

2023 Capital Budget Application

Technical Conference Presentation

October 6, 2022

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- Capital Investment for Holyrood Thermal Generating Station (“Holyrood TGS”)
- Risk Evaluation Methodology
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CAPITAL INVESTMENT FOR HOLYROOD TGS

Hydro's 2023 CBA & 2022 Update of the RRA Study

- Newfoundland and Labrador Hydro (“Hydro”) is recommending that the Holyrood TGS remain available as backup generation until long-term sources have been reviewed, approved, and constructed.
- Continued capital investments will be required for Holyrood TGS to perform as reliable backup generation.
- Hatch Ltd. provided a detailed capital plan in the Holyrood Condition Assessment as part of the Reliability and Resource Adequacy Study (“RRA”) proceeding. Hydro will use standard capital planning processes along with this assessment to guide planned capital expenditure in future applications.
- Projects proposed in Hydro’s 2023 Capital Budget Application (“CBA”) are required regardless of the recommendation presented in the 2022 RRA Update for Holyrood to remain available as backup generation.
- The Five-Year Plan does not include any projects to support the continued generation at Holyrood TGS past March 2024.

Holyrood TGS Risks

Safety

Reliability

Supply Adequacy



Holyrood TGS 2023 Investments

Thermal Generation: \$19.1 Million¹

- Required Post Generation: \$2.4 Million²
- Thermal In-Service Failures (2023): \$3.3 Million
- Required for continued generation at the Holyrood TGS: \$13.4 Million
 - Overhaul Unit 2 Turbine and Valves (2023): \$9.7 Million
 - Boiler Condition Assessment and Miscellaneous Upgrades (2023) – Holyrood: \$2.9 Million
 - Overhaul Pumps (2023): \$742,400
- **Hydro does not have evidence to support the deferral of these projects.**



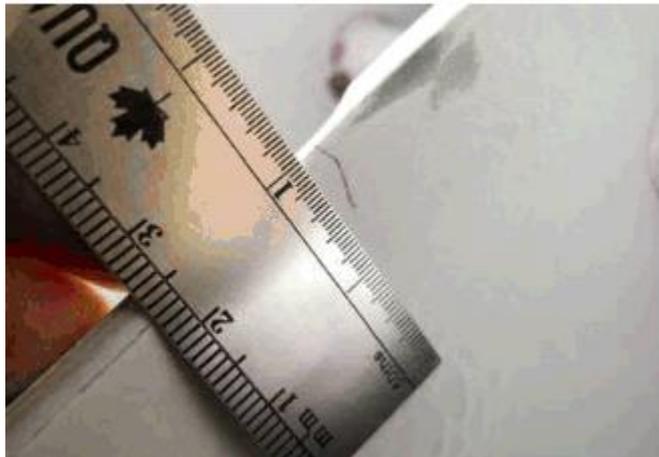
¹ Expenditures proposed for the Holyrood TGS in the 2023 CBA are those required for the continuation of full generation availability until March 31, 2024.

² This includes \$1.9 million in previously approved expenditures.

Typical Findings in Turbine Overhauls



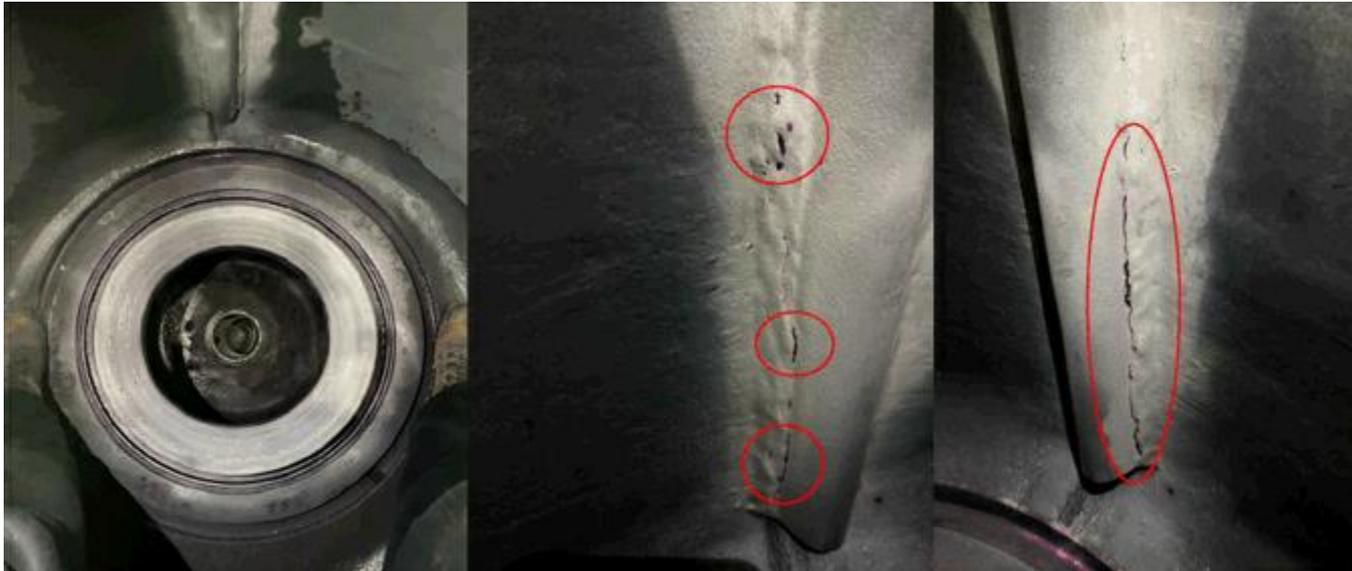
Holyrood Unit 1 – Last Stage Blade Damage



Typical Findings in Turbine Overhauls

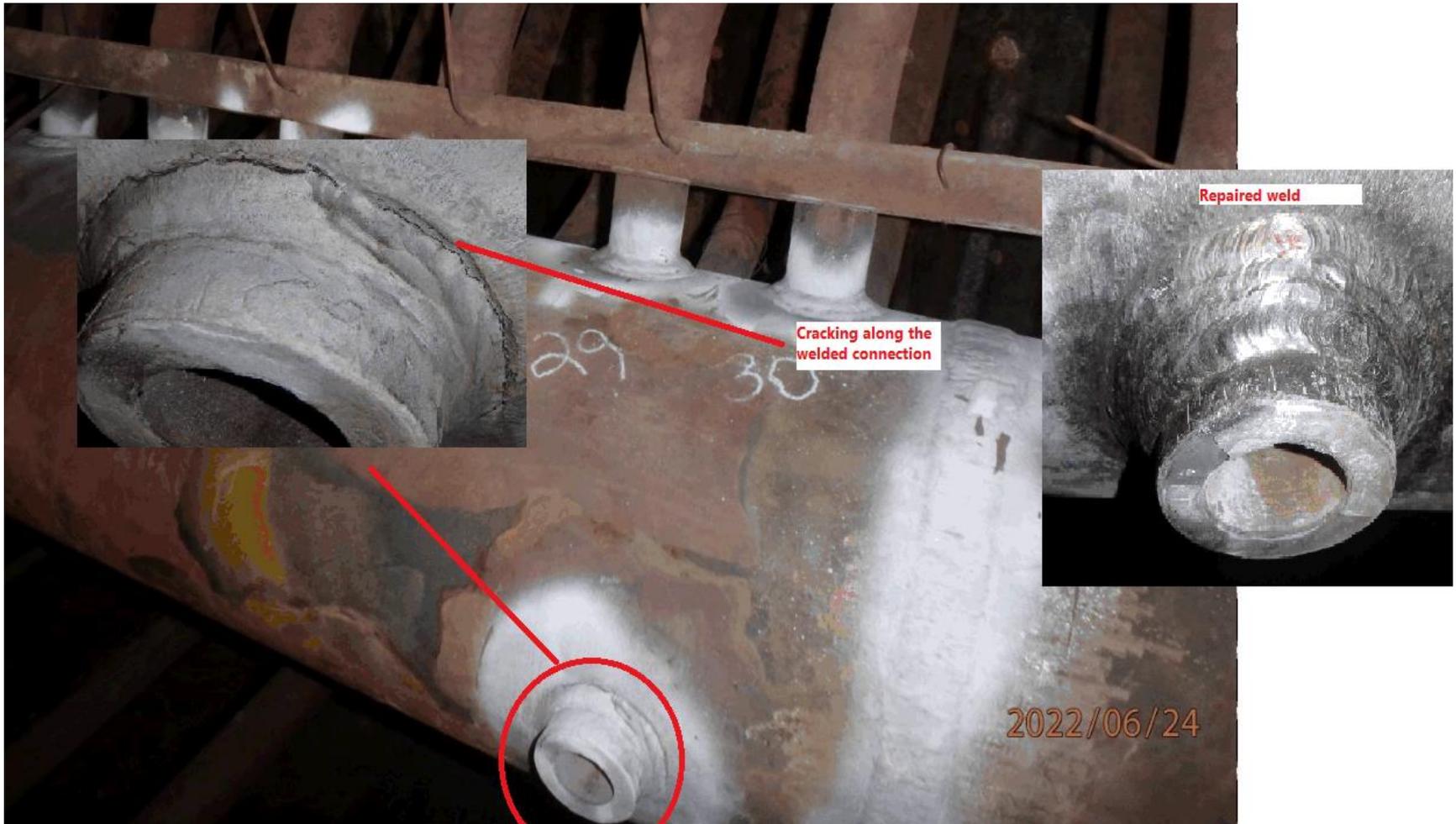


Typical Findings in Turbine Valve Overhauls

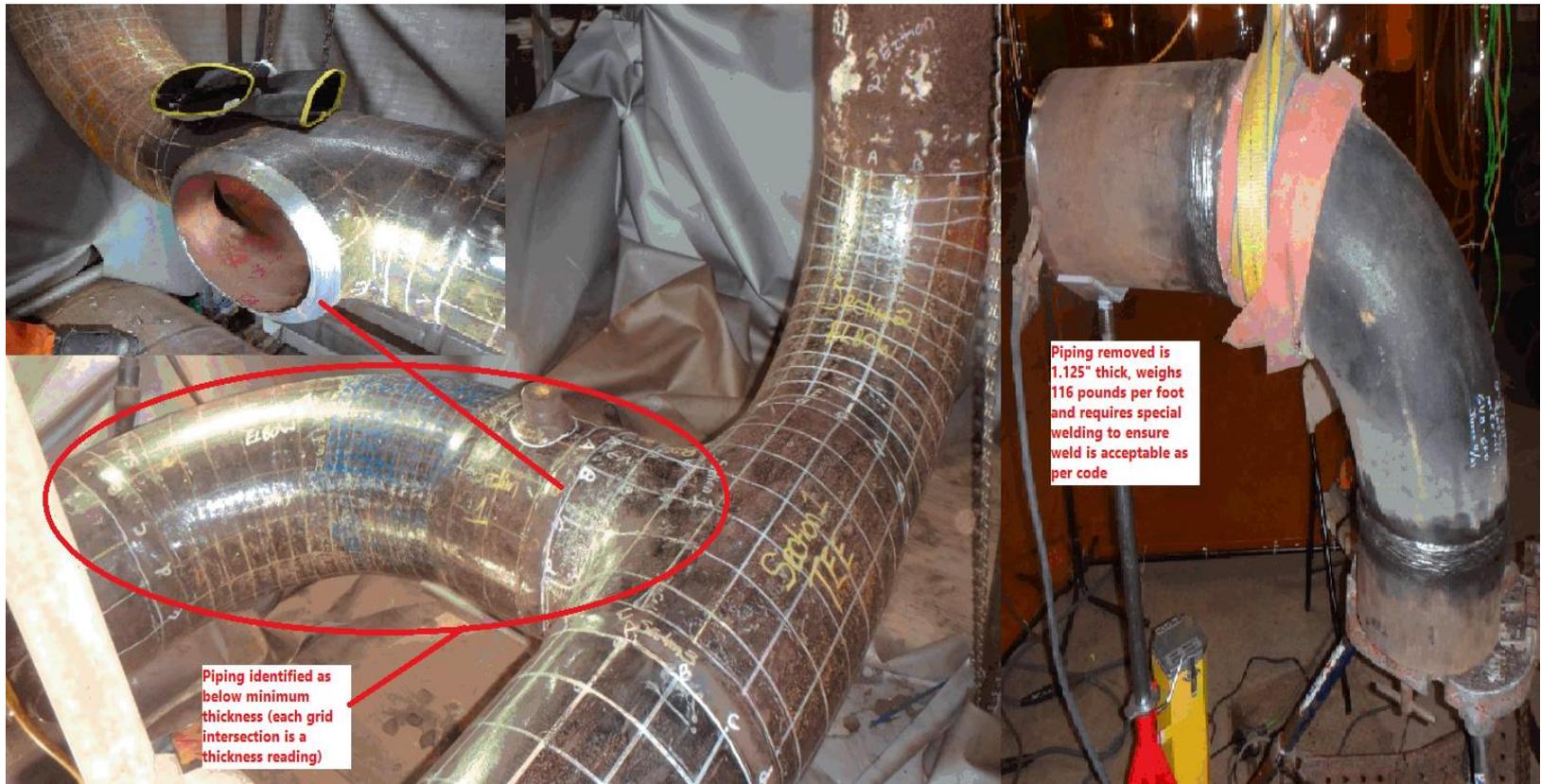


Main steam stop valve seat. Weld cracking identified with red circles.

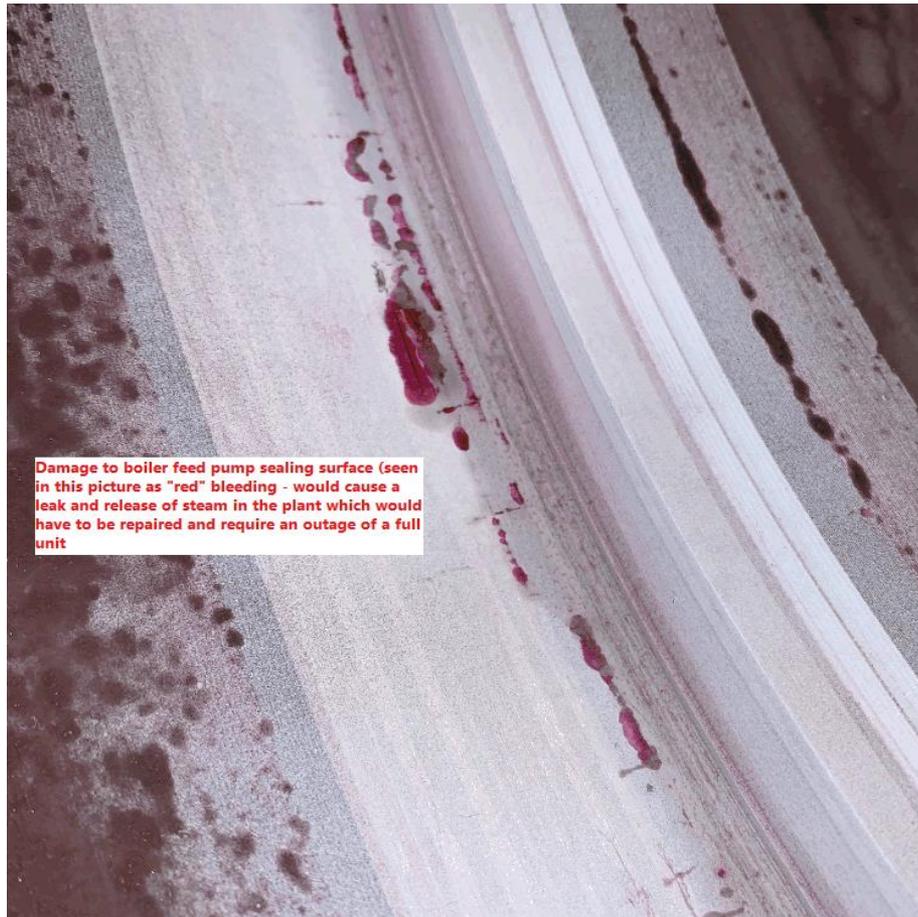
Typical Findings in Boiler Condition Assessments



Typical Findings in Boiler Condition Assessments



Typical Findings in Pump Overhauls



Damage to boiler feed pump sealing surface (seen in this picture as "red" bleeding - would cause a leak and release of steam in the plant which would have to be repaired and require an outage of a full unit



Weld repair of the sealing surfaces



Machining (removing all the pump internals to do so) required to ensure the pump matches the manufacturer tolerances to ensure proper operation

RISK EVALUATION METHODOLOGY

Risk Assessment

Based on safety, environment, and reliability per Guidelines

Expanded corporate risk evaluation matrix which is aligned with ISO 31000

Assessed risk pre- and post-implementation of capital work

Pre-Implementation Risk Scores

Impact					
Very High (5)		2	4	6	1
High (4)			6	6	
Moderate (3)			12	3	7
Low (2)			9	5	1
Very Low (1)					
Likelihood	Very Low (1)	Low (2)	Moderate (3)	High (4)	Very High (5)

Post-Implementation Risk Scores

Impact					
Very High (5)	12	1			
High (4)	12				
Moderate (3)	21		1		
Low (2)	15				
Very Low (1)					
Likelihood	Very Low (1)	Low (2)	Moderate (3)	High (4)	Very High (5)

Risk Assessment – Example

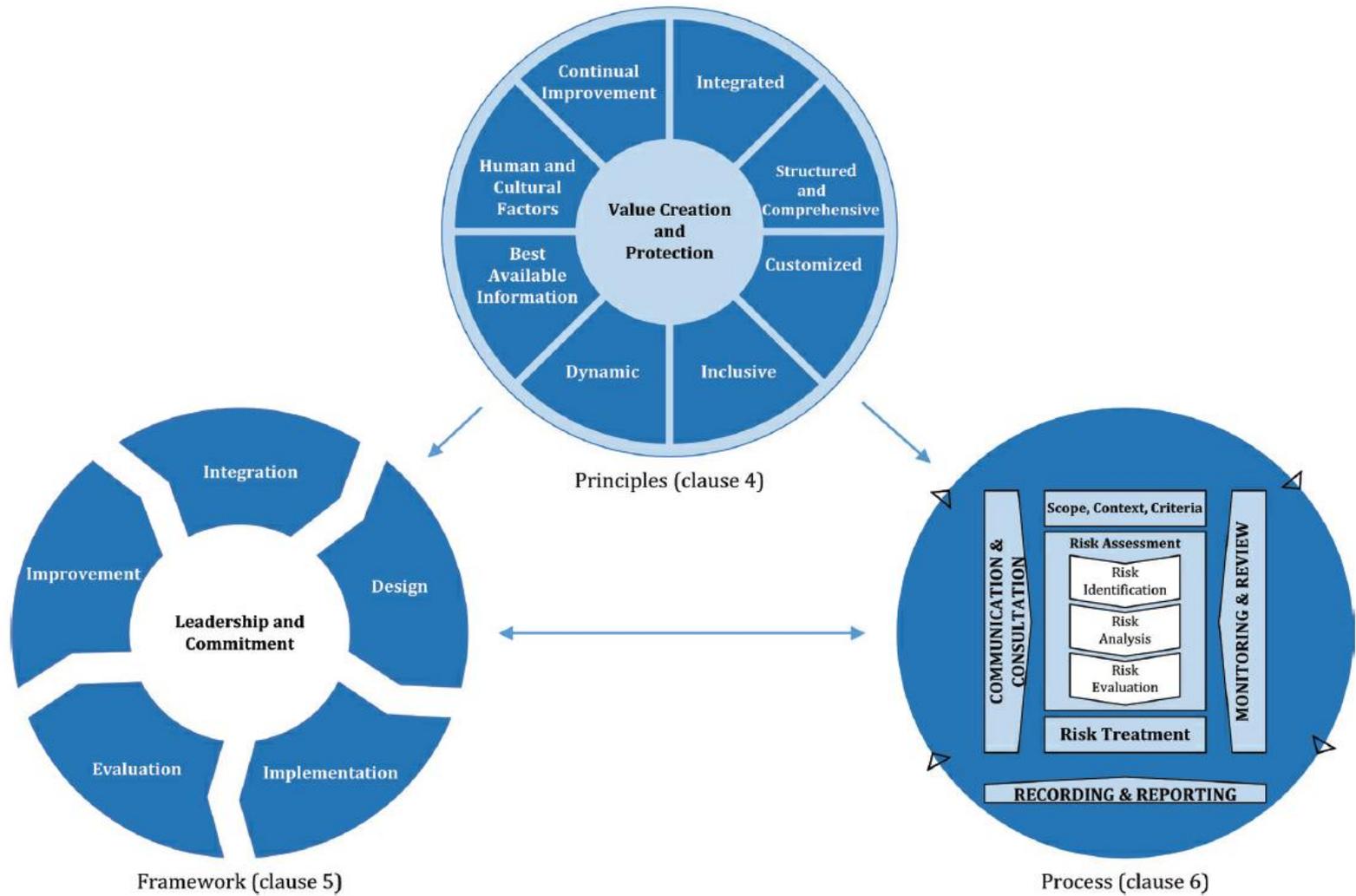
- Overhaul Unit 2 Turbine and Valves – Holyrood
 - Risk impact categorized by unit rated output for generating assets
 - Impact Score of 5 for Holyrood Unit 2 (170 MW)
 - Likelihood of forced outage considered highly probable if overhaul is not completed
 - Likelihood score of 5

	Impact	Likelihood	Score
Pre-Execution	5	5	25
Post-Execution	5	1	5
Risk Mitigated			20
Risk Mitigated /\$ Million			2.1

ISO 31000

- Hydro's Enterprise Risk Management ("ERM") practices are aligned with spirit and intent of ISO 31000.
- For the 2023 CBA, Hydro expanded upon existing ERM framework.
- Capital Risk Evaluation provides value in current state.
- Continuous improvement key to success.
- Hydro will seek further alignment and value over time in parallel with asset management improvement.

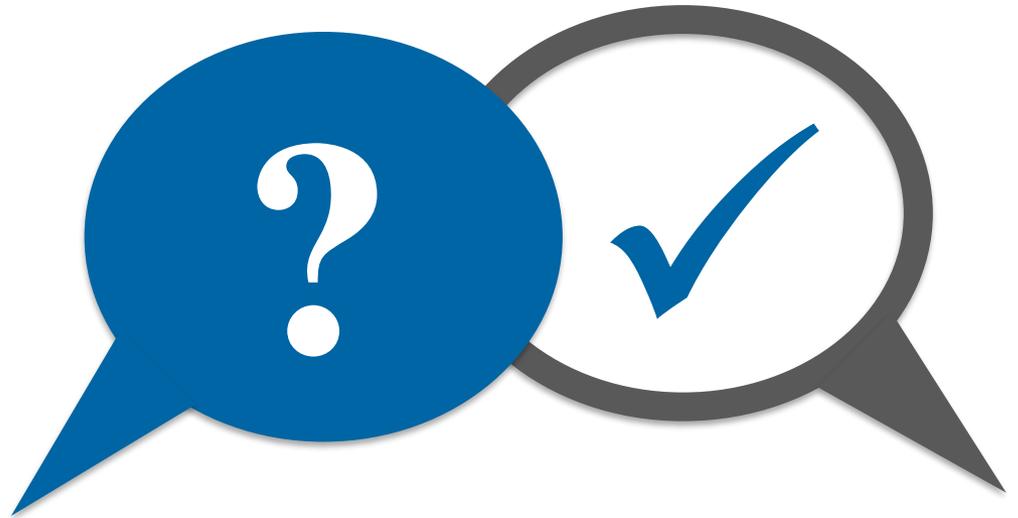
ISO 31000



Prioritization

- Risk Mitigated: Difference between pre- and post-implementation (baseline and residual) risk scores.
- Risk Mitigated per \$ Million Spent: Risk mitigated divided by the cost (in \$ millions).
- Guidelines state that projects shall be prioritized based on Risk Mitigated per Dollar Spent.
 - Hydro has observed limitations with this approach with regards to expenditure prioritization.
- Hydro has provided prioritization based on Risk Mitigated per \$ Million Spent as well as based on Risk Mitigated.
- Hydro is unable to prioritize based on Reliability Impacts per \$ Million Spent.
 - Do not track reliability impacts associated with all individual assets.

Questions?



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