

1 Q. In the Nalcor Submission at Table 23: Isolated Island Alternative:
2 Generation Expansion CPW (2010 \$, millions), \$6.04 billion of the total \$8.810
3 billion CPW (68.7%) is comprised of fossil fuels. Has Nalcor sought advice from Risk
4 Management expertise or other expertise as to the reasonableness of relying on a
5 single firm's thermal fuel oil price forecast? If so, please provide a copy of the
6 advice received. If not, why not?

7

8

9 A. Nalcor's thermal fuel oil price forecasts were reviewed by Navigant Consulting Ltd.
10 as part of the Independent Supply Decision Review and were considered to be
11 reasonable¹.

12

13 Varying views with respect to future thermal fuel prices have been assessed by
14 Nalcor through fuel price sensitivity analysis. CPW results from higher and lower
15 fuel price futures are provided in section 7.2 of Nalcor's submission to the Board.
16 The sensitivity analyses indicate a preference for the Interconnected Island Scenario
17 (Muskrat Falls and the Labrador Island Transmission Link).

18

19 Present Value, 2010\$, millions

Case	Isolated Island Scenario	Interconnected Island Scenario	Preference for Interconnected Island Scenario
PIRA High World Oil Forecast	\$12,822	\$7,348	(\$5,474)
PIRA Low World Oil Forecast	\$6,221	\$6,100	(\$120)
PIRA May 2011 Update For Reference Oil Price Forecast	\$9,695	\$6,889	(\$2,806)

20 *(From Nalcor's Submission, Page 126, Revision 1)*

¹ Exhibit 101, page 50.

1 Q. On 22 November, 2011, the National Energy Board of Canada (NEB) published a
2 report entitled, "Canada's Energy Future: Energy Supply and Demand Projections to
3 2035." For the record, please file a copy of the report and its appendices on the
4 record.

5

6

7 A. The above referenced document is available in the public domain at:

8

9 <http://www.neb-one.gc.ca/clf->

10 [nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2011/nrgsppldmndprjctn2035-eng.html](http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2011/nrgsppldmndprjctn2035-eng.html)

11

12 While Nalcor has filed Table A1.1¹ from this report as Exhibit 118 for its responses
13 to CA/KPL-Nalcor-53 and CA/KPL-Nalcor-55, the Consumer Advocate may file the
14 above referenced document with the Board if he wishes to have this document as
15 part of the record.

¹Table A1.1 contains the NEB's oil price forecasts, which are discussed in Nalcor's response to CA/KPL-Nalcor-53.

1 Q. With regard to the NEB report referred to in the previous question, the NEB's report
2 at Chapter Two states that its reference case for West Texas Intermediate (WTI) is
3 assumed to average US \$90/bbl in 2011 and notes, "The real price increases slowly
4 over the projection period, reaching US \$115/bbl by 2035 (in U.S 2010 dollars). In
5 the low case, the WTI crude oil price is assumed to be US \$30/bbl below the
6 reference case price, reaching just over US \$85/bbl in 2035. In the high case, it is
7 assumed to be \$40 higher than the reference case price, growing to US \$155/bbl by
8 2035.

9
10 a) What is PIRA's forecast for the price of WTI over this period as
11 compared to the NEB's?

12
13 b) What is the price relationship between WTI and the types of No. 6
14 fuel oil presented in Exhibit 4?

15
16
17 A. a) Under the license agreement for retainer services with PIRA Energy Group,
18 Nalcor is prohibited from releasing PIRA's proprietary content within the
19 public domain and therefore cannot provide PIRA's forecast for the price of
20 WTI. PIRA's price forecast for WTI crude oil has been submitted to the
21 Board as Confidential Exhibit CE-34, Rev. 1. The NEB forecasts have been
22 filed as Exhibit 118 and the EIA forecasts have been filed as Exhibit 117.

23
24 Nalcor has provided a comparison of the PIRA, NEB, and EIA forecasts to the
25 Board as Confidential Exhibit CE-69, and notes they are similar.

1 Based on Nalcor’s price forecasts provided on page 10 of Exhibit 43, the
2 price in 2010 dollars for No. 6 (0.7%*s*) reference fuel reaches a ceiling of
3 about \$108 per barrel in 2025. In the low price case, the No. 6 (0.7%*s*) real
4 fuel price is about 35 dollars per barrel below the reference price forecast.
5 In the high price case, the No. 6 (0.7%*s*) real fuel price is about 70 dollars per
6 barrel above the reference price forecast. Nalcor’s price forecasts for No. 6
7 fuel would be highly correlated with the underlying WTI crude price forecast
8 which can be interpolated using the price ratio provided in the response
9 below.

10

11 b) As indicated in the response to (a), Nalcor cannot provide the forecasted
12 price relationship between WTI and the types of No. 6 fuel oil presented in
13 Exhibit 4. The table below provides the historic New York Harbor price of
14 No. 6 fuel oils relative to WTI at Cushing Oklahoma for the years 1995
15 through 2010.

#6 Fuel Oil Sulphur Content		Price Ratio to WTI
0.3% <i>s</i>		96%
0.7% <i>s</i>		84%
1.0% <i>s</i>		81%
2.2% <i>s</i>		75%
3.0% <i>s</i>		73%

1 Q. In April, 2011 the US Energy Information Administration (EIA) provided Annual
2 Energy Outlook 2011 with Projections to 2035. For the record, please file a copy of
3 the report and its appendices on the record. (www.eia.gov/forecasts/aeo/)
4

5
6 A. This above referenced document is available in the public domain at
7 <http://www.eia.gov/forecasts/aeo/>
8

9 While Nalcor has filed EIA's petroleum price projection¹ as Exhibit 117 for its
10 responses to CA/KPL-Nalcor-53 and CA/KPL-Nalcor-55, the Consumer Advocate may
11 file the above referenced document with the Board if he wishes to have this
12 document as part of the record.

¹ Downloaded from EIA's Interactive Table Viewer at
<http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2011&subject=3-AEO2011&table=12-AEO2011®ion=0-0&cases=lp2011hno-d022511a,hp2011hno-d022511a,ref2011-d020911a>

Publication	Annual Energy Outlook 2011
Subject Filter	Energy Prices
Table	Petroleum Product Prices
Region	No Regional Tables
Cases/Scenarios:	Reference case, High oil price, Low oil price

1 Q. Please compare PIRA's price forecasts, including low and high cases, filed in this
2 review with other publicly available comparable price forecasts.

3
4
5 A. The table below is extracted from Confidential Exhibit CE-69, which provides a
6 comparison of PIRA's, EIA's, and NEB's forecasts. As noted in Nalcor's response to
7 CA/KPL-Nalcor-53, Nalcor is prohibited from releasing PIRA's proprietary content
8 into the public domain.

Price Forecasts for Light Crude Oil in the United States									
	PIRA Energy Group November 2009 Forecast (2008US\$/bbl)			EIA, Annual Energy Outlook April 2011 Forecast (2009US\$/bbl)			NEB - Canada's Energy Future November 2011 Forecast (2010US\$/bbl)		
	Reference	Low	High	Reference	Low	High	Reference	Low	High
2012				86	57	126	91	69	116
2013				88	56	135	93	68	123
2014				91	56	141	94	67	129
2015				95	55	146	96	66	136
2016				98	55	151	97	67	137
2017				101	54	156	98	68	138
2018				103	54	161	100	70	140
2019				106	53	165	101	71	141
2020				108	53	169	102	72	142
2021				110	52	173	103	73	143
2022				112	52	177	105	75	145
2023				114	52	180	106	76	146
2024				116	52	183	107	77	147
2025				118	51	186	108	78	148
2030	-	-	-	123	50	196	112	82	152
2035	-	-	-	125	50	200	116	86	156
Note:	PIRA Energy Group price forecasts did not extend beyond 2025 at the time of DG-2 analysis. For analysis purposes, Nalcor projected fuel prices beyond 2025 by holding PIRA's 2025 price levels constant in real terms.								

1 Q. In the Nalcor Submission, page 126 of 158 Revision 1, Nalcor provides Table 1:
2 Summary of CPW Sensitivity Analysis with Respect to Reference Case and
3 Preference (Present Value 2010 \$, millions). In Table 1, it refers to a "PIRA High
4 World Oil Forecast" and a "PIRA Low world Oil Forecast."

5

6 (a) Please provide a copy of each of these forecasts and provide the date
7 when each was made.

8

9 (b) Please also show the calculations as to how each of the forecasts yields the
10 amount shown in the 'Preference for Interconnected Island' Column.

11

12

13 A. (a) Please refer to Exhibit 43 Rev. 1, p. 10 for the requested fuel forecasts. The low
14 and high thermal fuel price forecast as of March 2010 is based on PIRA's
15 Scenario Planning Service forecast for 2010 Q1.

16

17 (b) The starting point is the fuel price series for the Base Case, presented on page
18 10 of Exhibit 43. As noted at the bottom of page 10, No. 6 fuel costs for the
19 Isolated Island Alternative were based on 0.7% sulphur content up to and
20 including 2015, and after pollution controls are installed at Holyrood in 2015,
21 switched to 2.2% sulphur content for the remainder of the study period. For the
22 Interconnected Island Alternative, the reference fuel price series for 0.7% S was
23 used for all years.

24

25 Fuel factors, shown on page 11, were derived by relating the Low and High
26 forecast fuel prices for the sensitivities to those used for the Base Case.

Once the fuel factors had been calculated, they were brought forward to the sensitivity worksheets (pages 7 and 8 of Exhibit 43) and applied to the fuel costs used in the base cases. Fuel costs by type for the base cases were presented in Exhibit 99 filed in response to MHI-Nalcor-1.

Sample calculations for 2016, for both the Low and High Fuel Price Sensitivities, are illustrated in the following tables:

2016	(A)	(B)	(C)	(D)	(E)
	PIRA Low	Base Case	Fuel Factor (A / B)	Base Case Fuel Costs (\$ 000)	Sensitivity Fuel Costs (C x D)
ISOLATED ISLAND:					
Isolated Island #6 2.2% <i>s</i> (\$/bbl) <i>Exhibit 43 Rev. 1 References</i>	50.70 <i>p. 10, Col. 6</i>	107.00 <i>p. 10, Col. 5</i>	0.47383 <i>p. 11, Col. 5</i>	252,720 <i>p. 7, Col. 2</i>	119,747 <i>p. 7, Col. 7</i>
#2 Diesel (\$/litre) <i>Exhibit 43 Rev. 1 References</i>	0.385 <i>p. 10, Col. 9</i>	0.945 <i>p. 10, Col. 8</i>	0.40741 <i>p. 11, Col. 4</i>	4,320 <i>p. 7, Col.3</i>	1,760 <i>p. 7, Col. 8</i>
INTERCONNECTED ISLAND:					
Interconnected #6 0.7% <i>s</i> (\$/bbl) <i>Exhibit 43 Rev. 1 References</i>	52.60 <i>p. 10, Col. 3</i>	111.10 <i>p. 10, Col. 2</i>	0.47345 <i>p. 11, Col. 2</i>	307,523 <i>p. 7, Col. 10</i>	145,596 <i>p. 7, Col. 15</i>
#2 Diesel (\$/litre) <i>Exhibit 43 Rev. 1 References</i>	0.385 <i>p. 10, Col. 9</i>	0.945 <i>p. 10, Col. 8</i>	0.40741 <i>p. 11, Col. 4</i>	6,041 <i>p. 7, Col. 11</i>	2,461 <i>p. 7, Col. 16</i>

2016	(A)	(B)	(C)	(D)	(E)
	PIRA High	Base Case	Fuel Factor (A / B)	Base Case Fuel Costs (\$ 000)	Sensitivity Fuel Costs (C x D)
ISOLATED ISLAND:					
Isolated Island #6 2.2% <i>s</i> (\$/bbl) <i>Exhibit 43 Rev. 1 References</i>	189.80 <i>p. 10, Col. 7</i>	107.00 <i>p. 10, Col. 5</i>	1.77383 <i>p. 11, Col. 9</i>	252,720 <i>p. 8, Col. 2</i>	448,283 <i>p. 8, Col. 7</i>
#2 Diesel (\$/litre) <i>Exhibit 43 Rev. 1 References</i>	1.72 <i>p. 10, Col. 10</i>	0.945 <i>p. 10, Col. 8</i>	1.82011 <i>p. 11, Col. 8</i>	4,320 <i>p. 8, Col.3</i>	7,863 <i>p. 8, Col. 8</i>
INTERCONNECTED ISLAND:					
Interconnected #6 0.7% <i>s</i> (\$/bbl) <i>Exhibit 43 Rev. 1 References</i>	197.00 <i>p. 10, Col. 4</i>	111.10 <i>p. 10, Col. 2</i>	1.77318 <i>p. 11, Col. 6</i>	307,523 <i>p. 8, Col. 10</i>	545,293 <i>p. 8, Col. 15</i>
#2 Diesel (\$/litre) <i>Exhibit 43 Rev. 1 References</i>	1.72 <i>p. 10, Col. 10</i>	0.945 <i>p. 10, Col. 8</i>	1.82011 <i>p. 11, Col. 8</i>	6,041 <i>p. 8, Col. 11</i>	10,995 <i>p. 8, Col. 16</i>

1 The CPW for each alternative for the low fuel sensitivity was calculated on the
2 first line on page 7. For the Isolated Island alternative for the low fuel
3 sensitivity, the value (in \$000) of \$3,459,645 is reported in column 9. For the
4 Interconnected Island alternative for the low fuel sensitivity, the value (in \$000)
5 of \$618,393 is reported in column 17.

6
7 The CPW for each alternative for the high fuel sensitivity was calculated on the
8 first line on page 8. For the Isolated Island alternative for the high fuel
9 sensitivity, the value (in \$000) of \$10,060,838 is reported in column 9. For the
10 Interconnected Island alternative for the high fuel sensitivity, the value (in \$000)
11 of \$1,866,186 is reported in column 17.

12
13 These values were brought forward to the Fuel lines for the “Fuel Costs: PIRA
14 Low” and the “Fuel Costs: PIRA High” sensitivities on the Results worksheet
15 (Exhibit 43, p. 3), replacing fuel costs reported for each base case.

16
17 The sensitivity totals shown on the Results worksheet are those reported on p.
18 126 of Nalcor’s Submission.

1 Q. Nalcor has filed PIRA's Thermal Fuel Price forecast as of May, 2011 in reply to MHI-
2 126. Please also provide PIRA's "low" and "high" forecasts as of that date.

3

4

5 A. Please refer to Nalcor's response to MHI-Nalcor-128.

1 Q. Please state what the Preference for Interconnected Island would be using PIRA's
2 May 2011 "low" and "high" forecasts respectively.

3

4

5 A. The requested CPW differences are shown in the table below. Fuel sensitivities
6 were developed by applying annual factors to adjust the base case fuel costs.

7

	Cumulative Present Worth (\$ M)		
	Isolated Island	Labrador Interconnection	Difference
Base Case: October 2010	8,810	6,652	2,158
Fuel Sensitivities:			
Fuel Costs: May 2011 Reference Forecast	9,695	6,889	2,806
Fuel Costs: May 2011 Low Forecast	6,139	6,215	(76)
Fuel Costs: May 2011 High Forecast	14,055	7,232	6,823

8

9

10 Nalcor is of the view that the difference in the CPWs derived from the May 2011
11 Low Forecast is not material in the context of economic preferences for investment
12 decision making.

13

14 Nalcor's recommendations to its shareholder at project sanction will be based on
15 the most current oil price forecast then available.

1 Q. What qualifications on opinion, if any, has PIRA provided to Nalcor or Hydro in
2 connection with the Thermal Fuel Price forecasts filed in this review.

3

4

5 A. The thermal fuel price forecasts filed in this review were prepared by Nalcor using
6 PIRA's crude and fuel oil price forecasts as inputs. PIRA does not provide an
7 individual forecast with a corresponding opinion specifically to Nalcor, but rather
8 provides reference oil price forecasts to all of its clients worldwide based on its
9 energy market analysis. PIRA provides the following disclaimer with respect to its oil
10 market services:

11

12 *"PIRA endeavors to ensure that all of its information is accurate.*
13 *However, PIRA gives no warranties and makes no representations*
14 *with respect to the accuracy, currency, or completeness of its*
15 *information contained in the Energy Price Portal. All representations*
16 *and warranties, expressed and implied, including, but not limited to,*
17 *any warranty of merchantability or fitness for a particular purpose,*
18 *are hereby expressly excluded by PIRA. PIRA shall not be held liable to*
19 *the user, the Licensee or to any other party for any inaccuracies,*
20 *errors, or omissions contained in the Portal's information or for any*
21 *loss of profits or special indirect or consequential damages suffered*
22 *by the user, Licensee or any other third party, whether or not due to*
23 *reliance placed by the user, Licensee or third party on any statements*
24 *of fact, regardless of validity, or expression of opinions contained in*
25 *the information."*

1 Q. Why does PIRA provide a "low" and "high" forecast to clients?

2

3

4 A. PIRA develops high and low price forecasts for benchmark crude oil and other
5 energy products so that uncertainties affecting future prices can be identified and
6 quantified. This enables PIRA to address the following questions:

7

- What assumptions are most critical to the Reference price case?

8

- What changes to assumptions could result in significantly lower or higher
price outlook from the Reference price case?

9

10 • How different could prices be?

11 • What probabilities can be assigned to alternative price paths?

12 PIRA provides high and low price forecasts and their associated probabilities to
13 clients so that clients can assess the impact of variable price futures on their
14 business plans.