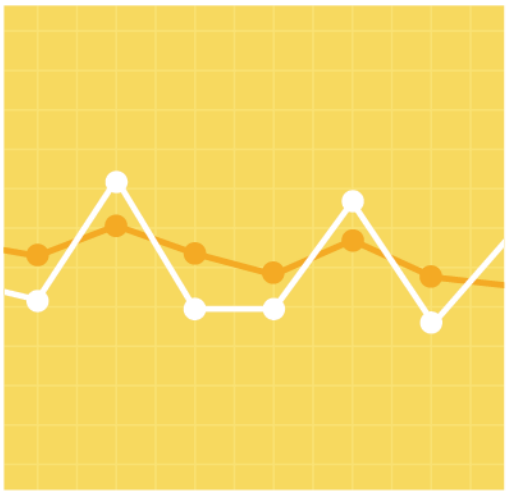
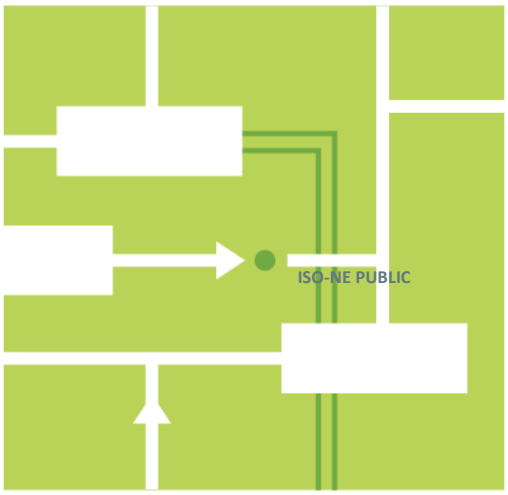
Attachment D to ISO New England Planning Procedure 4-Project Cost Estimating Guidelines

System Planning Department

September 7, 2023





Attachment D
Contents

1 PURPOSE

This document provides consistent cost engineering terms and definitions and a standardized approach to cost estimating in the region for Regional Benefit Upgrade (RBU) projects developed through the Solutions Study process pursuant to Section 4.2 of Attachment K of the OATT, or reconstructions/replacements of Pool Transmission Facilities.

This document also outlines the active review and reporting of cost estimates throughout the project life cycle from the planning and design to the construction phase. The process outlined in this document will help enable consistency in Participating Transmission Owners' project cost estimates, increase project costs transparency, and provide regular information about the transmission investments made in the region and the impact to rates.

2 TERMS AND DEFINITIONS

2.1 Cost engineering definitions

Cost Estimate: A prediction of quantities, cost, and/or price of resources required by the scope of an asset investment option, activity, or project. As a prediction, an estimate must address risks and uncertainties. Estimates are used primarily as inputs for budgeting, cost or value analysis, decision making in business, asset and project planning, or for project cost and schedule control processes. Cost estimates are determined using experience and calculating and forecasting the future cost of resources, methods, and management within a scheduled timeframe.

- Base Estimate: The Base Estimate is the original estimate (without contingency) in any estimate class (A, B, C or D). The Base Estimate will not change while the project is in the particular estimate class and all cost adjustments will be based on this estimate. For a Base Estimate to change the project will need to be moved to a differed Estimate Class
- Escalation: The provision in actual or estimated costs for an increase in the cost of equipment, material, labor, etc., over that specified in the purchase order or contract due to continuing price level changes over time. Inflation may be a component of escalation, but non-monetary policy influences, such as supply-and-demand, are often components.

Contingency: An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs. Typically estimated using statistical analysis or judgment based on past asset or project experience.

Project: For the purpose of this document, a Project shall mean a RBU developed though the Solutions Study process pursuant to Section 4.2 of Attachment K of the OATT, or reconstructions/replacements of Pool Transmission Facilities included in the Regional System Plan and/or the ISO-NE Asset Condition List. Projects are broken down by components in the RSP listing (Lines & Substations) but are typically permitted and reviewed as a whole for efficiency and resource/costs savings.

- Project Scope: The sum of all that is to be or has been invested in and delivered by the performance of an activity or project. In project planning, the scope is usually documented (i.e., the scope document).
- Project Components: The breakdown of the Project into a subset. Examples of project elements would be a transmission line, substation, switching station, underground transmission line, etc. As described above, these will typically correspond to an individual RSP Project ID number or Asset Condition List Project ID number.
- Change in Scope: A change in the defined deliverables or resources used to provide them.
- Right of way cost: All costs associated with the acquisition of new right of way including easements, land purchases, and associated agent, surveying (relative to land acquisition) and recording fees (as defined by FERC 350 account definition).
- Level of Project Definition: This characteristic is based upon percent complete of project definition (roughly corresponding to percent complete of engineering). The level of project definition defines maturity or the extent and types of input information available to the estimating process. Such inputs include project scope definition, requirements documents, specifications, project plans, drawings, calculations, learning's from past projects, reconnaissance data, and other information that must be developed to define the project.

2.2 Examples of Contingency & Scope Change

The variance to the cost estimate baseline falls into the two categories defined in section 2.1, contingency or scope changes. Contingency typically reflects the risks associated with some of the project elements. These risks are identified, quantified and a cost is associated with these risks. Scope changes on the other hand accounts for project costs incurred as a result of changes to the project itself. The following list gives a few examples of each of these cost categories.

Some examples for transmission project contingency are:

- Field condition design adjustment (e.g. field conflict)
- Incremental change to cost estimate (e.g. unit price increase) excluding general escalation.
- Estimating variances (e.g. quantity, equipment)
- Design development and changes within the original scope (e.g. pole placement less than 50ft)
- Market & vendor variations (e.g. price delta between vendors)
- Reasonable environmental condition or customer request adjustments (e.g. avoiding stream)
- Weather impact on construction (limited to minor delays of few days or less)
- Permitting requirements (e.g. working hour restrictions, rare plants and species protection measures)

Contingency usually excludes:

- Major scope changes such as changes in end product specification, capacities, building sizes, and location of the asset or project;
- Extraordinary events such as major strikes and natural disasters;
- Escalation and currency effects.

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.

Some examples for transmission project Scope changes are:

- Substation site relocation
- Design criteria change
- Currency effects
- Regulatory & permitting project definition changes (e.g. undergrounding transmission or distribution lines, Army Corps of Engineer construction requirements)
- Project re-Routes or relocation from the original Scope
- Changes to the project to accommodate compliance measures (Environmental, Land impact mitigation)
- Significant project delays (cost incurred through the escalation cost and the carrying charges for the project, including capital interest)
- Major schedule changes

3 COST ESTIMATING PROCESS

3.1 Development of the cost estimate

The development of initial cost estimates takes place early in the regional planning process to allow for alternative comparison as well as alternative cost/benefit evaluation. As the project goes through its life cycle, different grade of estimates are developed and released. The different types of estimates are:

-
- Conceptual Estimate[1]
- Planning Estimate
- Engineering Estimate
- Construction Estimate

The level of detail in the estimate will increase as the project develops. The level of project definition also varies depending on the stage of the project. The following shows the expected level of definition on various project phases and the corresponding estimate types:

Project Stage	Level of Project Definition (%)	Estimate Class	Estimate Type	Regional Review	Accuracy Range	Suggested Contingency Range (%)
Concept*	0 to 15	-	-	-	-50% to 200%	-
Proposed	15 to 40	D	Conceptual	PAC	-25% to 50%	30 to 50
Planned	40 to 70	C	Planning	-	Approach ±25%	10 to 30
Final Design	70 to 90	B	Engineering	TCA	Approach ±10%	10 to 20
Under Construction	80 to 100	A	Construction			5 to 10

* For Asset Condition Projects Only

Table 1: Cost Estimate types per project phase

3.1.1 Cost estimate components

Base Estimate Development

The project estimate depends on the level of project definition as well as the type of estimate being developed. At a minimum the cost estimate should be broken down by project elements (e.g. line segments, substations etc…). The estimate shall conform to the template as described in section

[1] For Asset Condition Projects only.

4 of this document. The following information and level of details should be provided at the different project stages of the estimate development process:

- Concept project: Cost broken down by project elements (lines, substations, etc…). Analogous cost estimating practices may be used to developed conceptual stage estimates (using similar past projects as a reference).[2]
- Proposed Project: Project characteristics should be refined (e.g. line mileage, major equipment specifications, etc…) so to achieve a project level of definition sufficient to achieve the level of accuracy targeted. Some preliminary engineering, field recognition may be necessary to refine project knowledge.
- Planned Project: One line diagrams and preliminary design with proposed project location and equipment specifications need to be developed in order to increase the level of project definition. These requirements are already in place to enable Proposed Plan Application (PPA) approval and for the ISO to authorize the project to proceed.
- Transmission Cost Allocation (TCA): For TCA approval a. detailed estimate should be developed and broken down by the following cost categories:
    - Material
    - Labor
    - Right of way costs
    - Engineering, Permitting (Including administrative & legal cost) and Indirects
    - Financing cost (AFUDC & Interest Costs)
    - Escalation (using Handy Whitman or similar)
    - Contingency

At a minimum the project scope of work shall be developed and provided with the estimate (See reporting template for details in section 4 of this document)

Escalation

At each of these stages costs should be calculated and the estimate expressed in year-of-expenditure dollars to reflect escalation. This can be done by assigning an inflation rate per year

[2] To be used for Asset Condition projects only.

for the different project cost elements. The selected year-of-expenditure should reflect a realistic scenario, taking into account project planning and permitting durations, as well as construction timeframe. Inflation rates may be different for specific cost elements (e.g. substation vs. transmission lines). Handy Whitman is a custom tailored index for the utility industry where updates are released twice a year. This index follows the Uniform System of Accounts as defined by the Electric Code of Federal Regulations (Title 18) and is used by the utility companies for tax preparation and depreciation purposes. Despite its historical basis it does provide accurate trends that may be used to anticipate inflation rates. Estimates should clearly specify how inflation is considered in the estimate and clearly state that the estimate is expressed in year-of-expenditure dollars. Multiple sources may be used for determining the inflation rate, including other nationwide and local references.

Contingency

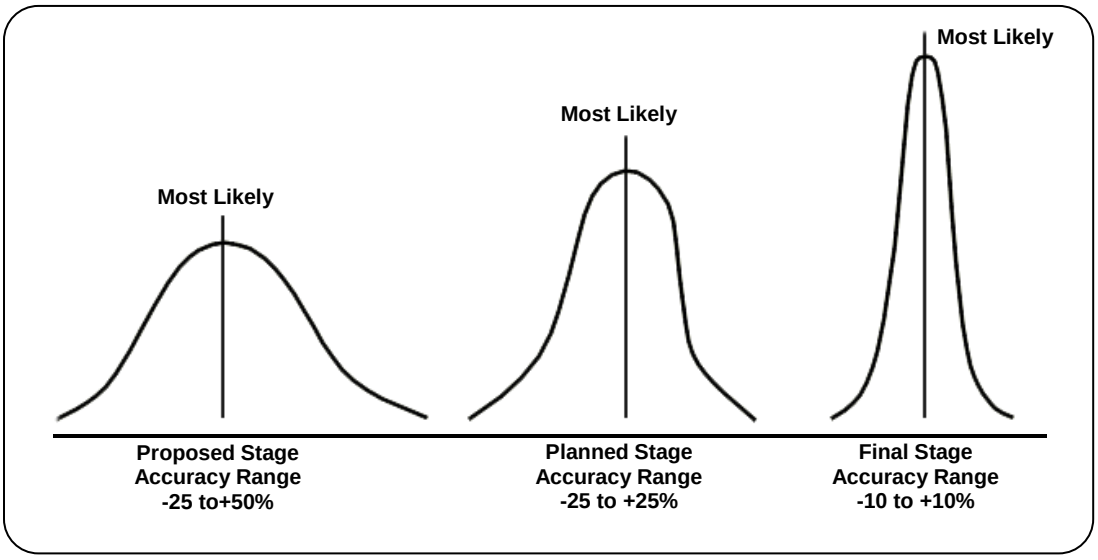
Reasonable contingencies should be developed and evaluated for each project cost estimate. Contingency captures uncertainties and cost risks within an estimate. The contingency should adhere to the definition as provided in Section 2 of this document and is dependent on the level of project definition. Some general guidelines for contingency have been developed based on AACE definitions by EPRI and the Department of Energy and are shown in Table 1 above.

Major and more complex projects may include higher contingency levels based on increased project risks and challenges. Typically, as the project is refined, the contingency should reflect the shift of contingencies into actual cost categories. Transmission Owners should manage risks and uncertainties to reduce the contingency used. However, per the AACE definition, historically, contingency is expected to be expended and should be included in the estimates.

3.2 Cost Estimate Accuracy & Contingency

Contingency and accuracy should not be confused. Where contingency reflects an amount added to a project cost estimate for project unknown and risks identified, accuracy reflects the probability that the estimate will come within a predefined parameter (e.g. 90% confidence). Accuracy is defined by the width of the bell curve distribution of the cost estimate. Contingency is fully part of an estimate.

AS THE PROJECT EVOLVES, THE COST ESTIMATE IS REFINED AND THE ACCURACY CHANGES AS FOLLOW:



4 PROJECT COST ESTIMATES UPDATES

4.1 Submission of Project Cost Estimate Updates.

For Projects that are a Category 4 or 5 TCA (as identified in Section 1.5, Table 1, of Planning Procedure No. 4), a Project Cost Estimation Update must be submitted at least once a year to the ISO and the RC. The update should correspond with the RSP Project List update and should be sent to TCApps@iso-ne.com.

4.2 Project Cost Estimate Template

The Project Cost Estimate Template will be used the first time a Project is reviewed. The Project Cost Template will be completed one time and not changed unless the Project estimate's class changes. It is not necessary to submit a Project Cost Estimation Change Reporting Template when completing this template.

4.3 Project Cost Estimate Change Reporting Template

The Project Cost Estimate Change Reporting Template will be used to update project costs and completion percentage. This is the template that will be used once a Project Cost Estimation Template has been completed. It is not necessary to update the Project Cost Estimation Template when completing this Template.

PROJECT COST ESTIMATE & SCHEDULE SHEET

Transmission Owner: RSP or ACL Project ID #'s:

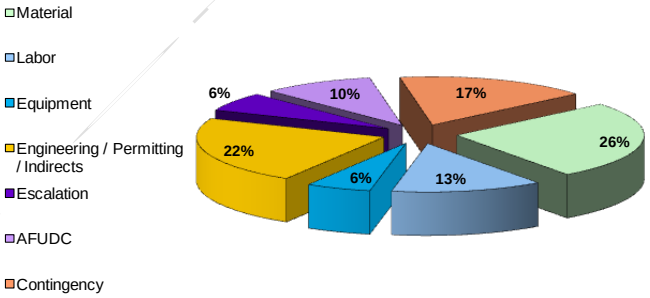
Project Name: Date:

Estimate Grade: PPA # PPA Approval:

1. Project Scope Summary

2. Project Cost Summary

Project Cost Summary			
Cost Category	PTF	Non-PTF	Total
Material			
Labor			
Equipment			
Engineering / Permitting / Indirects			
Escalation			
AFUDC			
Contingency			
Total Project Cost			



Detailed Cost Summary By Project Element									
	Material	Labor	Equipment	Indirects	Escalation	AFUDC	Contingency	**Total**	**PTF Amount**
2.2.1 Component A (Substation)									
2.2.2 Component B (Line)									
Total									

3. Project Milestone Schedule (examples shown)

Project Initiation
Initial Engineering
Final Engineering
State/Local Siting
Environmental Permitting
Land/ROW acquisition
Long Lead Time Equipment Procurement
Civil Construction
Construction
    Project Element 1

Project Element 2
Project Element X
Construction complete
Energize/in-service

PROJECT COST ESTIMATE UPDATE SHEET

Transmission Owner: RSP or ACL Project ID #'s:

Project Name: Estimate Grade:

Base Estimate: PPA # PPA Approval:

Base Estimate Date:

Prior Estimate Cost:

TCA Application #: Date:

1. Project Scope Summary

2. Project Update

3. Project Cost Summary

Project 115 kV Line Upgrade Components	Base Estimate	Base Estimate With Contingency	Scope Change	Actual Costs	Project Forecast	Estimated % Completion	Forecast vs. Estimate
Material	3.79	3.79	0.00	4.52	4.68	0.97	0.89
Labor & Equipment	37.46	37.46	8.00	26.27	35.46	0.74	-2.00
Right of Way	5.00	5.00	0.00	2.32	2.33	1.00	-2.67
Engineering/Permitting /Indirects	11.59	11.59	0.00	7.59	9.50	0.80	-2.09
Escalation	0.00	0.00	0.00	0.00	0.00		0.00
AFUDC	7.50	7.50	0.00	2.29	4.15		-3.34
Contingency	0.00	7.96	0.00	0.00	0.50		-7.46
Grand Total	**65.34**	**73.30**	**8.00**	**42.99**	**56.63**	**87.64%**	**(16.67)**

Note: On Track and Off Track are indicators comparing forecasted cost to the baseline estimate for PTF funding in accordance to PP-4

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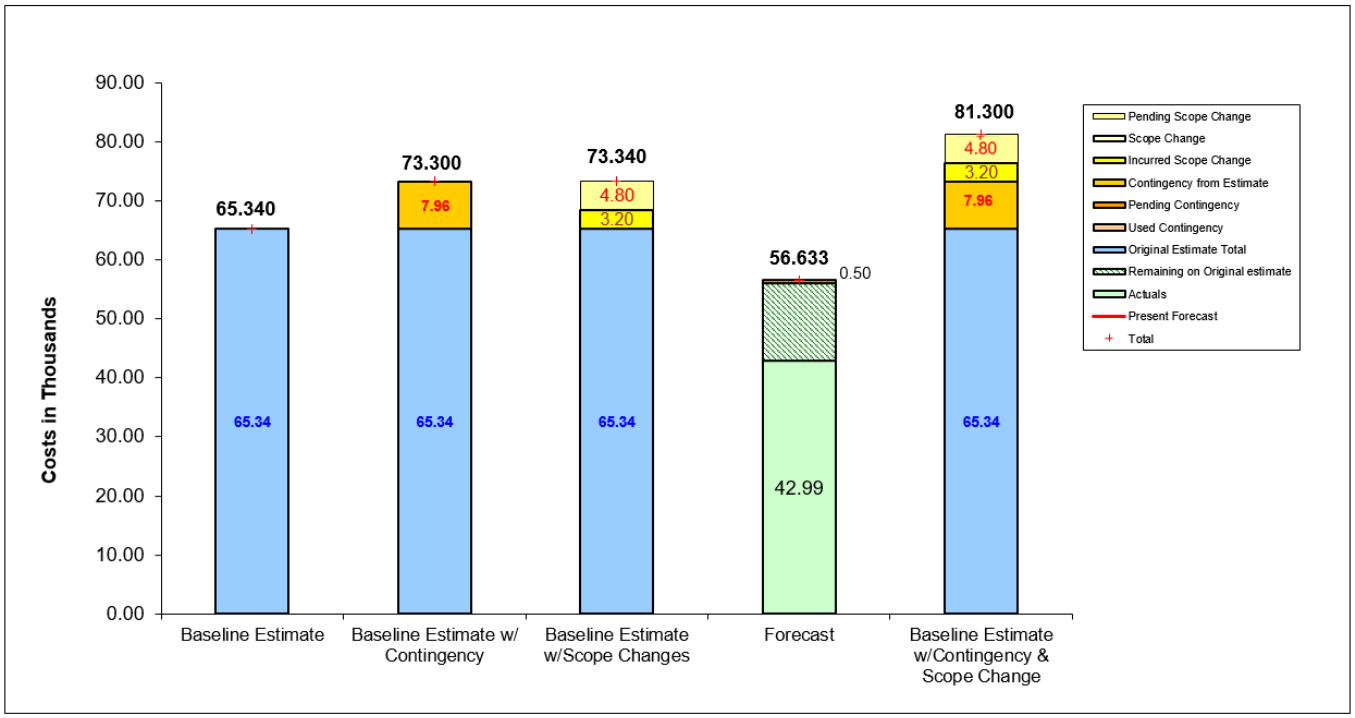
4. Project Forecast


Costs in Thousands
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
65.340
73.300
73.340
56.633
0.50
81.300
4.80
3.20
7.96
65.34
42.99
Baseline Estimate
Baseline Estimate w/ Contingency
Baseline Estimate w/Scope Changes
Forecast
Baseline Estimate w/Contingency & Scope Change
Pending Scope Change
Scope Change
Incurred Scope Change
Contingency from Estimate
Pending Contingency
Used Contingency
Original Estimate Total
Remaining on Original estimate
Actuals
Present Forecast
Total