

MANITOBA HYDRO

2012/13 & 2013/14 ELECTRIC GENERAL RATE APPLICATION

UNDERTAKING PROVIDED BY: V. WARDEN

Manitoba Hydro Undertaking #42

Manitoba Hydro to provide the unit costs for each existing generating station on Manitoba Hydro's system. Manitoba Hydro to also indicate what discount rate was used.

Response:

The table below (column 8) provides the unit embedded cost of each generation facility by energy based on expected flow conditions ("Unit Cost"). The table reflects the mathematical derivation of Unit Cost and does not reflect the value of the resource to Manitoba Hydro. The generation costs and forecast energy output in this analysis are consistent with those in Manitoba Hydro's Prospective Cost of Service Study for 2013 ("PCOSS13") based on IFF11-2. Under other than PCOSS13 assumed flow conditions, the Unit Cost is subject to change.

The Cost of Service Study ("COSS") includes all costs included in the Corporation's Revenue Requirement which are then functionalized as Generation, Transmission, Subtransmission, and Distribution Plant or Distribution Service.

Costs functionalized as Generation in the COSS include the total costs related to generation facilities including: mitigation, HVDC Transmission facilities (excluding Dorsey convertor station), and a share of communication facilities, administrative buildings and general equipment. Costs functionalized as Generation in the COSS but unrelated to operation of the stations such as DSM, power purchases, and diesel generation have been excluded from this cost analysis. The analysis also does not include the cost of networked AC transmission or any other costs not functionalized as generation in the COSS.

The cost of the Churchill River Diversion and HVDC facilities have been included in the costs of Kettle, Limestone and Long Spruce stations, while the cost of Lake Winnipeg

Regulation has been included in the costs of all Nelson River stations (Limestone, Long Spruce, Kettle, Jenpeg, and Kelsey).

Interest costs in the COSS include the total forecast finance expense, capital taxes, and contribution to reserves which are functionalized based on net rate base investment. Therefore the study does not use a discount rate per se; however the ratio of total interest costs to net rate base in the PCOSS13 equals 5.1%.

Forecast 2012/13 Unit Costs Based on PCOSS13										
	Capital Cost (million\$) (1)	2012/13 GWh (2)	Water Rentals (\$/MWh) (3)	O&M (\$/MWh) (4)	Fuel (\$/MWh) (5)	Depreciation (\$/MWh) (6)	Interest (\$/MWh) (7)	Total Cost (\$/MWh) (8)	Total Cost (\$/MWh) - Dependable Flow (9)	Total Cost (\$/MWh) - Maximum Flow (10)
Limestone	1,446	7,395	3.34	4.27	-	5.85	10.50	23.97	30.53	19.07
Long Spruce	511	5,920	3.34	4.27	-	4.01	5.51	17.13	22.59	13.99
Kettle	419	6,938	3.34	3.98	-	3.46	4.97	15.75	19.97	13.16
Jenpeg	258	822	3.34	14.04	-	6.55	10.32	34.25	39.90	25.44
Kelsey	327	1,981	3.34	5.70	-	3.96	7.92	20.92	23.13	20.92
Wuskwatim	1,337	970	3.34	8.32	-	19.55	50.04	81.25	98.08*	75.11*
Great Falls	176	891	3.34	9.70	-	5.01	6.21	24.27	37.55	21.80
McArthur Falls	51	363	3.34	10.08	-	3.20	3.91	20.53	30.48	16.62
Seven Sisters	130	977	3.34	6.13	-	3.11	4.49	17.06	24.79	14.37
Pine Falls	61	647	3.34	6.82	-	2.48	3.08	15.73	26.57	14.47
Pointe Du Bois	97	432	3.34	26.41	-	11.10	7.75	48.61	64.45	36.94
Slave Falls	133	460	3.34	12.12	-	7.78	13.99	37.22	63.29	30.45
Grand Rapids	256	1,417	3.34	10.89	-	5.50	10.46	30.20	32.17	24.60
Laurie River	21	54	3.34	56.80	-	20.84	15.19	96.18	128.67	66.00
Brandon	187	56	-	261.49	35.79	160.73	85.63	543.64	75.37	543.64
Selkirk	106	20	-	494.61	44.56	124.20	129.87	793.24	79.41	793.24
Brandon CT	143	35	-	66.45	118.46	193.97	102.52	481.41	71.66	481.41
System Average								25.24	36.78	20.90

*Note Wuskwatim unit costs under dependable and maximum flows reflect partial year costs and prorated energy output.

The costs in the table represent the direct costs of owning and operating each facility divided by the megawatt hours generated in that year. These costs include both fixed and variable costs attributable to each facility such as depreciation, interest and operating costs. The cost per megawatt hour could vary substantially year over year depending on the actual output of the facility which varies depending of factors such as demand, water conditions and market prices etc. The variability is especially true for the Thermal Plants (Brandon and Selkirk) which may have very low volumes in some years as they may be uneconomic or prohibited from operating due to legislation. Unit costs have also been presented using energy production under dependable (minimum) and maximum flow conditions (columns 9 and 10) to illustrate the range in Unit Costs that are possible. The total operating and maintenance (excluding fuel and water rentals), depreciation and interest costs in these calculations are assumed to be unchanged from those in the COSS, and do not represent full year costs in the case of Wuskwatim.

The Unit Cost by Generating Station provides useful information for examining the embedded cost for each Station and may, to some extent reflect the generation vintage (in some cases old plant has been refurbished and the Unit Cost will reflect both historical and current cost).

It is, however, necessary to provide some context regarding the Unit Cost output for Hydraulic and Thermal Generating Stations as shown in the table above when compared to Export Market price data and Domestic Rates. Hydraulic and Thermal plants have different cost structures. Hydraulic generating stations have high fixed costs that accrue regardless of the amount of energy generated by the plant. The variable cost of Hydraulic Generation is low, including only Water Rental Fees and variable Operating and Maintenance costs. The variable cost of Thermal Generating Stations, on the other hand, are dominated by fuel (variable) costs that are dependent on the amount of energy generated. For the purpose of making dispatch decisions and export sales Manitoba Hydro uses the incremental variable cost of generation, which excludes fixed operating, interest and depreciation costs, and not on embedded costs as reflected in the table above. For the purpose of setting Domestic Rates Manitoba Hydro uses embedded costs (which include the cost of the Transmission and Distribution systems) offset partially by export revenue. It is therefore inappropriate to compare the Unit Costs in the table above with Export Market prices and Domestic Rates given the differences in their cost structure.