ELECTRIC GENERAL RATE APPLICATION 2015

Manitoba Hydro Undertaking #24

Manitoba Hydro to provide project value template, with an example

Response:

Please find the project value template attached, including an example using the Great Falls Unit 5 Discharge Ring Replacement and Overhaul project.

The original driver for this project was failure indications on the discharge ring of Unit 5 of Great Falls Generating Station. The discharge ring is a mechanical ring component installed to protect the concrete structure from premature erosion in the area where the water is discharged from the turbine runner (i.e. at bottom of the unit). Due to the extent of the disassembly required to replace this component, the project also addresses the other aging assets at risk that would have to be removed to access the discharge ring.

The purpose of the project value template is to evaluate the value/cost of deferring a generation project, considering the risks associated with deferring the project and the probability of the risks occurring. Manitoba Hydro assessed this project using its project value template, and considering the minimal annual costs for added maintenance to protect the operation of the unit, in conjunction with the benefits of executing this project in the future to gain more knowledge of the scope of work required, decided to defer this project. The risks and the benefits of deferring this project will be reviewed annually in order to capture changes to the status of any information assessed and new information gained.

Introduction

This tool has been developed to evaluate the value/cost of deferring a generation project, in order to prioritize projects with a higher cost of deferral over projects with a lower cost of deferral. Each of the worksheets in this file, except "Summary" and "Introduction" prompts the user for information that will be used to calculate the Value Summary. Each worksheet contains a description of the component of the cost that it is calculating. Not every project will have entries on each worksheet.

The fields that require user input are shaded yellow or orange. The yellow fields are looking for a number, which could be a cost, probability or length of time, and the orange fields are looking for a text description of what the number belongs to.

Summary

Project Name/Copperleaf Code #:	GF U5 DISCHRGE RING REPL& MAJOR OVERHAUL / 2925
Project I.M. Node #/ Project WBS #	1.1.1.3.28.2 / P:15694
Last Updated	3/27/2014

Project Value Summary

One Time Costs

One Time Contractual Obligations	$0.00	One Time Cost ($)
Increased Effort to Stop and Resume the Project	$0.00	One Time Cost ($)
One Time Maintenance Costs	$0.00	One Time Cost ($)
Cost of Increased Outage Duration	$0.00	One Time Cost ($)
	$0.00	**Sum of One Time Costs ($)**

Annual Costs for the duration of the deferral

Interest	$0.00	Annual cost for the duration of the deferral ($/year)
Annual Contractual Obligations	$0.00	Annual cost for the duration of the deferral ($/year)
Annual Maintenance Costs	$40,000.00	Annual cost for the duration of the deferral ($/year)
	$40,000.00	**Sum of the Annual costs for the duration of the deferral ($/year)**

Annual Benefits That Commence at the Conclusion of the Project (indicate the year which the benefits will be recognized)

Benefits	$0.00	Annual Benefit ($/year)
Cost of a Currently Failed Unit	$0.00	Annual cost for the duration of the deferral ($/year)

Risk of Unit Failure

Risk of Unit Failure	$1,582,337.73	Annual cost for the duration of the deferral ($/year)

Contractual Obligations

The purpose of this worksheet is estimate the financial compensation that may be payable to a Contractor that has been engaged to complete a project that is later deferred. For example, if a contractor is already on-site preparing for the project when it is deferred, the contractor will have to de-mobilize, and re-mobilize in the future when the project is later completed. The contractor may be entitled to recover these costs. Another example would be if Manitoba Hydro is required to compensate a contractor to store a component during the deferral. Onetime costs will be applied in the first year of the deferral. Annual costs will be applied in each year of the deferral.

	One time contractual obligations		
One Time Contractual Obligation 1	Not yet scheduled	$0.00	
One Time Contractual Obligation 2		$0.00	
One Time Contractual Obligation 3		$0.00	
One Time Contractual Obligation 4		$0.00	
One Time Contractual Obligation 5		$0.00	
One Time Contractual Obligation 6		$0.00	
		$0.00	**Sum of One Time Contractual Obligations**

	Annual contractual obligations		
Annual Contractual Obligation 1	Not yet scheduled	$0.00	
Annual Contractual Obligation 2		$0.00	
Annual Contractual Obligation 3		$0.00	
Annual Contractual Obligation 4		$0.00	
Annual Contractual Obligation 5		$0.00	
Annual Contractual Obligation 6		$0.00	
		$0.00	**Sum of Annual Contractual Obligations**

Internal Resources

The purpose of this worksheet is to estimate the internal costs (in terms of labour hours) of deferring a project and restarting the project at a later date.

Internal Resources to Stop the Project

Department	Hours	Hourly Rate		
Not yet scheduled			$0.00	
Department 2			$0.00	
Department 3			$0.00	
Department 4			$0.00	
Department 5			$0.00	
Department 6			$0.00	
			$0.00	**Sum of Increased Resources to Stop the Project**

Extra Resources to Resume the Project

Department	Hours	Hourly Rate		
Not yet scheduled			$0.00	
Department 2			$0.00	
Department 3			$0.00	
Department 4			$0.00	
Department 5			$0.00	
Department 6			$0.00	
			$0.00	**Sum of Increased Resources to Resume the Project**

Maintenance

Depending on the duration of the deferral of a project, extra maintenance may be required to keep the unit in service. The purpose of this worksheet is to estimate the cost of the additional maintenance (onetime or annual) costs required if a project is deferred. For example, if an overhaul was deferred, additional maintenance may be required in order to keep the unit running.

	One time maintenance cost		
One Time Maintenance Cost 1		$0.00	
One Time Maintenance Cost 2		$0.00	
One Time Maintenance Cost 3		$0.00	
One Time Maintenance Cost 4		$0.00	
One Time Maintenance Cost 5		$0.00	
One Time Maintenance Cost 6		$0.00	
		$0.00	**Sum of One Time Maintenance Costs**

	Annual maintenance costs		
Annual Maintenance Cost 1	Inspection & repair of cracks	$40,000.00	
Annual Maintenance Cost 2		$0.00	
Annual Maintenance Cost 3		$0.00	
Annual Maintenance Cost 4		$0.00	
Annual Maintenance Cost 5		$0.00	
Annual Maintenance Cost 6		$0.00	
		$40,000.00	**Sum of Annual Maintenance Costs**

Increased Outage Duration

Depending on the situation, deferring a project could result in increased outage duration. The purpose of this worksheet is to estimate the costs of increased outage duration resulting from the deferral of a project.

Additional Length of Outage (months)	0.00
Cost of Outage ($/year)	$0.00
Cost of Increased Outage Duration	$0.00

Interest

The purpose of this worksheet is to estimate the increase in the amount of interest capitalized to a project (on sunk costs) as a result of deferring the project.

Interest Rate	6.20%		
Cumulative spent to date at the end of the 2012/2013 fiscal year less any amount put into service.		$0.00	
		$0.00	Interest Charge

Cost of Failed Unit

If a unit has failed, any deferral of the project will increase the outage duration and result in lost benefits. The purpose of this worksheet is to estimate the value of the benefits forgone as a result of increased outage duration.

Is there a failed unit associated with the project	no	
Value of failed unit ($/year)	$0.00	Only enter the value if the unit is already failed.

Benefits Forgone

By deferring a project, realization of the potential benefits associated with the project will also be delayed, such as increased unit performance, and reduced maintenance and operating costs. The purpose of this worksheet is to estimate the value of the benefits forgone as a result of deferring a project. For example, if the completion of a unit overhaul will increase the rating of the unit by 3 megawatts, deferral of the project results in the value of the 3 megawatts forgone for the duration of the deferral.

	Description of Benefit	Year that the benefit begins		
Benefit 1			$0.00	
Benefit 2			$0.00	
Benefit 3			$0.00	
Benefit 4			$0.00	
Benefit 5			$0.00	
Benefit 6			$0.00	
			$0.00	**Sum of Benefits**

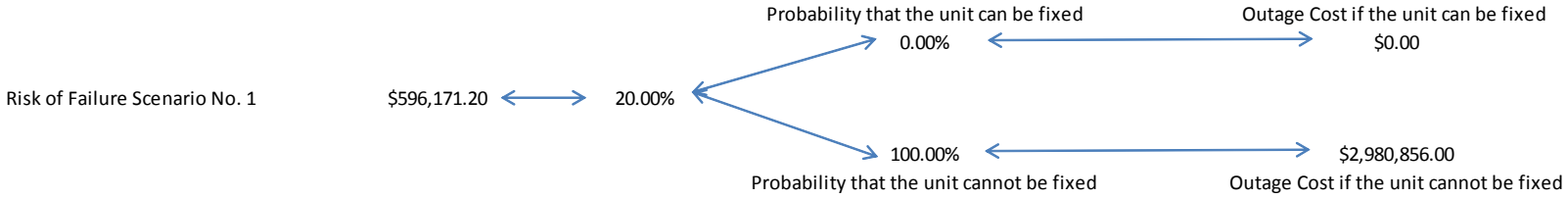
Risk of Unit Failure

The purpose of this worksheet is to estimate the cost associated with the risk of failure during the deferral, if the project is being driven by the condition of multiple components of the unit. For example, the failure of one component of a unit may cause adjacent components to fail. Decision tree analysis using probabilities should be undertaken to determine the estimated costs. The value provided should be in $/year.

Failure Scenario No. 1

Description of Scenario: Deterioration (cracking and warping) of the discharge ring beyond repair due to the backside stress corrosion cracking.

Probability of the Unit Failing	20%	Best guess right now ***based on degradation curves / condition assessments
Probability that the unit can be fixed if it fails	0.00%	
Outage Duration, in months, if the unit can be fixed	0.00	
Outage Duration, in months, if the unit cannot be fixed	24.00	3 months to diagnose and determine direction, 3 months engineering,
Cost of outage ($/year)	$1,490,428	12 months manufacture discharge ring, 6 months for installation and commissioning

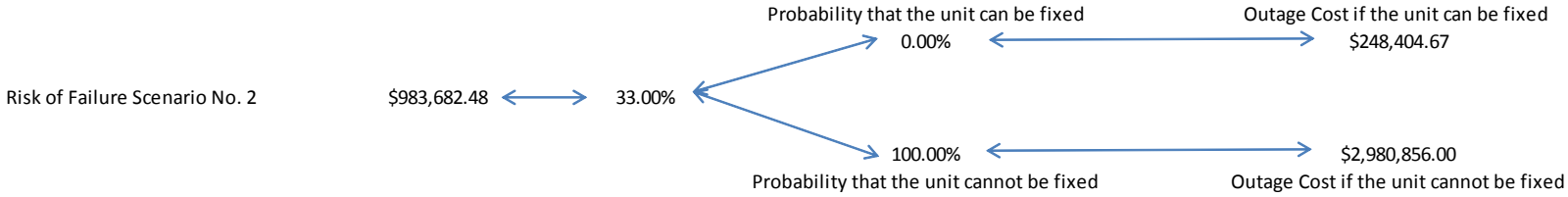


Failure Scenario No. 2

Description of Scenario: Movement of the stator core at the split joint.

*If frame fails, core and windings must be replaced as well.

Probability of the Unit Failing	33%	2 out of 6 units have failed in this mode
Probability that the unit can be fixed if it fails	0.00%	if core has moved, there is no available solution
Outage Duration, in months, if the unit can be fixed	2	
Outage Duration, in months, if the unit cannot be fixed	24.00	3 months to determine direction, 12 months for manufacture,
Cost of outage ($/year)	$1,490,428	3 months to assemble, 6 months for installation and commissioning

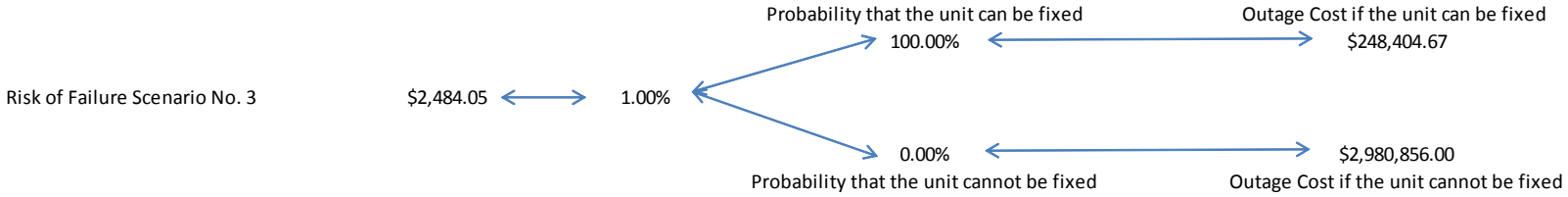


Failure Scenario No. 3

Description of Scenario: Stator winding end of life

Probability of the Unit Failing	1%
Probability that the unit can be fixed if it fails	100.00%
Outage Duration, in months, if the unit can be fixed	2
Outage Duration, in months, if the unit cannot be fixed	24.00
Cost of outage ($/year)	$1,490,428

3 months to determine direction, 12 months for manufacture,
3 months to assemble, 6 months for installation and commissioning



Failure Scenario No. 4

Description of Scenario:

Probability of the Unit Failing	0%
Probability that the unit can be fixed if it fails	0.00%
Outage Duration, in months, if the unit can be fixed	0
Outage Duration, in months, if the unit cannot be fixed	0
Cost of outage ($/year)	$0.00