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
- Application to NFAT
- Project Execution/Lessons Learned

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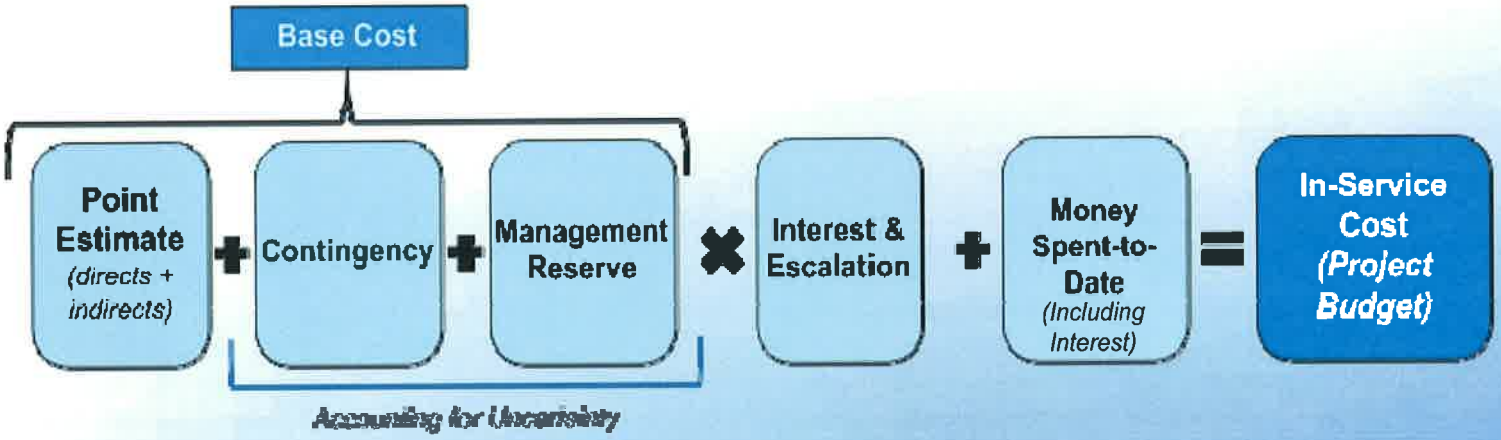
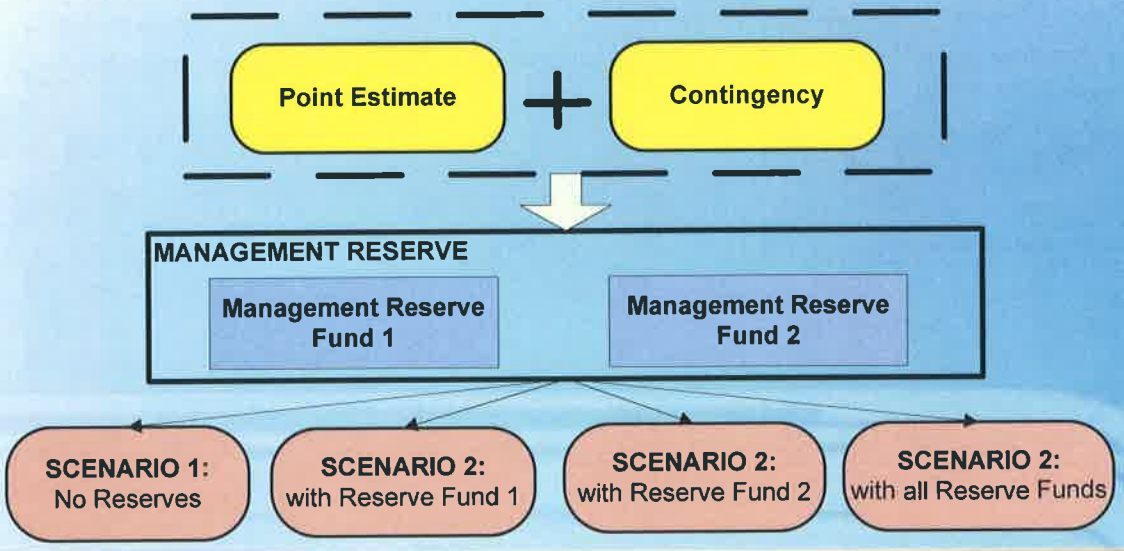
Estimate Development Process

STEP 1: Estimate Development



STEP 2: Budget Scenario Development



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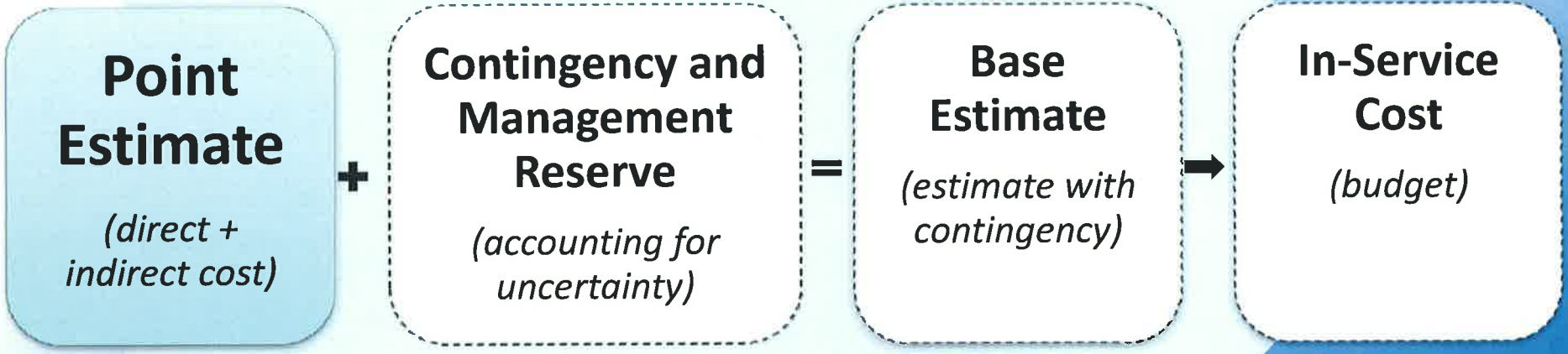

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What is the Point Estimate?

- The risk free, interest and escalation free (or bare) cost based on an initial set of assumptions, not accounting for risks/uncertainties
- Assumptions used to develop the estimate based on
  - Learning/experiences from previous & current projects
  - Other North American Heavy Civil Projects
  - Market intelligence
- Comprised of Direct (2/3) & Indirect Costs (1/3)

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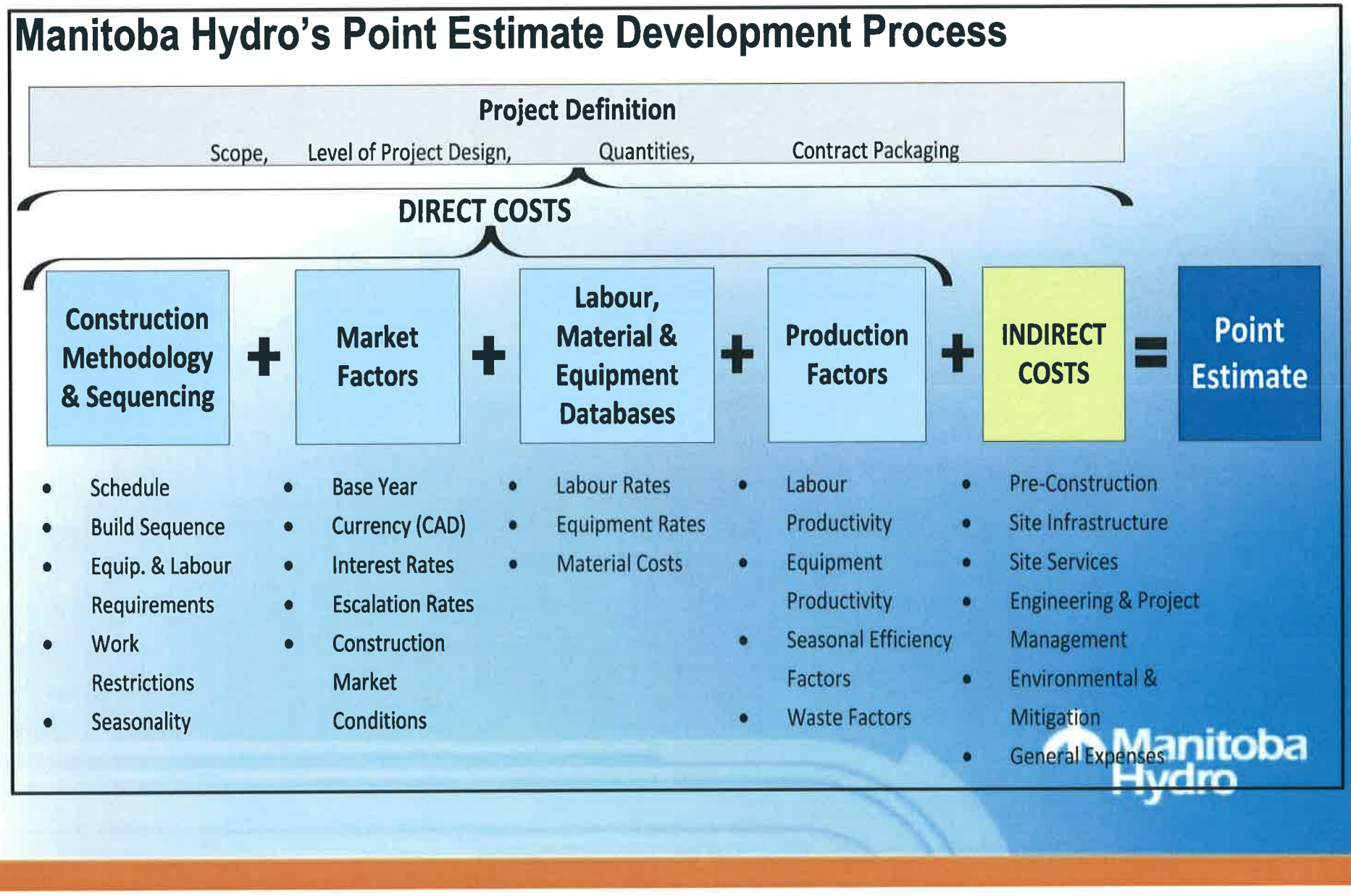
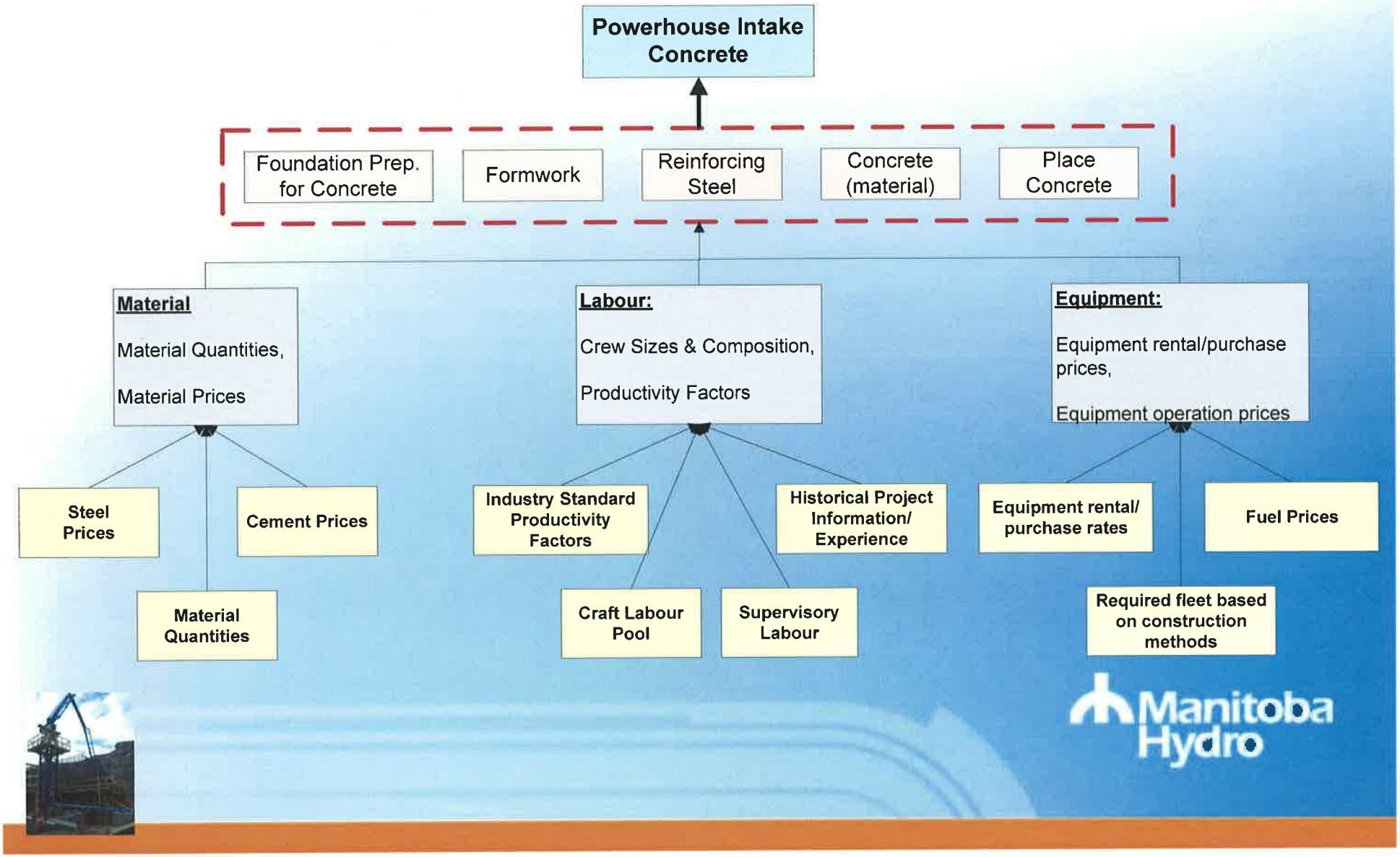
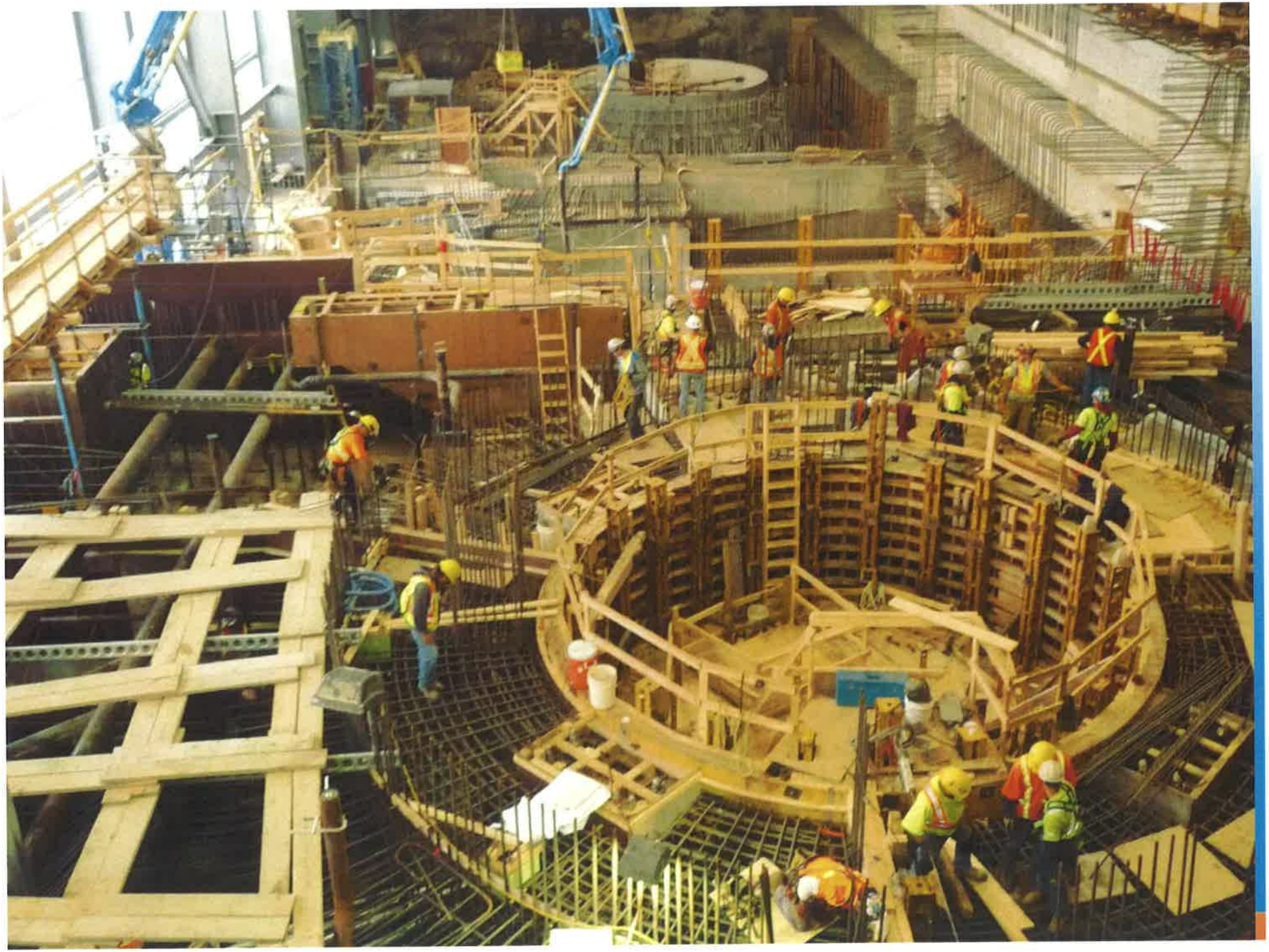
Point Estimate

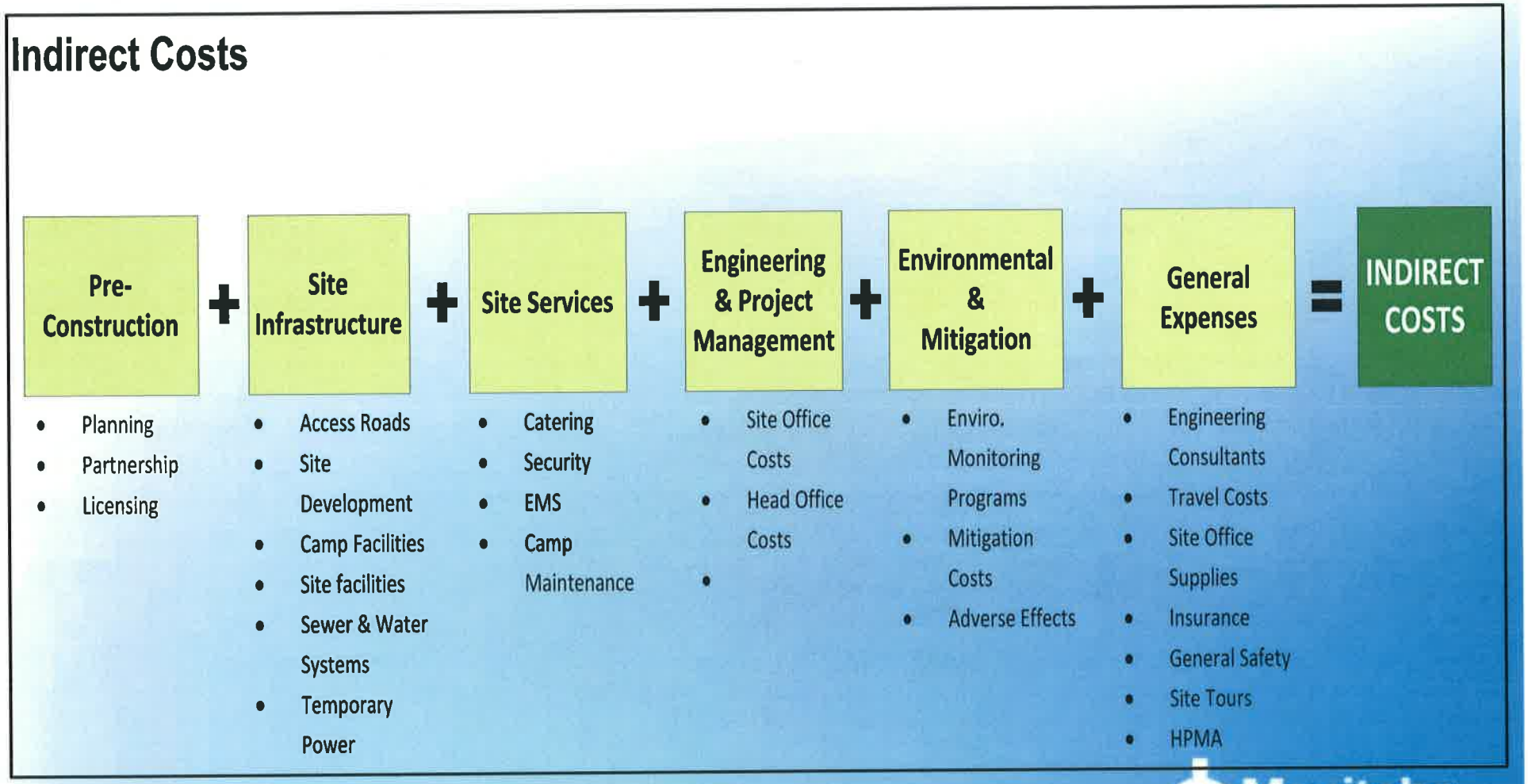


Estimate Development – What a First Principles Estimate Looks Like

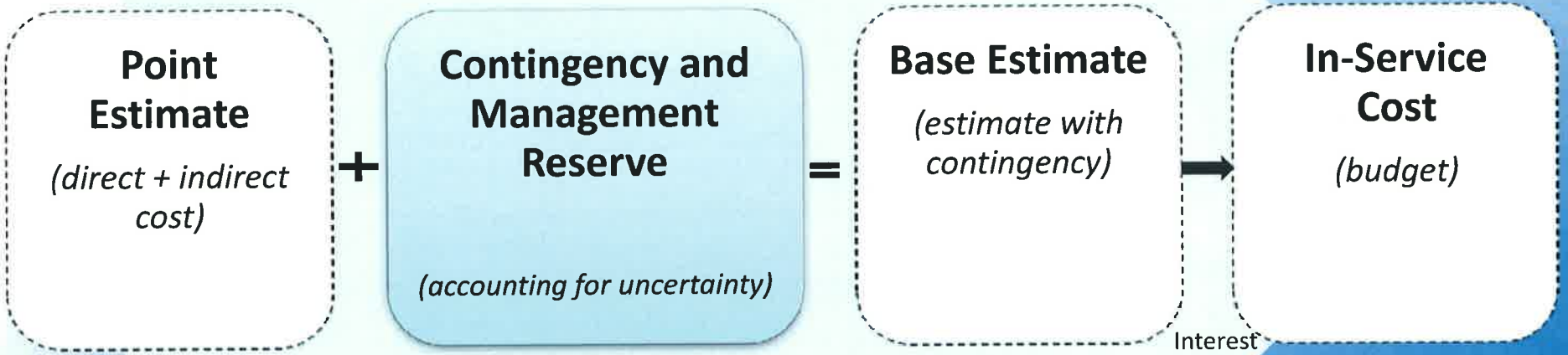




Indirect Costs



Contingency



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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

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Contingency Development

- Probabilistic curve based on Point Estimate
- Includes Systemic and Project Specific Risks
- Systemic risks include:
  - level of project definition/scope,
  - Empirically based on industry stats
- Project specific include:
  - geotechnical conditions, weather, quality etc...
  - Expected value based
- Values combined in Monte Carlo analysis to produce a contingency curve

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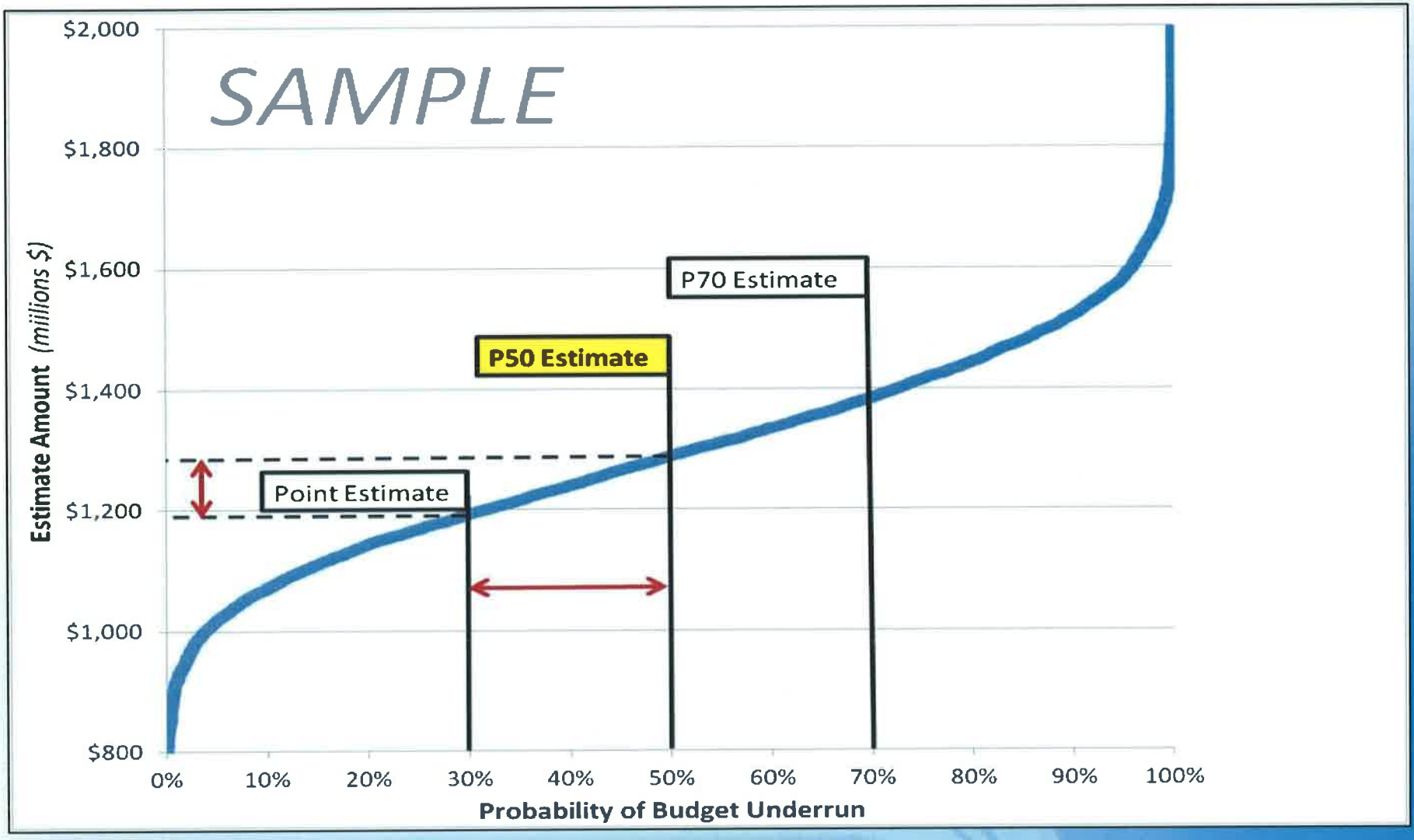
Contingency Curve



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

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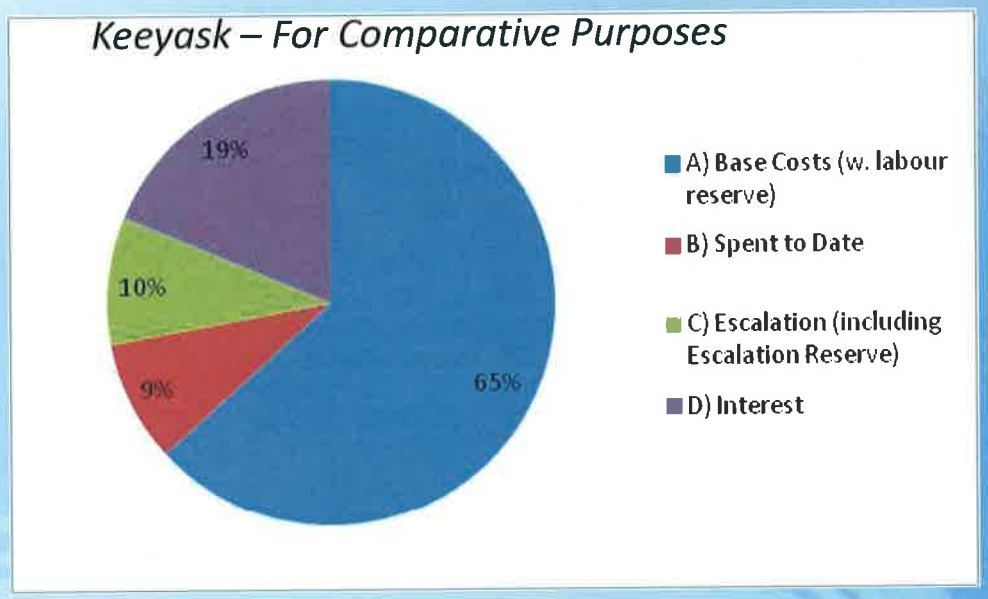
What is In-Service Cost?

- 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



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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

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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.

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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

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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

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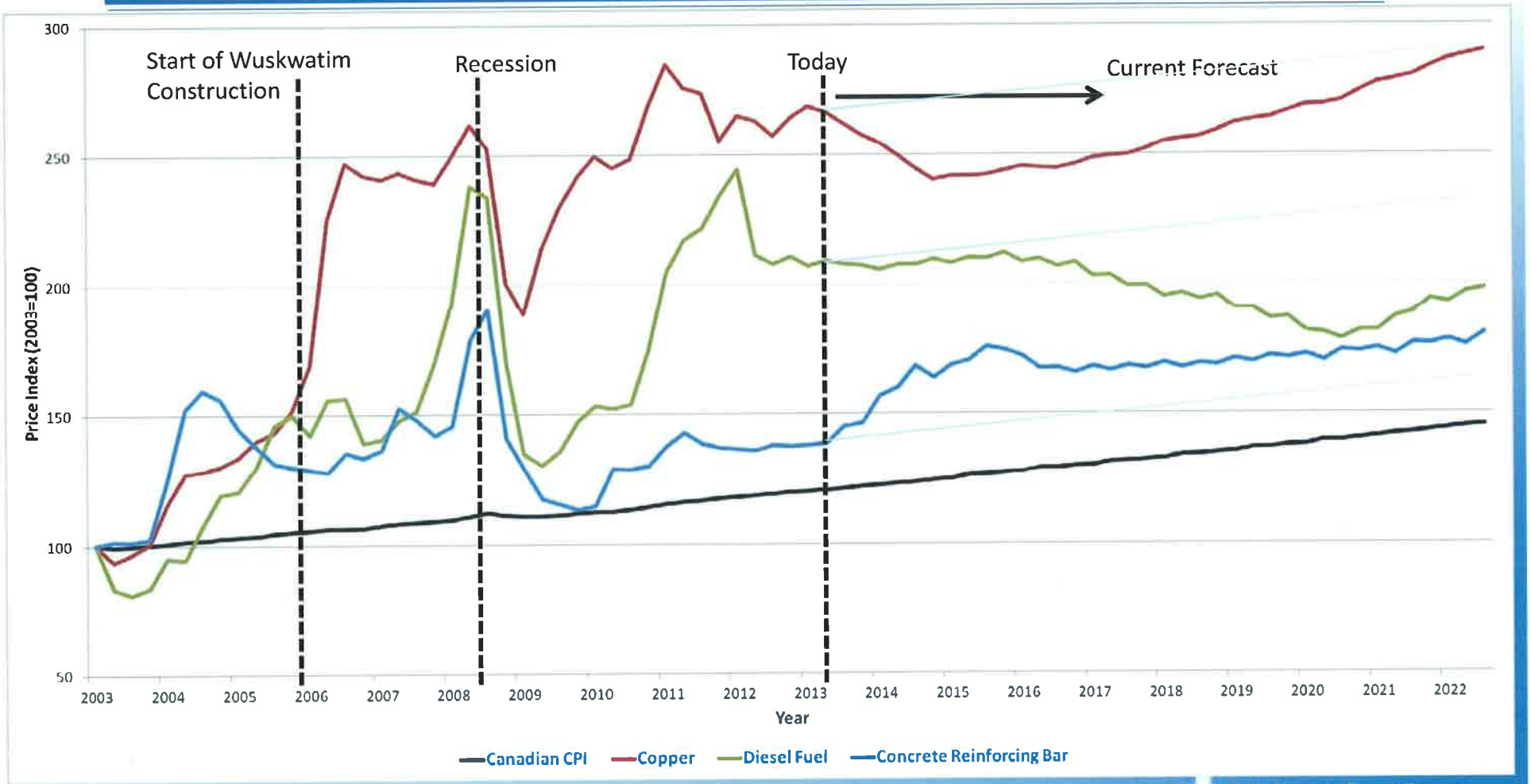
Budget Scenarios - Escalation Risk



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Estimate Development Process

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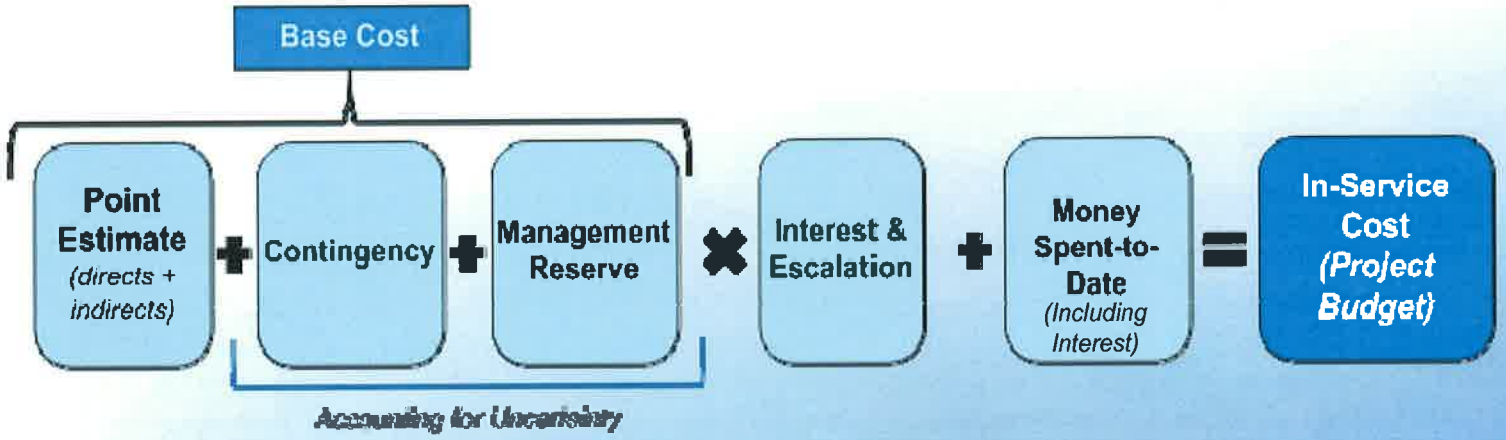
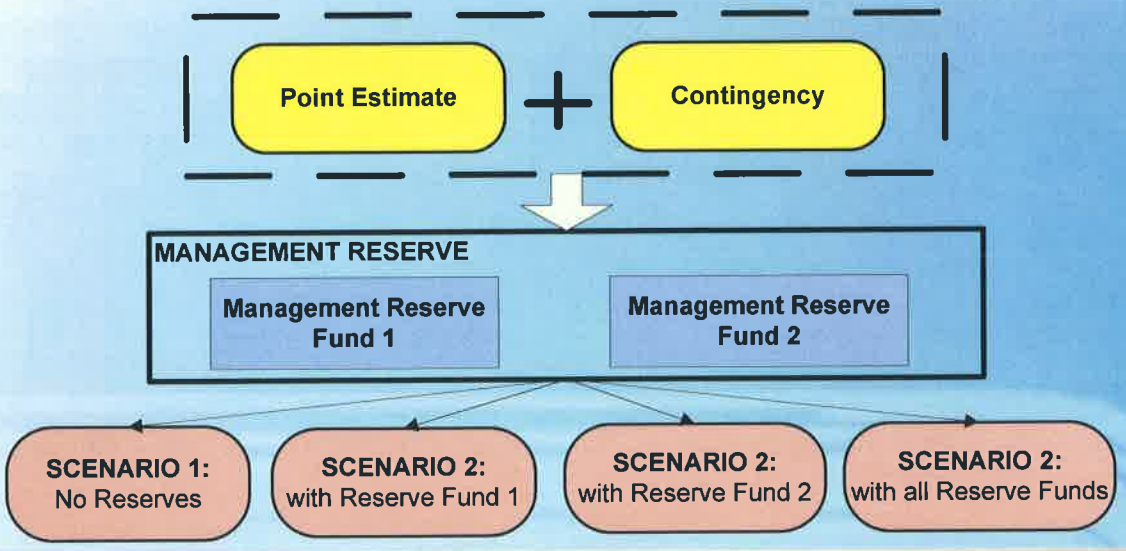


STEP 2: Budget Scenario Development – Included 2012 Stress Test



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IFF/CEF Budget and NFAT Evaluation

	Conawapa 2025/26 IFF/CEF12	Keeyask 2019/20 IFF/CEF12
	(Billions of Dollars)	
Point Estimate	4.54	3.05
Contingency + Management Reserve	1.60	1.03
A) Base Costs	6.13	4.08
B) Spent to Date (as of March 31, 2012)	0.23	0.50
C) Escalation at CPI	1.24	0.42
D) Interest	2.59	1.07
Total In-Service Cost:	**10.2**	**6.2**

NB: Includes Generation Outlet Transmission

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

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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 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

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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

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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

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Thank you

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