REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 1 of 27; United States Government Accountability Office; GAO Cost Estimating and Assessment Guide; Best Practices for Developing and Managing Capital Program Costs - Table 2: The Twelve Steps of a High-Quality Cost Estimating Process in http://www.gao.gov/new.items/d093sp.pdf

PREAMBLE: Appendix 2.4 states: "The Point Estimate is the first step in the estimate development process." however the Point Estimate is merely step 7 in the attached process. Clarify the following for each estimate undertaken (i.e. Gas options, Solar options, Wind options, Conawapa G.S. and Keeyask G.S.).

QUESTION:

Define the estimate's purpose (i.e. required level of detail, overall scope; who will receive or has received the estimate).

RESPONSE:

The purpose of the detailed estimate is to establish an up-to-date project control budget that aligns with current project scope, design and construction marketplace expectations. This control budget is used for project authorization and for reviewing bids for major aspects of the work.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 1 of 27; United States Government Accountability Office; GAO Cost Estimating and Assessment Guide; Best Practices for Developing and Managing Capital Program Costs - Table 2: The Twelve Steps of a High-Quality Cost Estimating Process in http://www.gao.gov/new.items/d093sp.pdf

PREAMBLE: Appendix 2.4 states: "The Point Estimate is the first step in the estimate development process." however the Point Estimate is merely step 7 in the attached process. Clarify the following for each estimate undertaken (i.e. Gas options, Solar options, Wind options, Conawapa G.S. and Keeyask G.S.).

QUESTION:

What was the overall estimating plan? (i.e. who composed the cost estimating team (external and internal) and developed its schedule; who has or will conduct an independent cost estimate; outline the cost estimating approach; what was the estimate development timeline?)

RESPONSE:

This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 2 of 27; United States Government Accountability Office; GAO Cost Estimating and Assessment Guide; Best Practices for Developing and Managing Capital Program Costs - Table 2: The Twelve Steps of a High-Quality Cost Estimating Process in http://www.gao.gov/new.items/d093sp.pdf

PREAMBLE: Appendix 2.4 states: "The Point Estimate is the first step in the estimate development process." however the Point Estimate is merely step 7 in the attached process. Clarify the following for each estimate undertaken (i.e. Gas options, Solar options, Wind options, Conawapa G.S. and Keeyask G.S.).

QUESTION:

Reference the exact documents (author and date) used to define the project in each estimate.

RESPONSE:

References are noted below and these sections are attached for reference:

- Keeyask Basis of Cost Estimate Report December 2009 Cost Estimate – June 1, 2010 by KGS ACRES Ltd. Sections 1-3.
- Conawapa Basis of Cost Estimate Report November 2010 Cost Estimate – October 20, 2011 by KGS ACRES Ltd. Sections 1-3.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 2 of 27; United States Government Accountability Office; GAO Cost Estimating and Assessment Guide; Best Practices for Developing and Managing Capital Program Costs - Table 2: The Twelve Steps of a High-Quality Cost Estimating Process in http://www.gao.gov/new.items/d093sp.pdf

PREAMBLE: Appendix 2.4 states: "The Point Estimate is the first step in the estimate development process." however the Point Estimate is merely step 7 in the attached process. Please clarify the following for each estimate undertaken (i.e. Gas options, Solar options, Wind options, Conawapa G.S. and Keeyask G.S.).

QUESTION:

Please define, provide or reference the estimating structure and if possible the work breakdown structure (WBS) used in each estimate.

RESPONSE:

This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: Table Appendix 7.2-1 and 7.2-2; Page No.: 9 of 367

PREAMBLE: Table Appendix 7.2-1 and 7.2-2

QUESTION:

What are the respective design lives of the respective options for which levelized cost is presented?

RESPONSE:

This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: Table Appendix 7.2-1 and 7.2-2; Page No.: 9 of 367

PREAMBLE: Table Appendix 7.2-1 and 7.2-2

QUESTION:

Please provide a breakdown calculation including the capital and operating costs used to derive the levelized cost for Keeyask, Conawapa, the Heavy Duty CCGT 70% capacity factor, the 20 MW Single Axis Photovoltaic, and the Generic 65 MW wind farm.

RESPONSE:

Please see Manitoba Hydro's response to LCA/MH I-308.

REFERENCE: Chapter 7: Screening of Manitoba Resource Options; Section: 7.1.2; Page No.: 3 of 39

PREAMBLE: Photovoltaic and Solar Thermal technologies are summarized respectively as having high unit cost & intermittency and very high unity costs.

QUESTION:

Was the U.S. Annual Energy Outlook 2013 (AEO2013) the only source of information used to draw this conclusion, if not please provide the additional reference material.

RESPONSE:

Only one public data source, the U.S. Annual Energy Outlook 2013 (AEO2013), was referenced in order to populate the economic characteristic – "Forecast USA Unit Costs" in Table 7.1. This was done for the purposes of transparency and reproducibility. Other screening characteristics in Table 7.1 used for solar resource technologies utilized additional references. Reference lists for solar resource options can be found in Appendix 7.2 starting on pages 293 of 367, 300 of 367, 307 of 367, 315 of 367, and 323 of 367.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: 2.5; Page No.: 20 of 367

PREAMBLE: "It is projected that the Total Plant Costs will drop by 50% by 2020 and 75% by 2030"

QUESTION:

Was a 20 MW photovoltaic solar farm the largest and only size farm considered?

RESPONSE:

A solar PV option with a 20 MW nameplate capacity rating was the only size of installation considered in the NFAT Business Case. A 20 MW Solar PV installation would have a footprint in the order of 55 to 85 hectares, which is considered a significant sized installation in southern Manitoba.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: 2.5; Page No.: 20 of 367

PREAMBLE: "It is projected that the Total Plant Costs will drop by 50% by 2020 and 75% by 2030"

QUESTION:

What Capital Costs were assumed or considered for Solar options?

RESPONSE:

The following 2012 capital costs were considered:

- fixed tilt $3,750/kW
- single axis tracking $4,500/kW, and
- dual axis tracking $5,000/kW.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: 2.5; Page No.: 20 of 367

PREAMBLE: "It is projected that the Total Plant Costs will drop by 50% by 2020 and 75% by 2030"

QUESTION:

How does the projected levelized cost for solar in 2020 and 2030 compare to the projected levelized cost for other sources?

RESPONSE:

Manitoba Hydro has not calculated the levelized costs for other resource options in the 2020 and 2030 timeframes. The levelized cost was used as one of the factors in the initial screening of resource options in the NFAT Business Case. Subsequent analysis was not based on levelized cost, it was based on an economic evaluation of costs and benefits as well as an analysis of financial factors.

REFERENCE: Appendix 7.2 Range of Resource Options; Section: Table Appendix 7.2-2; Page No.: 9 of 367

PREAMBLE: The capacity factors of 20% (Fix tilt), 26% (Single Axis Tracking), and 28% (Dual Axis) quoted in Table Appendix 7.2-2

QUESTION:

What is the source of these capacity factors?

RESPONSE:

The capacity factors of 20% (Fix tilt), 26% (Single Axis Tracking), and 28% (Dual Axis) quoted in Table Appendix 7.2-2 were sourced from the National Renewable Energy Laboratory (NREL) PVWatts Calculator. The location selected for analysis was Melita, Manitoba using the PVWatts Cell ID No. 0223343 centered in North Dakota at 49.2°N and 101.2°W as the basis for analysis. Capacity Factors were calculated from the attached PVWatts outputs by dividing the yearly total AC Energy (kWh) by the AC rating times 8766 (hours/year) as follows:

Array Type	AC Rating	Max. Yearly AC Energy (kWh)	Yearly AC Energy (kWh)	Calculated Capacity Factor	Approximate Capacity Factor
Fixed Tilt	3.08 kW	26,999.3	5285	19.57%	20%
1-Axis Tracking	3.08 kW	26,999.3	6929	25.66%	26%
2-Axis Tracking	3.08 kW	26,999.3	7464	27.65%	28%

PVWatts v.2: AC Energy and Cost Savings

Melita MB

PVWatts ***** **AC Energy & Cost Savings** ***** Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification	
Cell ID:	0223343
State:	North Dakota
Latitude:	49.2 ° N
Longitude:	101.2 ° W
PV System Specifications	
DC Rating:	4.00 kW
DC to AC Derate Factor:	0.770
AC Rating:	3.08 kW
Array Type:	Fixed Tilt
Array Tilt:	49.2 °
Array Azimuth:	180.0 °
Energy Specifications	
Cost of Electricity:	7.4 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.52	376	27.71
2	4.65	435	32.06
3	5.43	537	39.57
4	5.55	499	36.77
5	5.56	496	36.55
6	5.71	475	35.00
7	5.98	509	37.51
8	6.03	519	38.25
9	5.18	448	33.01
10	4.36	408	30.07
11	3.29	317	23.36
12	2.61	266	19.60
Year	4.82	5285	389.45

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster
Disclaimer and copyright notice.

RReDC KReDC home page (*https://rredc.nrel.gov*)

PVWatts v.2: AC Energy and Cost Savings

PVWatts ***** **AC Energy & Cost Savings** *****

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification	
Cell ID:	0223343
State:	North Dakota
Latitude:	49.2 ° N
Longitude:	101.2 ° W
PV System Specifications	
DC Rating:	4.00 kW
DC to AC Derate Factor:	0.770
AC Rating:	3.08 kW
Array Type:	1-Axis Tracking
Array Tilt:	49.2 °
Array Azimuth:	180.0 °
Energy Specifications	
Cost of Electricity:	7.4 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	4.01	431	31.76
2	5.53	520	38.32
3	6.80	685	50.48
4	7.34	672	49.52
5	7.60	699	51.51
6	7.94	683	50.33
7	8.44	745	54.90
8	8.16	722	53.20
9	6.78	596	43.92
10	5.31	505	37.21
11	3.77	365	26.90
12	2.97	306	22.55
Year	6.22	6929	510.60

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster
Disclaimer and copyright notice.

RReDC home page (https://rredc.nrel.gov)

1 http://rredc.nrel.gov/solar/calculators/PVWATTS/version2/pvwattsv2.cgi 2/28/2013

PVWatts v.2: AC Energy and Cost Savings

PVWatts ***** **AC Energy & Cost Savings** ***** Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification	
Cell ID:	0223343
State:	North Dakota
Latitude:	49.2 ° N
Longitude:	101.2 ° W
PV System Specifications	
DC Rating:	4.00 kW
DC to AC Derate Factor:	0.770
AC Rating:	3.08 kW
Array Type:	2-Axis Tracking
Array Tilt:	N/A
Array Azimuth:	N/A
Energy Specifications	
Cost of Electricity:	7.4 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	4.35	466	34.34
2	5.74	540	39.79
3	6.96	701	51.66
4	7.78	712	52.47
5	8.51	784	57.77
6	9.19	794	58.51
7	9.63	852	62.78
8	8.78	778	57.33
9	7.00	616	45.39
10	5.40	514	37.88
11	3.93	380	28.00
12	3.20	328	24.17
Year	6.71	7464	550.02

Output Hourly Radiation Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster
Disclaimer and copyright notice.

RReDC RReDC home page (*http://rredc.nrel.gov*)

REFERENCE: Chapter 7: Screening of Manitoba Resource Options; Section: Table Appendix 7.2-5; Page No.: p 11 of 367

PREAMBLE: 40% Capacity Factor for Wind

QUESTION:

What is the basis for this capacity factor?

RESPONSE:

Please see Manitoba Hydro's response to GAC/MH I-006.

REFERENCE: Chapter 7: Screening of Manitoba Resource Options; Section: Table Appendix 7.2-5; Page No.: p 11 of 367

PREAMBLE: 40% Capacity Factor for Wind

QUESTION:

What is the capacity factor of operating Manitoba Wind Power facilities?

RESPONSE:

The Manitoba Hydro Annual Report for the year ended March 31, 2013 states at page 101 that wind purchases were 0.9 billion kWh. Using the installed capacities of St. Leon of 120.5 MW and St. Joseph of 138 MW, the operating capacity factor (CF) can be calculated to be 39.72%, or 40% rounded up.

CF = (900,000,000 kWh/year/(258,500 kW x 24 hours/day x 365.25 days/year))x 100% = 39.72%

REFERENCE: Appendix 7.2 Range of Resource Options; Section: Table Appendix 7.2-4;

PREAMBLE: A CCGT capacity factor range of 35% to 70% is shown the NFAT Thermal Options

QUESTION:

Why was a higher capacity factor not utilized?

RESPONSE:

The capacity factor range of 35% to 70% is representative of typical average operation of a Combined Cycle Gas Turbine over its asset life. This is consistent with the capacity factor range of an intermediate (i.e. not peaking or baseload) resource, which is typical operation for these resources.

For the purposes of system modeling, Combined Cycle Gas Turbines are able to dispatch up to full energy availability in any flow year (over 90% capacity factor) if required.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 26 of 27

PREAMBLE: Management reserve is intended to address major risk items not addressed through the normal scope of contingency.

QUESTION:

What ratio of the amount of management reserve in comparison with the total capital cost was applied to Manitoba Hydro previous projects (i.e. Wuskwatim)?

RESPONSE:

There was no management reserve for Wuskwatim.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 19 of 27

PREAMBLE: "Labour productivity and availability has declined based on…"

QUESTION:

In what way is labour productivity and availability not predictable?

RESPONSE:

Due to the increasing demand (i.e. growing capital project investments) and shrinking supply (retirements and lack of replacement) of skilled construction labor in Canada it is very difficult to predict what level of labour will be available for the projects. This is magnified on remote, camp projects in Canada. Projects across the country will be trying to attract the same national skilled construction workforce from a shrinking skilled labour pool.

Similarly, since it is difficult to predict the availability of skilled labour for the projects, there is uncertainty as to what level of productivity can be achieved. The ability to attract and retain the necessary amounts of skilled labour for the projects will directly impact the level of productivity that can be achieved.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 20 of 27

PREAMBLE: "Labour productivity and availability has declined based on…"

QUESTION:

Is the high labour turnover risk mitigated by increasing the contingency associated with the Indirect Costs?

RESPONSE:

Risks related to high labour turnover can be mitigated through ensuring high quality construction camp accommodations and services are provided and remoteness leave (turnaround) schedules are comparable to industry. All of these items are included within the base estimate (i.e. P50 estimate). Increasing contingency associated with indirect costs will not further mitigate the risk of high labour turnover.

REFERENCE: Chapter 2: Manitoba's Preferred Development Plan Facilities; Page No.: 19 of 59

PREAMBLE: Figure 2.4 Options Studies for Keeyask

QUESTION:

What is the levelized cost of energy for the corresponding options presented? For option 3, please show for the upper and lower site.

RESPONSE:

The Agreement in Principle made between Manitoba Hydro and the Tataskweyak Cree Nation (TCN) is dated October 17, 2000. This agreement formed the basis of the current design parameters and the negotiated adverse effects agreement. No economic studies have been undertaken for development options with a different reservoir level since that time. The decision made jointly by Manitoba Hydro and TCN to pursue the low head option at Gull Rapids was made because it has the least flooding and environmental effects. At the time the decision was made, the levelized cost for the low head option was the lowest of all options considered. The levelized cost for other options have not been updated since. The levelized costs would have been based on construction costs and discount rates that were applicable at that time.

REFERENCE: Chapter 2: Manitoba's Preferred Development Plan Facilities; Page No.: 35 of 59

PREAMBLE: In Service Cost = Base Cost x Escalation & Interest + Money Spent to Date

QUESTION:

Can the "Money Spent to Date" category be broken down?

RESPONSE:

Yes, the "Money Spent to Date" is provided below for Keeyask and Conawapa, as of March 31, 2012.

	Actuals to March 31/2012	Interest Cap to March 31/2012	Total sunk including Interest Cap
Keeyask GS Licensing & Planning	312,728,643	153,735,465	466,464,108
Infrastructure Upgrade	26,196,006	1,139,528	27,335,534
Generating Station	6,454,594	703,375	7,157,969
Transmission	997,048	117,205	1,114,253
Keeyask Totals	**346,376,291**	**155,695,573**	**502,071,864**

	Actuals to March 31/2012	Interest Cap to March 31/2012	Total sunk including Interest Cap
Conawapa GS Licensing & Planning	166,938,082	52,510,658	219,448,740
Infrastructure Upgrade	18,490	3,882	22,372
Generating Station Infrastructure	1,067,072	23,765	1,090,837
Generating Station	8,355,431	1,048,206	9,403,637
Conawapa totals	**176,379,075**	**53,586,511**	**229,965,586**

REFERENCE: Chapter 2: Manitoba's Preferred Development Plan Facilities; Page No.: 35 of 59

PREAMBLE: In Service Cost = Base Cost x Escalation & Interest + Money Spent to Date

QUESTION:

Has Hydro reported on performance measurement on "Money Spent to Date" for example a comparison on an Earned Value Basis of something similar

RESPONSE:

During stage I to V, performance measurement includes managing the scope of work to the approved budget and schedule and to provide timely and accurate information to the Project Manager and project team. A well defined work breakdown structure (WBS) is used to define various parts of the work and used to organize both costs and schedule. Once the work is estimated, both cost and cash flows are generated. These cash flows form the planned amount which is tracked using SAP. Actuals are also tracked in SAP. Monthly reporting on approved plan versus actuals for all work including forecast to complete is conducted to manage scope and provide timely and accurate information to the Project Manager and project team. In addition to the cost management, a baseline schedule is developed based on the WBS and establishes key milestone dates, and progressed/updated regularly to monitor the work.

During stages I to IV, costs and schedule are generally reported on separately but managed together. During stage V, performance measurement continues to manage the scope of work to the approved budget and schedule and to provide timely and accurate information to the Project Manager and project team. Earned value and other performance measurement techniques are utilized for construction and consulting contracts where appropriate. For example, the Stage V engineering uses earned value and the Turbine and Generator contract uses performance based payments to measure and control the work.

In addition, a project dashboard is being implemented that shows a high-level view of the cost and schedule performance compared to the approved plan along with the forecast to project completion. Key performance indicators reported on the project dashboard are Schedule Performance, Cost Performance and Earned Value Analysis where schedule performance compares actual start and finish dates with planned start and finish dates and cost performance compares actual costs with budget. Earned value analysis of project performance and progress compares budgeted cost of work performed, actual costs, planned costs and percent complete. All three costs are compared to determine schedule and cost performance to plan. A rigorous change management process is the backbone to manage project scope, schedule, and costs.

REFERENCE: Chapter 2: Manitoba's Preferred Development Plan Facilities; Page No.: 35 of 59

PREAMBLE: In Service Cost = Base Cost x Escalation & Interest + Money Spent to Date

QUESTION:

What interest rate is used on money spent to date? How is this incorporated in the final estimate

RESPONSE:

The interest capitalization rates for Keeyask and Conawapa that contributed to the actual capital costs to date on these projects were as follows:

2003	8.25
2004	8.00
2005	8.00
2006	6.60
2007	6.69
2008	6.69
2009	6.81
2010	6.45
2011	6.57
2012	6.51

Interest during construction is calculated by applying the interest capitalization rate to the actual or forecasted month-end work in progress balance (total cumulative costs incurred to that period) of each project, until the project becomes operational.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 2 of 27

PREAMBLE: "For items where definition is lacking assumptions are made based on previous North American hydroelectric projects."

QUESTION:

What items may be lacking assumptions? Can the degree of project definition be indicated on a breakdown basis?

RESPONSE:

The estimating methodologies used in developing the Keeyask and Conawapa cost estimates are outlined below. Methodologies D and E are approaches where industry standard costs and information from other North American Hydroelectric projects are applied. Items estimated under these two methodologies are also detailed:

A – First Principles
B – Manufacturer Quotations
C – Fabricator Quotations
D – Estimated from Vendor Quotations, Cost Build-Ups, Published Cost Data and Previous Costs
- Mechanical and Electrical Systems Supply and Installation.
- Bulk Materials for Heavy Civil contracts, such as rebar, cement, rock bolts, explosives, etc.
- Miscellaneous structural and architecture finishing materials and subcontracts for Heavy Civil.
- Ice Boom (Keeyask Only)

E – Allowances and Provisional Sums
- Architecture and Painting

Project definition can be defined as per AACEI Recommended Practice 69R-12 – Cost Estimate Classification System as Applied in Engineering, Procurement and Construction for the Hydropower Industry. The Keeyask project is considered to be between a Class 2 and Class 3 estimate and Conawapa is considered to be a Class 3 estimate.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 3 of 27

QUESTION:

Has an external party reviewed or audited Manitoba Hydro's Material, Equipment and Costs Databases

RESPONSE:

Database information is based on current market prices for all items and is obtained from industry sources. This information is updated prior to the estimate. Databases for material, equipment and costs were based on the following:

- Prices for industry construction materials were based on quotations from various suppliers and entered into the database on a common basis.
- Equipment rates are based on the "Equipment Watch" database. This database includes information such as list price, maintenance requirements, economic life, fuel consumption and resale price.
- Craft labour costs are based on the Burntwood/Nelson Agreement. Wage rates for administration and management staff were based on information from Canadian Human Resources Websites, an APEGM Salary Survey, or similar sources. Wage rates for site personnel have been increased to reflect the remoteness of the site.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 5 of 27

PREAMBLE: "Contractor indirect costs are also included in the overall project direct costs …"

QUESTION:

What contracting method is assumed to be used and where is the method referred to?

RESPONSE:

This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 12 of 27

PREAMBLE: "Interest and escalation costs are based on standard corporate rates (policy G911)."

QUESTION:

Please provide these rates.

RESPONSE:

The fall 2012 corporate approved forecast of Manitoba Hydro's interest and escalation rates are provided in the Reference Scenario on page 1 of Appendix 11.2, filed as part of the NFAT Business Case Submission.

REFERENCE: Volume: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 13 of 27

PREAMBLE: "The estimate can be considered to be between a Class 3 and Class 2 estimate."

QUESTION:

Can the classification be broken down between costs to be expended imminently and costs to be expended in the more distant future? Would this approach increase or decrease the contingency and management reserve.

RESPONSE:

If an estimate such as Keeyask is considered to be between a Class 2 and Class 3 estimate, where a number of contracts have been signed (Infrastructure contracts, Turbines & Generators) but a number of other major contracts must still be awarded (General Civil Contract), the differing degree of definition has been accounted for in the development of project contingency and management reserve.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 15 of 27

PREAMBLE: "The major changes incorporated into the 2009/2010 Keeyask cost estimate were as follows: - Cost reimbursable contracting strategy with the GCC)…" The move away from a fixed price contracting strategy would shift risk away from the contractor and on to Manitoba Hydro.

QUESTION:

How was the increased project risk to Manitoba Hydro assessed and taken into consideration?

RESPONSE:

The 2009/2010 Keeyask capital cost estimate was developed based on the assumption of target price (or cost reimbursable) contract not a unit price contract. Manitoba Hydro and Contractor indirect costs were adjusted accordingly. Additionally, the P50 contingency for Keeyask was developed based on the risks associated with a target price contract. This included adjustment of a number of cost estimate items based on experiences at Wuskwatim (also a target price contract model).

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 23 of 27

QUESTION:

Provide the Hydro G.S. Project Composite Escalation Rate

RESPONSE:

The fall 2012 corporate approved forecast of Manitoba Hydro's hydro project escalation rate is provided in the Reference Scenario on page 1 of Appendix 11.2, filed as part of the NFAT Business Case Submission.

REFERENCE: Appendix 2.4 Developing the Keeyask and Conawapa Capital Cost Estimates; Page No.: 23 of 27

PREAMBLE: "Detailed risk identification and quantification have been carried out on the Keeyask project."

QUESTION:

Please provide a reference and date.

RESPONSE:

This Information Request has been withdrawn by the IEC as no longer required, having been satisfied through discussion with Manitoba Hydro.

REFERENCE: Executive Summary; Section: Figure 2 - Page 9 of 42 of the Executive Summary - NFAT Business Case; Page No.: 9 of 42

PREAMBLE: For the All Gas development plan options, as shown on Figure 2 (Page 9 of 42 of the Executive Summary - NFAT Business Case), it would appear that there are no benefits related to the exploration or extraction of Natural Gas that go to the Province of Manitoba (i.e. it would appear that it is assumed that all Natural Gas is imported into the Province).

QUESTION:

Is the assumption that all natural gas for the Gas Only Option is imported correct?

RESPONSE:

The assumption that all natural gas for the Gas Only Option is imported is correct.

Please also see Manitoba Hydro's response to KP/MH I-024b.

REFERENCE: Executive Summary; Section: Figure 2 - Page 9 of 42 of the Executive Summary - NFAT Business Case; Page No.: 9 of 42

PREAMBLE: For the All Gas development plan options, as shown on Figure 2 (Page 9 of 42 of the Executive Summary - NFAT Business Case), it would appear that there are no benefits related to the exploration or extraction of Natural Gas that go to the Province of Manitoba (i.e. it would appear that it is assumed that all Natural Gas is imported into the Province).

QUESTION:

In the next 35 years is there an expectation that Manitoba will start extracting/exploiting its own Natural Gas reserves.

RESPONSE:

It is unknown at this time as to whether Manitoba will extract its own natural gas reserves in the future as this supply is unproven at this point. As a result, it was assumed in the NFAT business case analysis that all natural gas required for thermal generation is imported into the province. Manitoba Hydro is aware that the Province of Manitoba is in early stages of investigation of the commercial potential of shallow, unconventional shale gas in Manitoba. As a Manitoba based supply of natural gas is unproven, potential benefits from Manitoba-sourced natural gas were not included in the NFAT business case.

REFERENCE: Executive Summary; Section: Figure 2 - Page 9 of 42 of the Executive Summary - NFAT Business Case; Page No.: 9 of 42

PREAMBLE: For the All Gas development plan options, as shown on Figure 2 (Page 9 of 42 of the Executive Summary - NFAT Business Case), it would appear that there are no benefits related to the exploration or extraction of Natural Gas that go to the Province of Manitoba (i.e. it would appear that it is assumed that all Natural Gas is imported into the Province).

QUESTION:

If Manitoba does plan on extracting/exploiting its own Natural Gas reserves in the next 35 years, then we would assume that the benefits that the Province will see from these extractions for energy production would be reflected in the Net Present Value calculations presented in Figure 2

RESPONSE:

Manitoba Hydro assumed that all natural gas is imported into the Province in the NFAT analysis and therefore Figure 2 (page 19 of the Executive Summary) does not include potential benefits to the Province from unproven resources. In the future, if these resources can be relied upon, potential benefits from Manitoba-sourced natural gas would be included in resource planning analysis.

REFERENCE: Appendix 7.2 Range of Resource Options

PREAMBLE: Keeyask G.S. is indicated to be at Stage V: Final Design, Construction & Commissioning and Conawapa in Stage IV: Pre-Investment.

QUESTION:

Please explain the use of two estimate classification systems: the Manitoba Hydro Planning Stage system and the AACEI system.

RESPONSE:

The referenced systems are not both estimate classification systems. The AACEI is an estimate classification system. The Manitoba Hydro Planning Stages define stages of project development. It encompasses all project deliverables, not just the cost estimates.