

CAPITAL COST ESTIMATES FOR KEEYASK AND CONAWAPA GENERATING STATIONS

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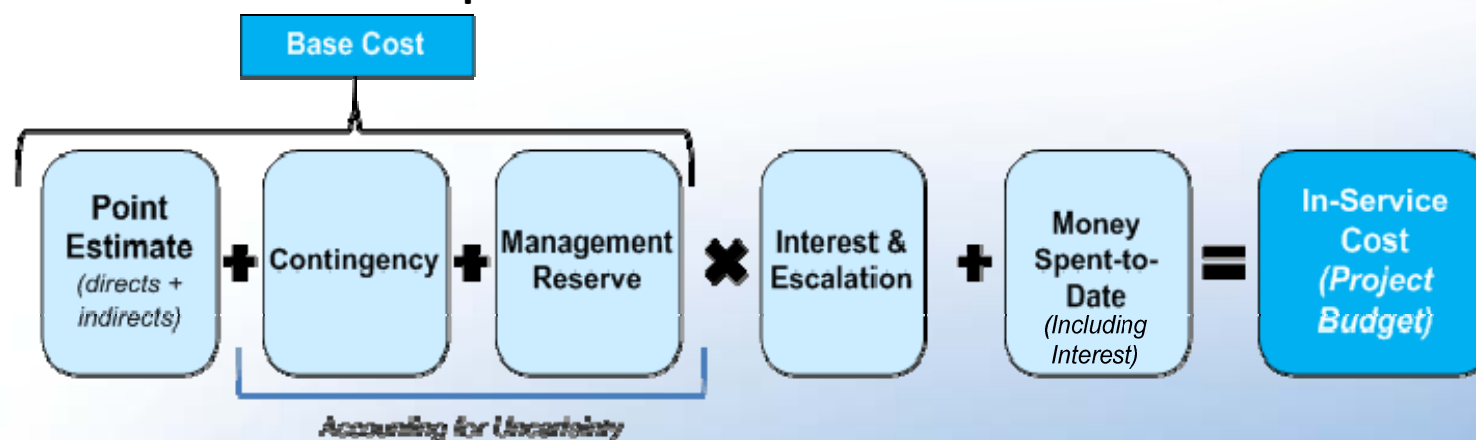


Outline

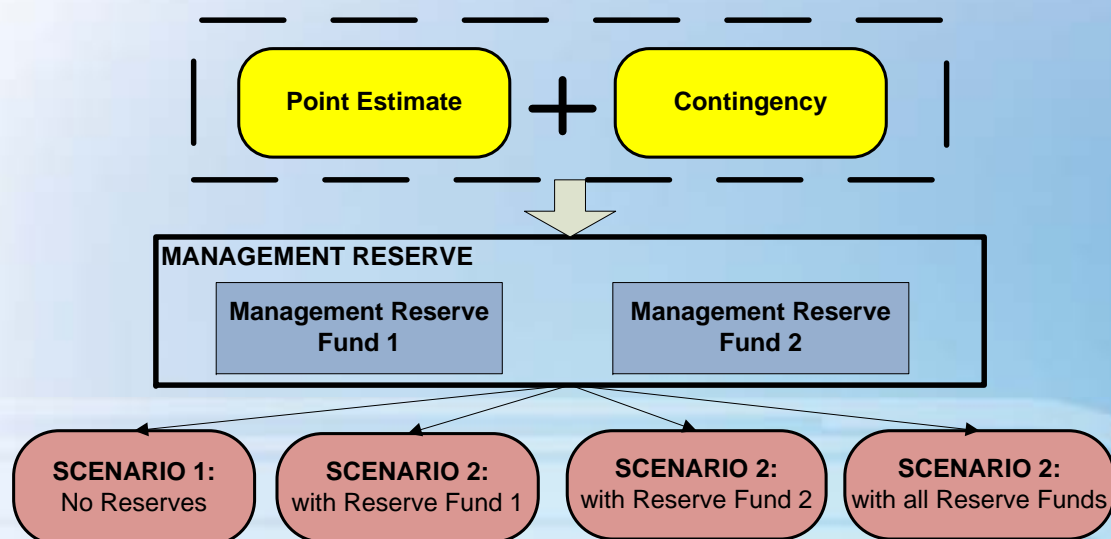
- Capital Cost Estimate Process
 - Base Cost
 - Treatment of uncertainty
 - In-Service Cost
- Development of IFF12/CEF12 Budget
 - Stress Test
 - Management Reserves
 - Results
- Project Execution/Lessons Learned
- Application to NFAT

Estimate Development Process

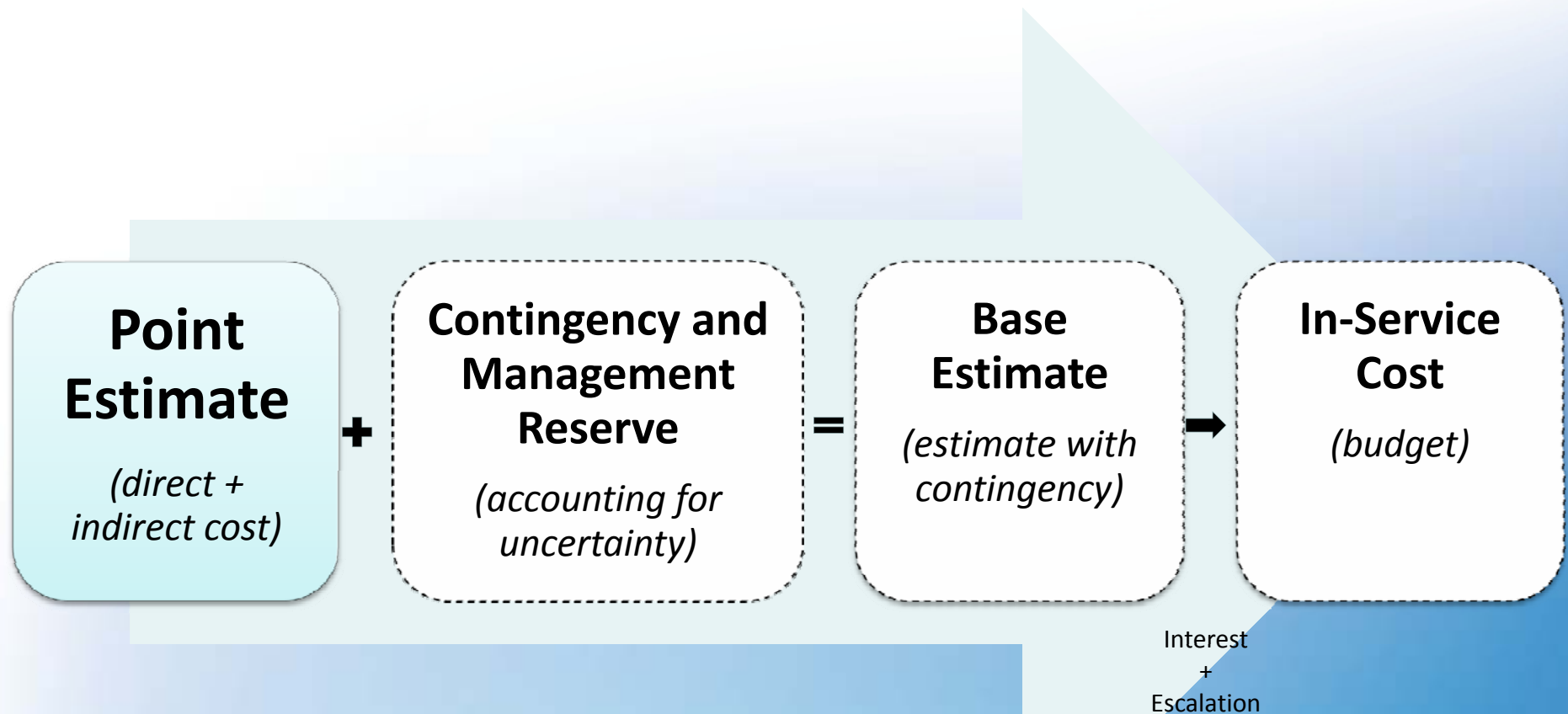
STEP 1: Estimate Development



STEP 2: Budget Scenario Development

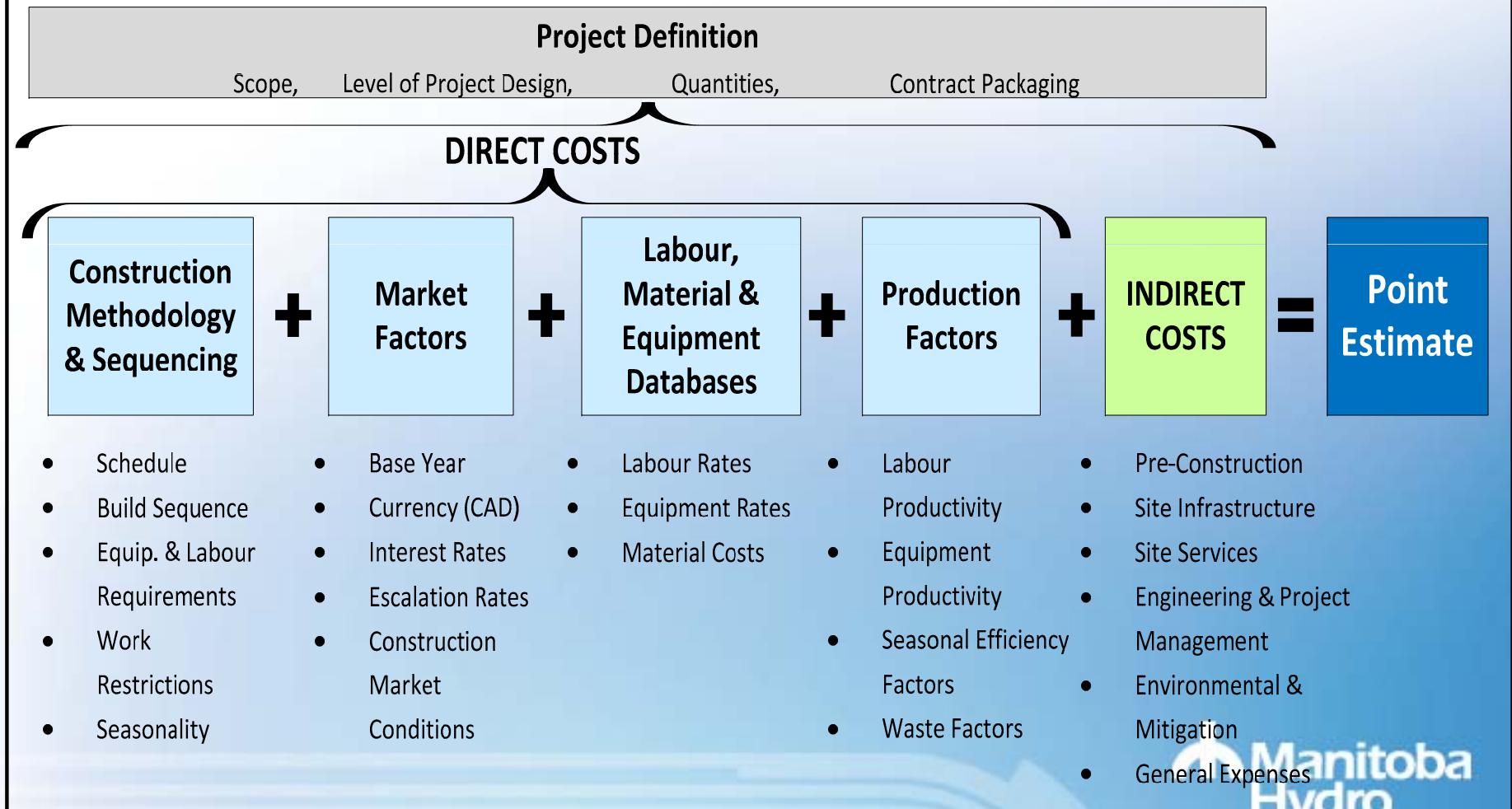


Estimate Development Process



Point Estimate

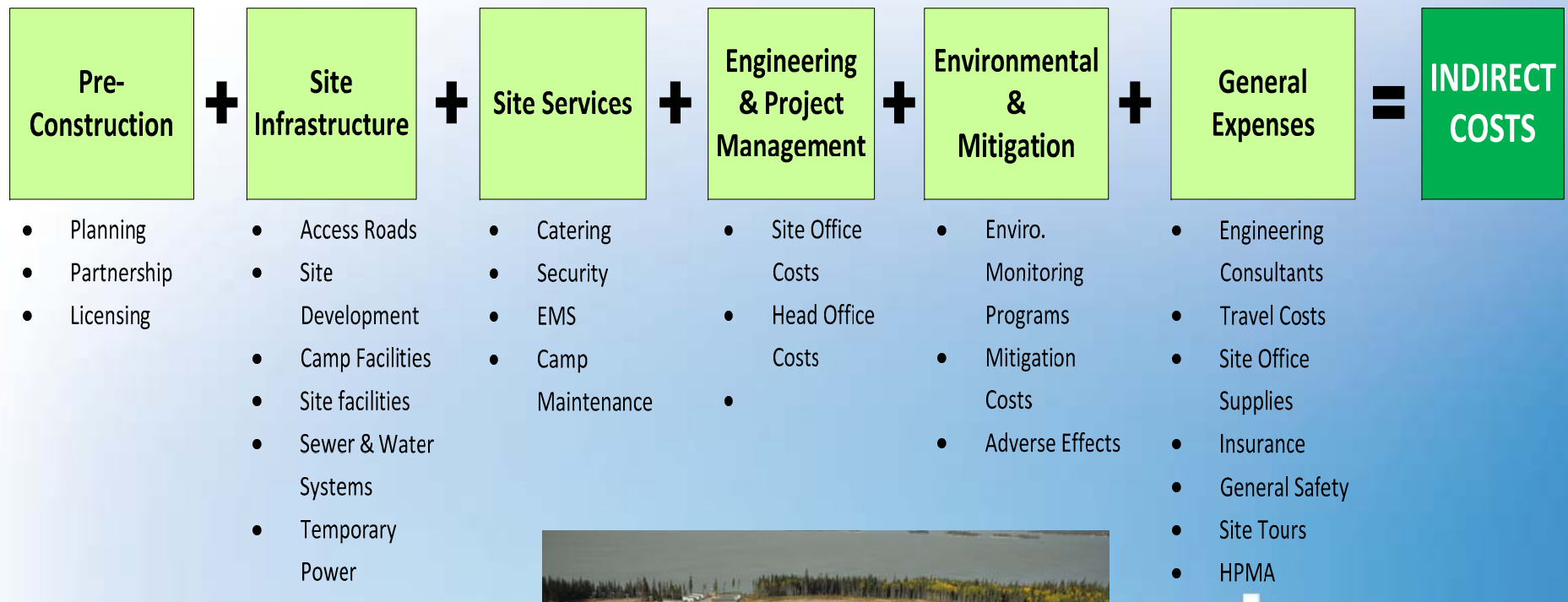
Manitoba Hydro's Point Estimate Development Process



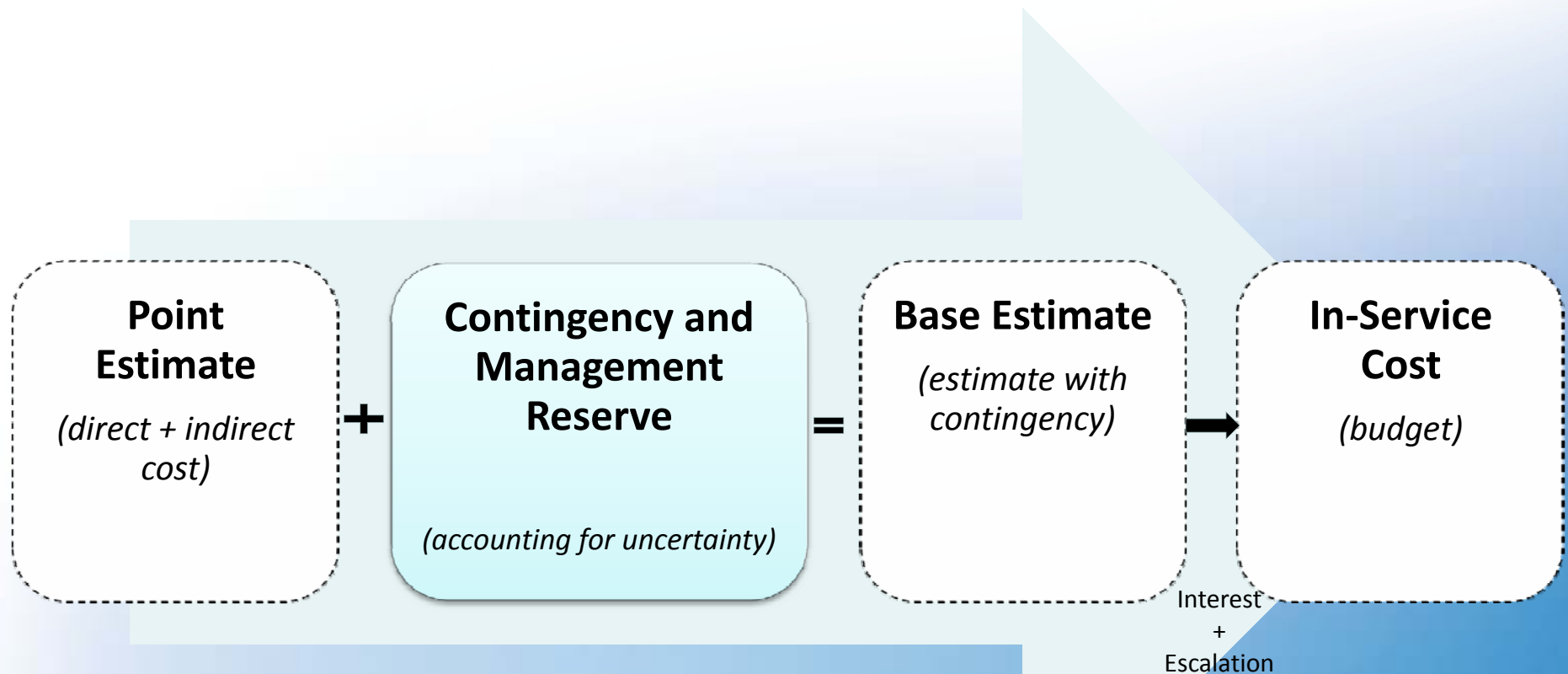


Indirect Costs

Indirect Costs



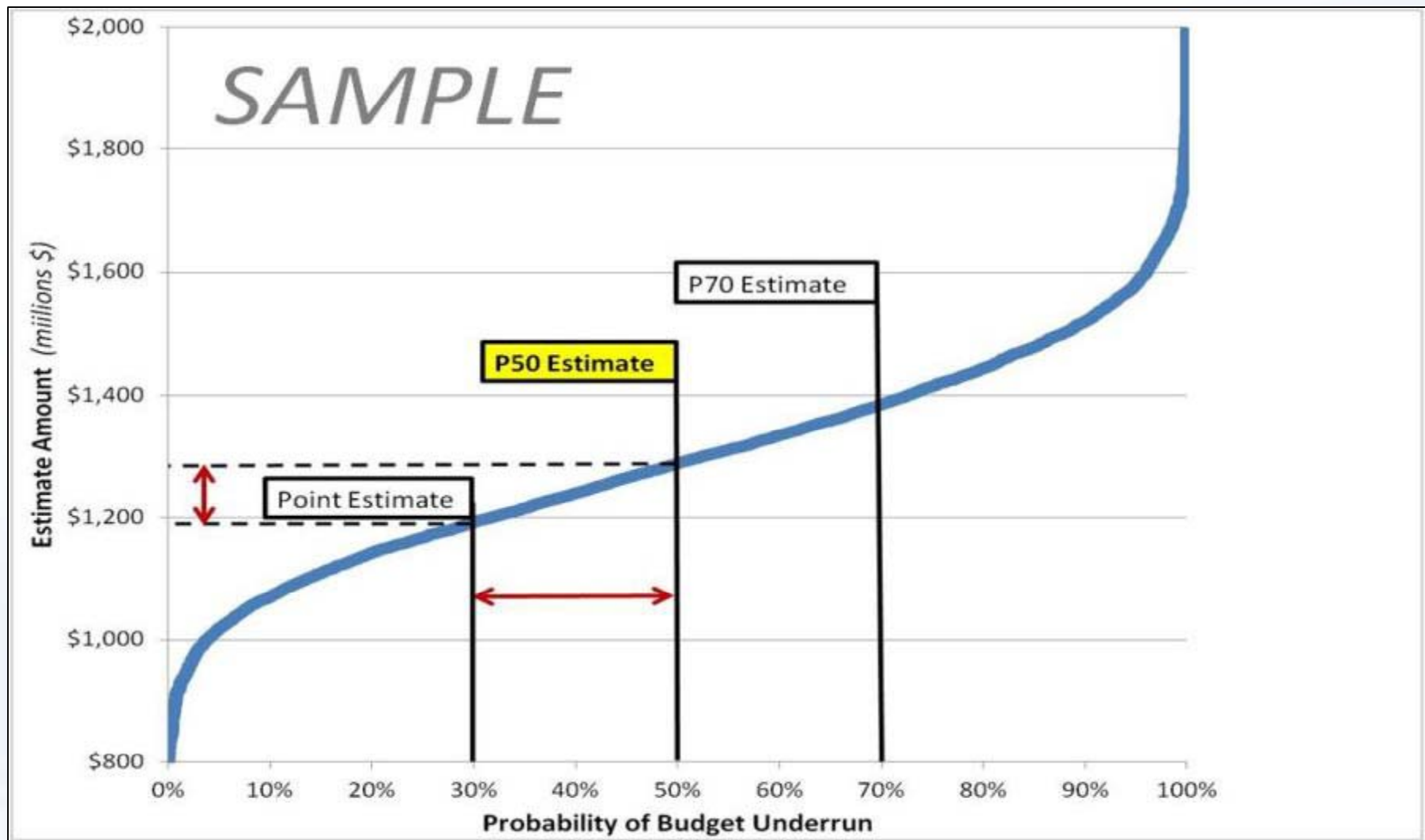
Contingency



What is Contingency?

- Meant to address uncertainty & risks associated with the estimate
 - Based on the current project scope
 - Risks & opportunities in assumptions of Point Estimate
 - One step of larger risk management process
- Developed with expectation it will be spent
 - Proven time and again that, due to uncertainties involved, major construction projects never go exactly as planned
- Developed as range of amounts for different desired levels of confidence in achieving a budget under run

Contingency Curve



What is Management Reserve?

- Next step, after contingency in risk management process
- Amount added to cover uncertainty items with very high impacts but lower likelihood of occurrence & substantial risk items not appropriate to be covered with contingency (*major market shifts, etc.*)
- Typically includes items related to regulatory requirements, future market conditions and significant risk items

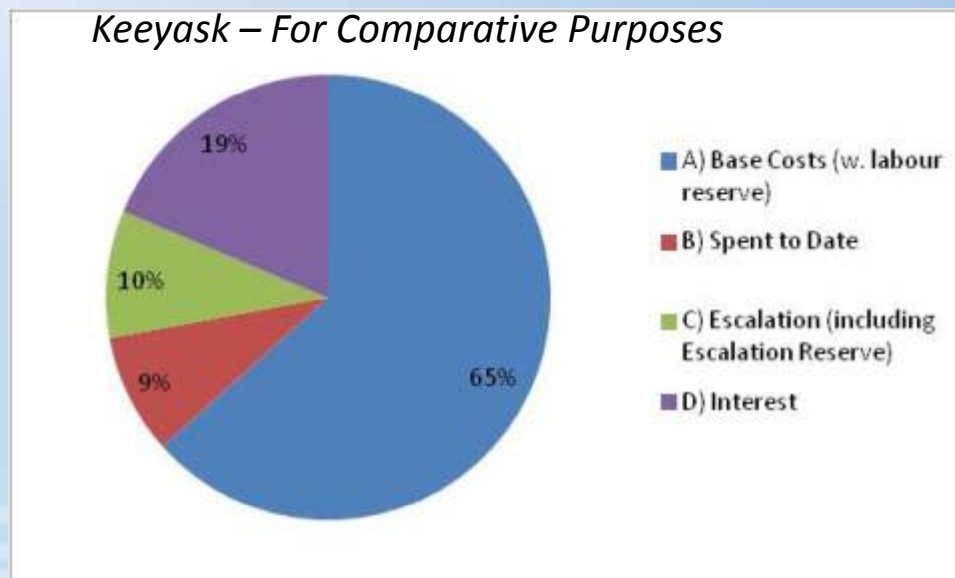


What is Management Reserve?

- Management Reserve is different than contingency:
 - Unlike contingency that is part of the cost of the work, management reserve is only spent if the identified event occurs
 - Use of management reserve requires MHEB approval
 - May or may not be recommended for inclusion in the Project Budget for the CEF/IFF

What is In-Service Cost?

- Interest and escalation on major projects, like Keeyask & Conawapa, add several Billions of dollars to the estimate
 - Approximately 30% of Keeyask In-Service Cost, 40% of Conawapa In-service Cost



Capital Cost Estimate Summary

- Base Estimate
 - Point estimate is developed at a point in time, based on project definition and market conditions of that time
 - Contingency addresses the majority of uncertainty associated with the Point Estimate
- In-Service Cost
 - Interest and escalation costs including interest on spent to date
- Scenarios used to establish Management Reserves if required
- But there are major items that can cause estimate to change:
 - Major scope changes (corporate driven)
 - Changes to ISD
 - Market Shifts (labour, construction)
 - Development Agreement Status
 - Environmental Requirements

2012 Review of K&C Estimates

- Re-estimate is a 6 month process. Primarily driven by change to the project definition/scope.
- Estimates for Keeyask and Conawapa were two and three years old, respectively, however, little change to project definition/scope
- Continual change observed in industry and Wuskwatim project essentially complete
- Stress tested key estimate inputs based on the most recent information
- Used to establish the IFF/CEF12 capital cost estimate for Keeyask and Conawapa, which included the addition of escalation and labour management reserves.

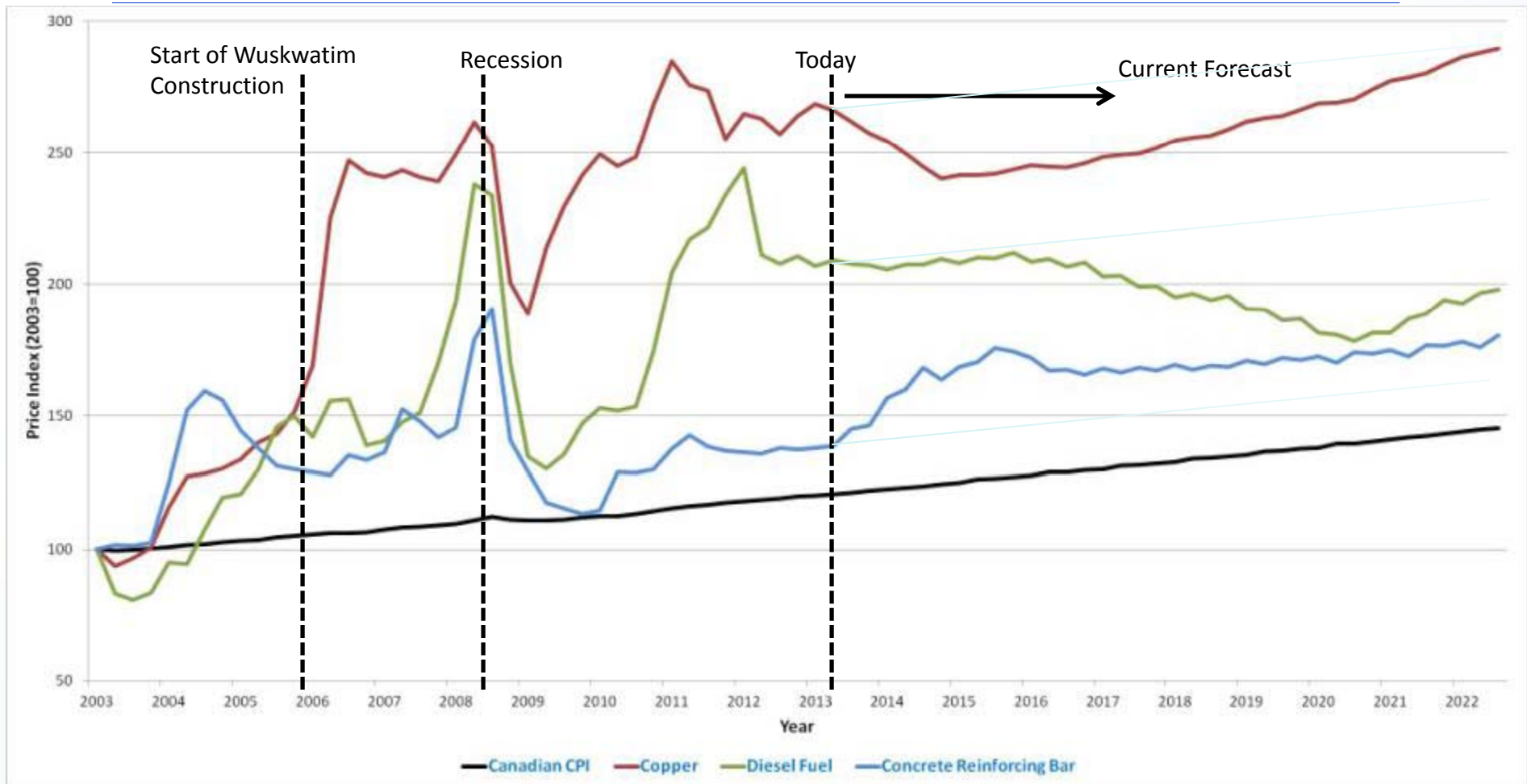
Stress Test Results - Budget Scenarios

- Labour (cost & productivity) and Escalation are the two largest contributors to estimate variation
- Escalation or labour risk alone would consume full contingency
- Scenarios used to address these two key risks and others. Not appropriate to address through contingency
- Lends itself to use of Management Reserves

Budget Scenarios – Labour Risk

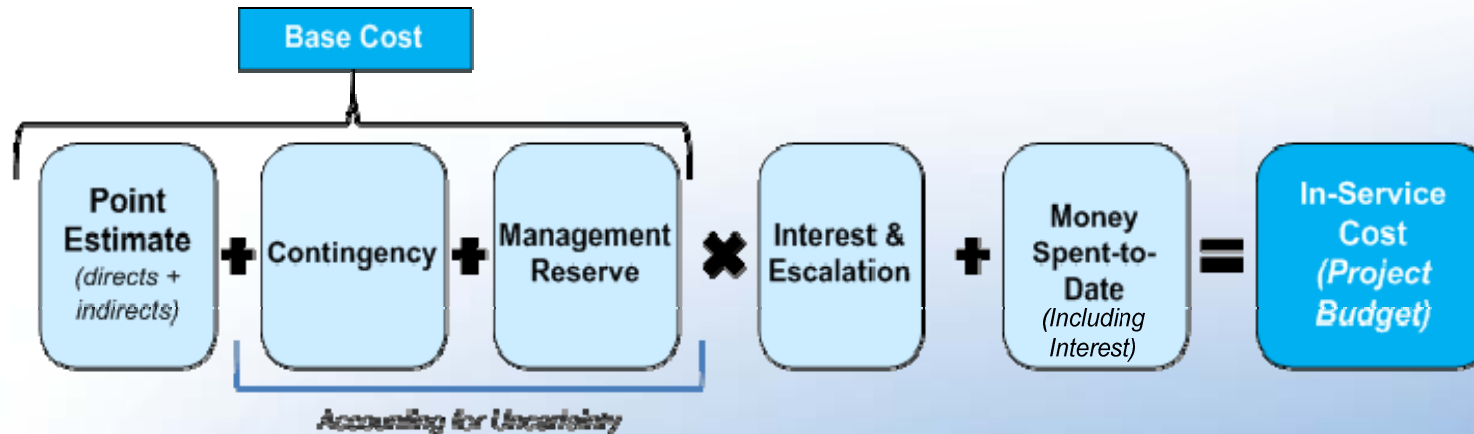
- Represents the additional costs if labour risk cannot be mitigated
- Labour reserve modeled after Wuskwatim scenario
 - Attraction & Retention issues, leading to poor productivity and larger number of workers
 - Schedule delay costs
 - Increased amount of camp and other indirect costs
- Labour risk
 - Busy mega-project marketplace in remote locations across Canada
 - Decrease in craft labour supply
 - Continued challenges in labour productivity particularly for remote projects

Budget Scenarios - Escalation Risk

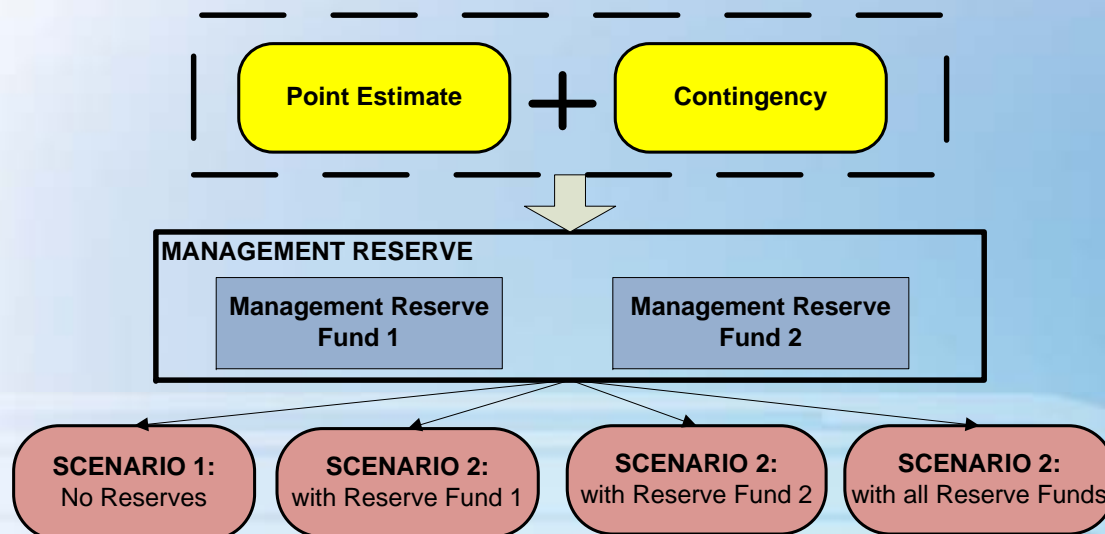


Estimate Development Process

STEP 1: Estimate Development



STEP 2: Budget Scenario Development – Included 2012 Stress Test



IFF/CEF Budgets Conawapa and Keeyask

	Conawapa 2025/26 CEF12/IFF12	Keeyask 2019/20 CEF12/IFF12
	(Billions of Dollars)	
Generating Station		
Point Estimate	4.53	3.05
Contingency	0.75	0.53
Management Reserve		
Labour Reserve	0.51	0.38
Escalation Reserve	0.34	0.12
Total Base Dollars	6.1	4.1
Total Dollars Spent As of March 31, 2012 5.	0.23	0.50
2012 Base Estimate	6.13	4.08
Escalation @ CPI	1.24	0.40
Capitalized Interest	2.59	0.85
In-Service Cost:	10.2	5.8
Interest on MH Equity	N/A	0.20
Generation Outlet Transmission (GOT)		
Total Dollars Spent As of March 31, 2012	0.00	0.00
2012 Base Estimate	0.01	0.16
Escalation @ CPI 6. 7.	0.00	0.02
Capitalized Interest 6. 7.	0.00	0.03
In-Service Cost:	0.02	0.20
Total In-Service Cost:	10.2	6.2

Key Lessons Learned from Wuskwatim

- Early Start for Infrastructure
- Engineering
 - Early Completion, earlier constructability inputs
- Human Resources
 - Attract & Retain Project Staff and Craft Labour
- Appropriate Project Delivery Strategy
- Project Management Practices

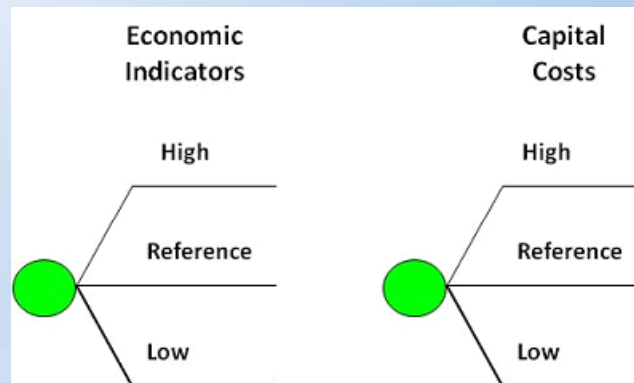
Project Execution

- Sound Project Delivery Strategy
- Comprehensive Project Schedule
- Project Team
 - World class consultants
 - Top tier suppliers
- Mitigation strategy for labour
 - Premier Camp
 - Early General Civil Contractor Involvement
 - Investigate Modifying work Schedule
 - Changes to BNA
- Incorporate Wuskwatim Lessons Learned

Capital Costs for NFAT Analysis

What's not specifically included in the Capital Cost Estimate?

- Change to:
 - In-service date
 - Major change to scope
 - Changes to escalation /interest
- Uncertainties with these items are addressed in the NFAT analysis



Capital Costs for NFAT Analysis

- To consider the full range of risks, three cases have been defined for the NFAT economic and financial analysis which are low, reference and high
 - Low value represents a low extreme that has a reasonable likelihood of occurrence
 - Reference represents the “most likely”
 - High value represents a high extreme that has a reasonable likelihood of occurrence
- These apply to all inputs (key variables) in the NFAT analysis
- Adjustments to the Keeyask and Conawapa Capital Costs to derive the low, reference and high cases were to the amounts of:
 - Contingency
 - Escalation
 - Labour reserve
 - Interest

Capital Costs for NFAT Analysis

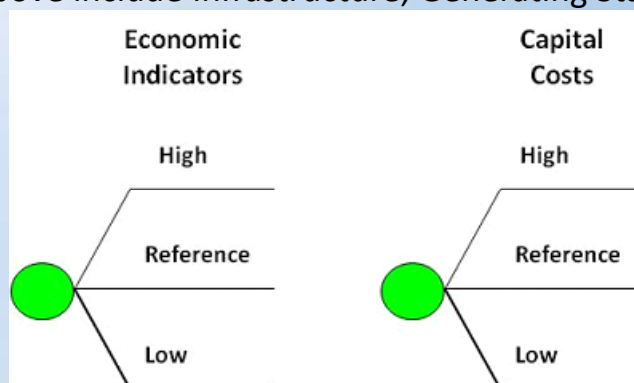
Summary of adjustments for the low, reference and high include:

- Base costs
 - Different amounts of contingency, escalation reserve, and inclusion of labour reserve
 - Low – P10 contingency amount and no labour reserve
 - Reference - P50 contingency amount with no labour reserve
 - High - P50 contingency amount plus labour reserve
- In Service Costs
 - Low, reference and high interest and escalation rates applied to cash flows

Summary of Keeyask Capital Costs

	Keeyask 2019/20 (Billions of Dollars)			
Capital Costs	CEF12/IFF12	NFAT Scenarios (Capital Costs and Economic Indicators)		
		Low	Reference	High
A) Total Base Dollars excluding Spent to Date (2012\$)	4.1	3.4	3.7	4.1
% Difference from NFAT Reference	11%	-8%	-	12%
B) Total In-Service Costs	6.2	5.0	5.7	6.7
% Difference from NFAT Reference	9%	-12%	-	18%

NB: Costs above include Infrastructure, Generating Station and Generation Outlet Transmission.



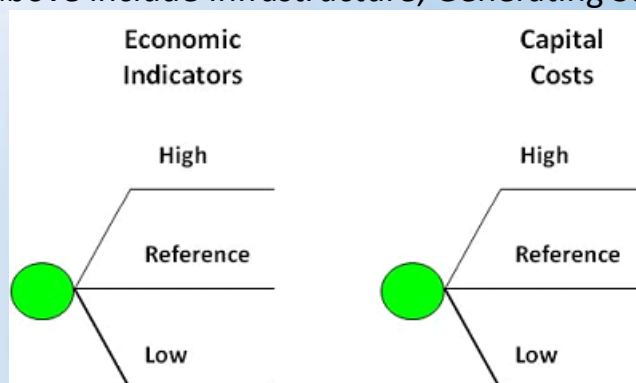
AACE Estimate Classification System HydroPower

Estimate Class	Primary Characteristics	Secondary Characteristics		
	Maturity Level of Protection Definition Deliverables Expressed as % of complete definition	End Useage Typical purpose of estimate	Methodology Typical estimating method	Expected Accuracy Range Typical variation in low and high ranges*
Class 5	0% - 2%	Concept Screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with forced detailed take-off	L: -3% to -10% H: +3% to 15%

Summary of Conawapa Capital Costs

	Conawapa 2025/26 (Billions of Dollars)			
Capital Costs	CEF12/IFF12	NFAT Scenarios (Capital Costs and Economic Indicators)		
		Low	Reference	High
A) Total Base Dollars excluding Spent to Date (2012\$)	6.1	5.0	5.6	6.2
% Difference from Reference	10%	-10%	-	12%
B) Total In-Service Costs	10.2	7.6	9.4	11.9
% Difference from Reference	9%	-19%	-	27%

NB: Costs above include Infrastructure, Generating Station and Generation Outlet Transmission.



Thank you