

November 14, 2023

Neil Millar
Vice President - Transmission
California Independent System Operator Corporation
250 Outcropping Way
Folsom, CA 95630

Subject: Project Cost Update for GLW/VEA Area Upgrades and Beatty 230 kV Projects

Dear Mr. Millar:

GridLiance West LLC (“GLW”) is writing to provide a project cost update regarding the GLW/Valley Electric Association Area Upgrades and Beatty 230 kV projects (“the Projects”) as approved in the California Independent System Operator’s (“CAISO”) 2021-2022 and 2022-2023 Transmission Plans (Figure 1). The Projects were identified as policy-driven solutions needed to meet the Renewable Portfolio Standards administered by the California Public Utility Commission (“CPUC”). The Projects were conceptually estimated using GLW’s 2021 and 2022 Per Unit Cost Guides¹ to cost \$661 MM in 2021/2022 dollars (“Conceptual Cost Estimate”) with a CAISO target in-service date of 2027. The Projects will enable an additional 4,100 MW of full deliverability capacity status and over 11 GW of total new renewables on the grid.

Since the Projects were approved for inclusion in the CAISO Transmission Plan in May 2023, GLW has performed additional engineering and pre-construction work. Based on this effort, GLW is providing updates on project cost, potential environmental mitigation requirements, and the Trout Canyon – Sloan Canyon upgrade.

Project Cost Update

Since the 2022 Per Unit Cost Guides were submitted in early 2022 (based on market pricing assembled in late 2021), the global economy has seen unprecedented inflation, which has been acutely challenging to developers of large infrastructure projects, including transmission projects. Additionally, scarcity pricing resulting from global supply chain bottlenecks has contributed to price escalations on core components. GLW is not alone: these dynamics have affected all Participating Transmission Owners.² While GLW initially forecasted an escalation of 8.1% for a 2027 in-service date in its 2022 Per Unit Cost Guide, actual inflation has paced even higher in the last 18 months. GLW now anticipates average escalation of approximately 35% across all project components, primarily due to raw material and engineered product cost increases. This has resulted in a \$177 MM increase in the GLW/VEA Area Upgrade and a \$54 MM increase in the Beatty 230kV project estimates.

In addition to escalation, GLW’s Per Unit Cost Guide explicitly acknowledges that terrain influences cost due to construction complexity and allows for a multiplier of up to 3x to account for more

¹ GLW does not include non-Engineering-and-Construction costs that may be capitalized as part of the Projects’ final cost in its conceptual Per Unit Cost Guide estimates during project submission, including taxes, land, allowance for funds used during construction (AFUDC), and contingency.

² The Handy-Whitman Index for Total Transmission Plant (Pacific Region) (as used by CAISO for Reliability Network Upgrades escalation) shows an implied 21% increase since 2020 for projects achieving commercial-operation in 2023-2024.

challenging terrain.³ As such, GLW published dollar-per-mile estimates derived using ideal conditions (e.g., flat, favorable subsurface conditions, good right-of-way access, and straight route). This conceptual cost estimate, therefore, reflects the lowest possible cost for a generic transmission project at the same length and voltage as the Projects. A terrain construction complexity multiplier, a standard practice used by transmission utilities, is used to adjust the conceptual estimate to reflect actual conditions for a specific route. Since the Projects were approved by CAISO, GLW has progressed the engineering design for the Projects, performed preliminary evaluations of subsurface conditions, and assessed the construction techniques and access points. GLW has concluded that the terrain construction complexity multiplier for the Projects should be 1.25x, which is driven in part by the need for helicopter construction for numerous transmission structures and additional construction tower modifications through mountainous terrain. The addition of the 1.25x multiplier results in an increase of \$165 MM to the Projects. Of this increase, \$144 MM is attributed to the GLW/VEA Area Upgrades, while the Beatty 230kV project accounts for the remaining \$21 MM.

Similar to terrain complexity, the Per Unit Cost Guide reflects generic dollar-per-mile costs and must be adapted to actual project conditions. The project scope, as identified in CAISO’s 2022-2023 Transmission Plan, does not contemplate the design specifics to enable the Project. As the Project has progressed through the design phase, GLW has identified additional substation and tower reconfigurations needed to enable the identified scope of work.⁴ The additional work for components not included in the conceptual cost estimate is anticipated to add approximately 10% or \$66 MM to the Conceptual Cost Estimate.

Given these updates, the table below reflects GLW’s revised cost estimate range for each project.

Cost Estimates (\$ MM)	GLW/VEA Area Upgrades	Beatty 230kV
Conceptual Cost Estimate	\$506	\$155
Market-Driven Price Escalations	\$177	\$54
Terrain Construction Complexity	\$144	\$21
Components Not Included in The Conceptual Cost Estimate	\$58	\$8
Updated Estimate (± 15%)	\$752-\$1,018	\$202-\$274⁵

Potential Environmental Mitigation Measures

Since the Projects were approved, GLW has applied for a right-of-way from the Bureau of Land Management (“BLM”) for the routes on lands managed by the BLM. Additionally, GLW has coordinated

³ GLW 2022 Per Unit Cost Guide, “BulkTrans Factors & Assumptions” sheet explaining additional terrain factor.

⁴ For example, upon engineering, the addition of a second circuit at the Desert View, Pahrump, Gamebird, and Trout Canyon substations will require a reconfiguration of the substation layout, involving dismantling, moving, and rebuilding busbars and breakers.

⁵ Beatty 230kV Component 1 through Component 6 listed in Figure 1 are considered as the Johnnie Corner to Beatty Project, which has a lower project estimate. Component 7, expand existing Vista 138 kV substations to 230 kV substation, and Component 8, install a second Johnnie Corner – Innovation and Johnnie Corner – Vista – Pahrump 230 kV line on the Innovation – Pahrump double circuit tower are excluded from the Johnnie Corner to Beatty Project.

with the BLM regarding the National Environmental Policy Act (“NEPA”) process and the potential for related incremental environmental mitigation. GLW also actively tracks changes in regulations and precedents set through NEPA documents and permits for similar projects. GLW observed that the Draft Environmental Impact Statement (the NEPA document) for NV Energy’s Greenlink West Project, a similar high-voltage transmission project in the region⁶, included a raven management plan requiring the use of tubular steel monopoles (“TSMs”) for *all* structures in desert tortoise habitat, which as defined by the BLM includes the majority of the range of the species, including the GLW/VEA Area Upgrades project area. For the GLW/VEA Area Upgrades, BLM recommended the incorporation of TSMs instead of self-supporting lattice steel towers into the design for the double circuit 500kV portion from Trout Canyon – Sloan Canyon, intended to be mitigation for potential common raven (*Corvus corax*) nesting and predation of the federally threatened Mojave Desert Tortoise (*Gopherus agassizii*). During a recent coordination meeting, BLM reiterated that GLW should expect the same environmental mitigation requirement for the Project as Greenlink West. The environmental mitigations associated with the additional use of TSMs on the 500 kV segment and additional incremental BLM procedures for the Project are incremental to the scope of GLW’s Conceptual Cost Estimate and could add approximately \$280 MM to the Project costs.⁷ GLW will continue to keep CAISO updated on this matter as the Projects progress through the permitting process.

Trout Canyon – Sloan Canyon 500 kV Upsize

With the revised cost estimate range, as described in the above table, GLW continues to believe that the Projects are in the best interest of CAISO and California to meet its policy objectives. Specifically, upsizing the Trout Canyon – Sloan Canyon segment from double-circuit 230 kV to double-circuit 500 kV remains critical to enhance GLW’s import capability into California, mitigate contingency overloads, and reduce generation curtailment. CAISO identified this upsize to enable ~1,650 MW of new sensitivity portfolio resources in the 2022-2023 Transmission Plan⁸ and given the large increase of resources mapped to the GLW system in the upcoming TPP, the need for the 500 kV upsize is even more apparent.⁹ Additionally, this need is evidenced by the extensive developer interest in the Trout Canyon and Sloan Canyon region, where GLW is actively working with generators seeking interconnection on the 500 kV system.

The original costs that formed the basis of CAISO’s 2022-2023 TPP decision to upgrade the Trout Canyon – Sloan Canyon from 230kV to 500kV was based on \$1.7 MM/mile for 230 kV and \$4.1 MM/mile for 500 kV, per the GLW 2022 Per Unit Cost Guide. Based on the cost updates provided above, the revised cost per mile for the Trout Canyon – Sloan Canyon segment would be \$3.7 MM/mile at 230 kV and \$5.6 MM/mile for 500 kV. Despite the increase in overall cost at both voltages, the basis for approving the 500kV upgrade on a marginal cost of \$2.4 MM/mile remains valid, given the smaller marginal cost of \$1.9MM/mile under the revised estimates. Additionally, when compared to other Participating Transmission Owners’ 2023 Per Unit Cost Guides, the revised estimates remain cost-competitive on a cost-per-mile basis.

⁶ In the May 2023 Draft Environment Impact Statement for Greenlink West (pg. 3-28), BLM required the use of tubular transmission structures, instead of lattice towers to mitigate impact to the federally threatened Mojave desert tortoise. Additionally, BLM required perch and nest deterrents to be installed on all transmission structures.

⁷ Incremental environmental mitigation beyond the Per Unit Cost Guide includes 59 miles of monopoles and adherence with BLM best management practices for the Project (clearing and access, wash outs, erosion control, storm water management, avoidance of disturbance, endangered species, and ROW restoration).

⁸ 2022-2023 Transmission Planning Process Stakeholder Meeting, CAISO, April 2023

⁹ Modeling Assumptions for the 2023-2024 Transmission Planning Process, CPUC, February 2023

Overall, when compared to other upgrades CAISO identified in the 2023 Transmission Capability Whitepaper, the Projects are still the most cost-effective way to increase renewable generation deliverability into the Los Angeles Basin.¹⁰ Furthermore, the escalation and additional scope categories identified would impact any other potential CAISO solution.

GLW intends to continue developing these Projects to meet California's policy objectives. There are several upcoming development milestones on the path to CAISO's target in-service date for the Projects of 2027, including the purchase of long lead-time equipment such as the Projects' 500/230 kV transformers, which may occur as early as the end of this month to keep the project on schedule.

If you have any questions concerning this information, please contact us.

Sincerely,



Matt Valle
President
NextEra Energy Transmission / GridLiance West LLC

¹⁰ Based on CAISO's 2023 Transmission Capability Estimates for Use in the CPUC's Integrated Resource Planning Process, GLW Planning identified the necessary upgrades to maximize deliverability in comparable regions surrounding the LA Basin (Tehachapi, East Riverside, and Imperial). To assess cost-effectiveness, GLW divided the estimated cost for the series of upgrades by the maximum full-capacity deliverability status ("FCDS") enabled, using both metrics as identified by CAISO in the 2023 Transmission Capability Estimates. When compared with the Project costs (as outlined above) and the 4,100 MW of additional FCDS the Projects enable, the Projects still remain the most cost-effective solution for the CAISO to continue supporting new renewable deliverability into the LA Basin.

Figure 1- Project Components as listed by CAISO's 2021-2022 and 2022-2023 TPP

#	GLW/VEA Area Upgrades Components	Approved Plan
1	Rebuild Northwest – Desert View 230 kV to double circuit line	2021-2022 TPP (as is)
2	Rebuild Pahrump – Gamebird 230 kV to double circuit line	
3	Rebuild Gamebird – Trout Canyon 230 kV to double circuit line	
4	Rebuild Innovation – Pahrump 230 kV line	
5	Add a second Innovation – Desert View 230 kV line	
6	Add a 500/230 kV transformer at Sloan Canyon and loop in the Harry Allen – Eldorado 500 kV line	
7	Install a 138kV phase shifter at Innovation 138 kV	
8	Upgrade VEA's 230/138 kV Amargosa transformer	
9	Rebuild Trout Canyon – Sloan Canyon 230 kV DCTL lines to 500 kV DCTL lines	2021-2022 TPP 230 kV, modified in 2022-2023 TPP to 500 kV
10	Install a new Trout Canyon 500 kV bus and three 500/230 kV transformers at Trout Canyon	2022-2023 TPP
11	Rebuild Innovation – Desert View 230 kV No.1 line with a normal rating of 1,154 MVA and an emergency rating of 1,578 MVA	
	Beatty 230kV Components	
1	Build a new Johnnie Corner 230 kV station and loop into the Pahrump – Innovation 230 kV line	2022-2023 TPP
2	Beatty 230kV substation (Expand existing Beatty 138 kV substation to 230 kV substation)	
3	Lathrop 230kV substation (Expand existing Lathrop 138 kV substation to 230 kV substation)	
4	Valley 230 kV substation (Expand existing Valley Switch 138 kV substation to 230 kV substation)	
5	Build 32 miles Beatty – Lathrop 230 kV line next to the existing 138 kV line in an adjacent ROW	
6	Build 30 miles Johnnie Corner – Valley Switch – Lathrop 230 kV DCTL lines next to the existing 138 kV line in an adjacent ROW	
7	Vista 230 kV substation (Expand existing Vista 138 kV substation to 230 kV substation)	
8	Install a second Johnnie Corner – Innovation and Johnnie Corner – Vista – Pahrump 230 kV line on the Innovation – Pahrump double circuit tower approved in 2021/2022 TPP	