Q. **Project C-56, Replace Diesel Units**

Provide more details regarding the input factors and calculations for the CPW values.

A. The following summarizes the input factors and calculations that were used to determine the CPW values. Two Alternatives were explored:

- Alternative 1: Replace Unit 2042 with a unit of the same size (455 kW)
- Alternative 2: Replace Unit 2042 with a unit of a different size (725 kW)

The analysis did not include costs associated with operations and maintenance costs since these costs are common for both alternatives. The alternatives have the exact same scope with the exception of the size of the diesel units being purchased and installed. According to the 2013 Operating Forecast it is expected that Port Hope Simpson will require additional generation capacity by 2020. In both alternatives the firm capacity (see IC-NLH-41) of the diesel plant would remain the same and therefore a generation expansion project in 2020 is common to both alternatives. As a result the capital cost of this expected generation expansion project was not considered as an input in the CPW analysis.

Inputs/Assumptions:

The following is a list of inputs or assumptions that were considered for both alternatives:

- A diesel unit has a straight line depreciable life of 25 years;
- 7.0% Discount Rate;
- Capital is spent at the end of a project year;
- A diesel unit is replaced after it has accumulated 100,000 hours of operation;

- Overhaul frequency of a diesel unit is 20,000 hours;
- Overhaul costs for each unit;
- An internally developed Diesel Plant Simulator was used to project the operating hours and fuel consumption in each of the 20 years of the study. The main inputs to this simulator included the 2013 load forecast, the load duration curve of the Port Hope Simpson and diesel unit specifications;
- Diesel fuel price forecast (developed by Hydro's Market Analyst group); and
- Diesel unit Loss on disposal costs.

Calculations:

The following summarizes the calculations used to establish the CPW values for both alternatives.

a. Fuel Costs Calculation: Fuel Consumed(L) X Fuel Price ($/L)

The following is a sample calculation for Alternative 1 in the year 2014:

1,121,418 L x $1.08/L = $1,211,131

b. Total Costs Calculation: Fuel Costs + Overhaul Costs (if applicable) + Unit Replacement Costs (if applicable) + Loss on Disposal Costs (if applicable)

The following is a sample calculation for Alternative 1 in the year 2019:

$1,436,394 (Fuel cost) + $112,120 (Escalated cost of overhauling a 455 kW Unit) + $1,152,085 (Escalated cost of replacing Unit 2043) + $3,642 (Loss on disposal cost of Unit 2043) = **$2,704,241**

c. Benefits Calculation: Straight Line Depreciation

Any book value remaining on a capital job at the end of the 20-year study period was calculated using straight line depreciation and considered a benefit.

d. CPW Calculation

The following is a sample calculation for Alternative 1 in the year 2033:

Net = Total Costs + Benefits = $2,756,888 – $1,676,812 = **$1,080,076**

$CPW_X = (Net \div (1+ Discount\ Rate)^{(n+1)}) + CPW_{X-1}$

(Where n is the number of years and x is the year in question)

$CPW_{2033} = (Net \div (1+ Discount\ Rate)^{(21)}) + CPW_{2032}$

$CPW_{2033} = (\$1,080,076 \div (1+ 0.07)^{(21)}) + \$17,622,830$

CPW_{2033} =**$17,883,682**