

2.9.3 Selection of the P50

2.9.3.1 Manitoba Hydro Policy

In CAC/MH I-001, Hydro stated:

"In fall 2009, Manitoba Hydro adopted the approach to utilize cost estimates at a P50 confidence level and management reserves to establish cost estimates for major capital projects. This approach was developed as a result of an international review of electric and other industries."

2.9.3.2 Use of the P50 by Others

According to CAC/MH I-002b, BC Hydro uses P50 for establishing the contingency amounts for capital projects and refers to it as "Expected Cost Estimate". BC Hydro also uses the difference between the P90 and the P50 to calculate a component of the "Project Reserve" for budget authorizing purposes. Hydro Quebec uses P50 for establishing the contingency amount for new projects and P70 for rehabilitation projects.

2.9.3.3 Argument for the use of a lower probability of overrun

KP and Hydro have not been able to identify a standard that outlines the "correct" level of contingency to include. The level at which to fund a project is specific for each estimate user.

While a corporate contingency guideline of 50 percent probability of overrun for projects that are part of a total annual capital budget may be fine in incidences where numerous smaller capital projects make up this total annual budget and where cost variations on one project may be offset by those on another project, this may not be the case for large projects.

An article entitled "*Monte Carlo Analysis: Ten Years of Experience*" (from Cost Engineering, a publication of the American Association of Cost Engineers, Vol 43/No. 6 June 2001) states:

"The 50 percent probability guideline is not applied to very large projects or to strategic projects outside the annual capital budget. For these, the 10 percent to 20 percent probability of overrun is often acceptable. When applying MCA (Monte Carlo Analysis) to projects at a very preliminary stage, management usually requires a very low probability of overrun, possibly 5 percent. Some of the items, conditions, or events for which the state, occurrence, and/or effect is uncertain include, but are not limited to, planning and estimating errors and omissions, minor price fluctuations (other than general escalation), design developments and changes within the scope, and variations in market and environmental conditions. Contingency is generally included in most estimates, and is expected to be expended."

2.9.3.4 Contingency Amounts Associated with a lower probability of overrun

In KP/MH II-026a Hydro has provided the following contingency amounts for the Keeyask Project. This could be used to re-estimate the project contingency if the decision maker wanted less than a 50/50 chance of under-run or over-run on the project cost. If for example, it was deemed more prudent to use a P90 level rather than a P50, an extra contingency of \$423 million would be added.

Table 2.9 Keyeyask Contingency Amounts

P-Value	Contingency Amount
P50	\$527 million
P80	\$848 million
P90	\$950 million
P95	\$,1032 million

2.9.4 Reducing Contingency through Contracting Method

Contingency is the portion of project budget that is available to cover uncertainty in the project estimates. In essence, this uncertainty can be handled either within the contracts or outside them. For example, contracting lump sum tends to increase contract costs (as contractors need to include more margin in their overheads to cover the risks) but to reduce the level of contingency required (by Hydro) because the risks have already been covered. Recent KP experience has been that it is more appropriate and affordable to share risk between owner and contractor (i.e. not to use Lump Sum methods where there are significant construction risks); they therefore affirm Hydro's basic approach.

2.10 ESCALATION AND ESCALATION MANAGEMENT RESERVES

Since the Keeyask and Conawapa projects will not be complete until about 2022 and 2028, escalation is a major contributor to the project costs and can represent anywhere from 10 to 20% of the total project in-service cost, depending on the date of the base estimate and the escalation rates assumed. Escalation refers to cost changes which result from changes in price levels that are in turn driven by underlying economic conditions. It is driven by changes in productivity, technology, and market conditions, including high demand, labour and material shortages, profit margins, and other factors. It includes the effects of inflation, but is fundamentally different. Inflation refers to general changes in price levels caused by changes in the value of currency and other broader monetary impacts.

2.10.1 Consumer Price Index

Hydro's normal practice has been to assume that future costs will increase at a rate generally consistent with the CPI, using the future CPI levels targeted by the Bank of Canada. They escalate costs in the price of specific goods or services associated with hydro-electric generation projects and natural gas-fired generation projects through a process called 'real escalation', as it has been determined that they change in price differently than more general cost escalators like the CPI. One off the main driver of the projected cost increase between capital expenditure forecasts has been that CPI has been much lower than the actual escalation for the project.

In Table 3 of Appendix 2.4, escalation at CPI (1.9%) is calculated to convert the base dollar estimate to nominal dollars and is included in the "In-Service Cost". Assumed escalation amounts are shown in Table 2.10