DSM showing that the Preferred Development Plan can derive more benefit from DSM than Plan 2 (Keeyask/Gas).

2013 Economics of 1.5 and 4.0 Times DSM

(Chapter 12, Section 12.4)

Figure 12.6 DSM Sensitivity and Stress Test - Potential Energy Efficiency compared to Plan 4 (K19/Gas/250MW)



The Preferred Plan and Plan 4 benefit similarly under 1.5 times DSM. Under 4.0 times DSM the higher level of DSM yields greater benefits to Plan 4.

2013 Economics of 1.5 and 4.0 Times DSM

(Chapter 12, Section 12.4)

- In general, the development plans analyzed benefit from increased levels of DSM. The Preferred Plan and Plan 4 (K19/Gas30/250MW) derive greater benefits from higher levels of DSM than Plan 2 (K23/Gas).
- Comparing the Preferred Plan to Plan 2 showed that in both cases (i.e., 1.5 times and 4.0 times DSM), the incremental NPV of the Preferred Plan is greater. (Figure 12.5)
- Both the Preferred Plan and Plan 4 benefit similarly at the 1.5 times DSM level. At the 4.0 times DSM level Plan 4 can derive more benefit from the higher level of DSM than the Preferred Plan. (Figure 12.6)

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Low Load Sensitivity

	Incremental NPV benefit, millions of 2014\$ @ 5.05% discount rate	
Development Plan	Reference Scenario	10 th percentile Manitoba Load (Low Load)
All Gas	-	-
K22/Gas	\$887	\$736
K19/C25/750MW (WPS Sale & Inv) Preferred Plan	\$1,696	\$1,390

Conclusions for 2013 Reference Economics

- Economic ranking of development plans remains the same
- Incremental economics between plans has narrowed with change in discount rate
- 2013 planning assumptions well within the range of uncertainty analysis
- Overall, the economic ranking of development plans remains the same under higher levels of DSM

THANK YOU