

# COMMON UPGRADE COST ESTIMATE

*Industry Position Paper, Presented to the ITWG for the 19 May 2022 Meeting*

## Problem statement

The industry has experienced frequent inconsistencies in construction costs included in CESIR estimates and invoices, making them unpredictable. These inconsistencies lead to the need for reconciliation/reimbursement of the funds in the future, which directly reduces the developer's bandwidth to deploy additional DER. The lack of consistency reduces developers' capability to forecast interconnection costs as a component of site development. There is a lack of transparency in how utilities are estimating construction costs, and with no ability to validate estimates and actual costs leads to unknown cost inconsistencies. We foresee greater challenges as greater saturation necessitates more frequent upgrades. This proposal provides transparency and historical data on distribution system upgrades.

## Common Upgrade Cost Estimate Concept

1. Common Upgrade Cost Estimate is a matrix that lists typical/common system upgrades (upgrades frequently triggered by developers) and their cost estimates.
2. The schedule would list equipment name & rating, the per-unit cost of equipment & associated costs, i.e. labor & overhead. Equipment and associated utility costs represent the average cost estimate of the equipment in the last 12 months.
3. The matrix would be updated periodically, semiannually, or at a minimum annually.
4. These estimates would be posted on the [Small Generator Interconnection Procedures](#), under SGIP resources or reference documents whichever is easier to locate.
5. Below is an example of a Common Upgrade Cost Estimate proposal.

## Value & Use cases of Cost Matrix

1. Enhance developers capability to accurately forecast interconnection costs as a component of site development.
2. Lack of transparency and consistency in how utilities are estimating construction costs, and no ability to validate estimates.
3. Grid equipment costs have seen significant cost increases with recent supply chain constraints. Publicly available records/data of equipment costs and cost trends over multiple years allow policy makers and developers to understand & predict changes in project economics.

4. Cost matrix will provide extensive cost data & help utility to bound delta between estimates and actual costs.
5. Provides insight on specific equipment that are frequently upgraded by DER developers.
6. Provides developers the data needed to predict reconciliation amounts (actual cost), enabling efficient use of developer finances.
7. Provides insight on the general scope of an upgrade and differentiate unique upgrades, this additional data set allows developers to understand upgrade costs.

## Upgrade Cost Estimates Sample

Category/Mitigation	Typical Scope	Unit Desc	Equipment & Materials (\$)	Other costs (\$) (Labor+Overhead)	Total (\$)
<b>Distribution Line Upgrades</b>					
<i>Conductor upgrade/Reconductoring (open wire - Spacer)</i>	<i>Install/remove one mile of open wire 1/0 Al bare primary, crossarm construction with 25% pole replacements and transfer associated equipment and secondary/neutral</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>New Overhead Line extension</i>	<i>Install one mile of open wire 1/0 Al bare primary, crossarm construction with associated equipment and neutral</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Recloser upgrade/installation</i>	<i>1. Install 15kV 6IVA vipor recloser and bypass disconnects</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
	<i>2. Install 35kV 6IVA vipor recloser and bypass disconnects</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Install Line Regulators</i>	<i>1. Install new xx/x pole and 15kV 167kVA line regulator with bi-directional control and install/remove associated equipment</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
	<i>2. Install new xx/x pole and 35kV 333kVA line regulator with bi-directional control and install/remove associated equipment</i>	x	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Installation of new</i>		x	\$XXX.XX	\$XXX.XX	\$XXX.XX

<i>service pole with 3-phase overhead transformer bank (per 100kVA)</i>					
<i>Installation of new pad-mount transformer and meter (per 100kVA)</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Upgrade of existing overhead/pad-mounted service transformers</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Install new 1P/3P capacitor bank (fixed/switched) (per 100kVAR)</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Item 10- Details</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<b>Substation Upgrades</b>					
<i>3V0 Installation</i>	<i>Install voltage transformer on high-side substation transformer</i>	X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>DTT Installation</i>	<i>Install 1 DTT communication relay in the control house or outdoor cabinet</i>	X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Install/Remove Regulators</i>	<i>Install and Remove 3-333kVA substation regulators and associated equipment</i>	X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Upgrade to Bi-Directional Regulator Control</i>	<i>Install Bi-Directional regulator controls and remove existing controls</i>	X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Upgrade substation transformer LTC</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Reconductor underground feeder getaway</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Item 7 - Details</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<b>PCC Upgrades</b>					
<i>Overhead (OH) Point of Interconnection (POI)/Point of Common Coupling (PCC)</i>	<i>Install approximately 160' of 3 phase 1/0 AL conductor, 4 poles, 15kV recloser, 15 kV loadbreaks switch, 15kV primary meter, and miscellaneous overhead equipment.</i>	X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Single Phase, self-contained meter (600</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX

V)					
<i>Secondary Metering</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Item 4 - Details</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<b>Non-System Costs</b>					
<i>Change settings (protection, regulator, cap)</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>EMS Integration</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Item 3 - Details</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<b>Telemetry</b>					
<i>Overhead SCADA Recloser</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Underground SCADA Switch</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<i>Item 3 - Details</i>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX
<b>Estimated Project Upgrade Summary</b>		X	\$XXX.XX	\$XXX.XX	\$XXX.XX

Below are a few examples of Upgrade Cost Estimates from different utilities:

- I. [\*\*New York Joint Utilities - Upgrade Cost Matrix\*\*](#)
- II. [\*\*PG&E Unit Cost for Interconnection Facilities\*\*](#)
- III. [\*\*Southern California Edison Unit Cost Guide\*\*](#)
- IV. [\*\*Xcel Energy General Cost Outlines\*\*](#)
- V. [\*\*Eversource Project Cost Guide\*\*](#)
- VI. [\*\*National Grid Project Cost Guide\*\*](#)
- VII. [\*\*Jersey Central Power & Light\*\*](#)
- VIII. [\*\*NREL Distribution Grid Integration Unit Cost Database\*\*](#)