

BAMx Comments on the 2017-18 Transmission Planning Process
Preliminary Reliability Assessment Results and PTO Request Window
Submissions

The Bay Area Municipal Transmission group (BAMx)¹ appreciates the opportunity to comment during the development of the 2017-18 Transmission Plan. The comments and questions below address the material presented at the CAISO Stakeholder meeting on September 21-22, 2017.

General Comments

Stakeholder Comment Period and the Volume of Material Presented

While BAMx supports the improved documentation included in the CAISO presentation, this contributed, in part, to a large number of technical slides (555 slides) over the two-day meeting. Posting of the slides so shortly before the stakeholder meeting and then only having two weeks to review and providing meaningful comments is too brief a period. BAMx recommends the posting of slides at least a week before the meeting so that the material can be studied and questions be prepared for the meeting. Also, the TPP timeline needs to allow more time following the stakeholder meeting to investigate the proposals and develop comments.

Non-Wires Solutions and Integrating the IRP and TPP

Substantial progress is occurring in multiple fronts on valuing potential non-wires solutions to transmission issues. BAMx believes that the IRP process is close to being able to test optimize the selection of system resources that includes resources that can easily be sited in locations that will provide loading relief for the transmission system. We know the CAISO is committed to integrating the IRP and the TPP and has initiatives to incorporate demand response products into its markets. BAMx strongly encourages efforts to pursue cost effective non-wires solutions to transmission issues. We believe that such efforts can achieve a reliable grid w/o unnecessary cost impacts. We believe the substantial work by PG&E in its study of a transmission solution for the East Bay is an example of the type of analysis that should be performed for all projects where local resources can provide all or a portion of the relief needed to accomplish our reliability goals. While more study is still needed to understand the extensive work by PG&E to solve reliability issues in the East Bay, BAMx is generally supportive of the type of analysis performed. The load duration curves indicate that expansion of the transmission system in this area could lead to highly underutilized transmission assets.

¹ BAMx consists of Alameda Municipal Power, City of Palo Alto Utilities, Port of Oakland and City of Santa Clara, Silicon Valley Power.

Project Assessment Formats

BAMx supports the format used in the PG&E area of the assessment presentation. The structure documents the assumptions for the planning area followed by project specific slides stating the reliability need, mitigation, alternatives and conclusion. This structure improves the documentation and made following the multiple presentations easier. BAMx encourages the CAISO to adopt a similar approach for its other areas.

PG&E's Previously Approved Project Analysis – General Comments

BAMx strongly supports the CAISO's efforts to review previously approved projects in light of the significant changes in the planning environment, especially in the load forecasts due to both increasing energy efficiency and BTM generation. The CAISO has appropriately revisited a number of previously approved reliability transmission projects in light of developments and updated expectations regarding electricity demand and distributed resources. In the next decade, further and probably more striking developments can be expected in these areas, as the goals of SB 350 are pursued and are reflected in demand forecasts and resource plans. In particular, significantly increased penetration of energy efficiency measures will probably further reduce demand forecasts. As indicated above, demand response and distributed storage will be further studied in the IRP process and its cost and impacts will be further defined.

Such an anticipated future is largely not reflected in adopted assumptions for the 2017-2018 TPP. However, we can expect that recalibrated expectations will be appearing in future TPP cycles, perhaps starting next year. In evaluating need, and appropriate timing and scope, for reliability solutions identified in the current TPP cycle the CAISO should thus take into account the direction in which we are headed. This is especially important wherever potential solutions involve scope and cost beyond what is needed to address near-term issues, and which could be revisited in future TPP cycles.

The construction of additional transmission upgrades contributes to an already increasing rate of transmission costs associated with past approvals and are adversely impacting BAMx customers. Therefore, it is very encouraging to see the CAISO re-evaluate transmission projects in areas where planning assumptions have changed. Furthermore, BAMx would encourage the CAISO to eliminate that portion of a project scope that provides reliability that exceeds federal, regional and CAISO requirements in non-urban areas unless accompanied by a cost/benefits analysis that supports the added scope. BAMx believes the Northern Fresno and Midway-Andrews projects, as discussed below, are good examples.

Midway-Andrews Transmission Project

Previously implemented "Los Padres Transmission Project" installed a SPS at both Mesa and Santa Maria 115kV Substations to address the Mesa area transmission standards violations by dropping approximately 230 MW of load. The Divide SPS Project installed a SPS to mitigate

standards violations in the Divide 115kV area by dropping approximately 145 MW of load following loss of Mesa-Divide #1 & #2 115kV lines. These solutions are acceptable under the applicable Planning Standards as the Los Padres area is a non-urban area and both the CAISO and NERC planning standards allow for post contingency load dropping for higher level of contingencies.

Therefore, the Midway-Andrew 230 kV Project is designed to provide a level of service above that required by the Planning Standards. The originally proposed project is estimated to cost up to \$150 million.² While BAMx is encouraged that the CAISO is considering lower cost options that would repurpose existing assets, this misses a fundamental point. As a reliability project, whether the Midway-Andrew 230 kV Project or an alternative such as described in the stakeholder meeting, such project justifications should include a cost/benefit assessment as described in the CAISO Planning Standards (Section 5.4). To date, nothing more than vague statements about the amount of load being armed have been used to justify providing reliability in excess of the Standards. This project justification should follow the framework set out in the CAISO Planning Standards.

Northern Fresno Reinforcement Project

Northern Fresno Reliability Project was originally approved by the CAISO during the 2011-2012 TPP. The proposed scope of the project would install a new 230/115 kV substation in the Fresno area with four terminals connecting to existing 230 kV circuits as well as new 230 kV circuit from the new substation to McCall. There would also be extensive 115 kV upgrades. The total cost of the project is estimated at \$300-\$381 million.³

Based on the latest assessment results that were presented during the latest stakeholder meeting, NERC category P2 (Bus Tie Breaker) fault is the only remaining driver for the project. As Bus Tie Breaker fault is an extremely rare type of contingency, BAMx supports CAISO evaluating potential alternatives to the proposed project. BAMx would propose that alternatives such as substation upgrades (such as sectionalizing Herndon and McCall 230kV buses) or possibly local preferred resources such as demand response should be investigated as potentially more cost effective ways to mitigate P2 violations than the proposed project.

² The PG&E cost estimates for the Midway Andrew 230 kV project now range from \$215M (PG&E AB 970 Report Oct 2, 2017) to \$414M (PG&E EL16-47)

³ PG&E AB970 Report Oct 2, 2017

Fresno Projects Missing Information

During CAISO's presentation on the preliminary results for the Fresno area, the CAISO presented a table on slide 6 showing seventeen (17) projects that were not modeled in the case due to their scopes being re-evaluated:

CAISO presented its preliminary conclusion on every project from the table except for the following six projects:⁴

- Kearney-Caruthers 70kV Line Reconductor (\$10M - \$20M)
- Reedley-Orosi 70kV Line Reconductor (\$6M)
- Gates-Gregg 230kV Line Reconductor (\$200M)
- Gates No. 2 500/230kV Transformer (\$60M)
- Kearney-Herndon 230kV Line Reconductor (\$13M)

BAMx members would encourage the CAISO to provide the results of analysis for the six projects listed above.

Need to Correct High Voltages on The PG&E System

PG&E has proposed a series of nine projects to install a total of 1,275 MVARs of shunt reactors at a combined cost of \$156 million to \$231 million. Most common causes of high voltages during low load periods are the addition of new, lightly loaded transmission circuits, transmission reconfigurations, or significant changes in generation dispatch, especially unit commitment.⁵ Natural load growth can provide some mitigation of high system voltages. More investigation is needed as to the cause of the trend in high voltages to better understand as to whether such causes are temporal or indicative of a long-term change.

BAMx supports PG&E's use of an Optimal Power Flow (OPF) tool to identify size and location of the proposed installations. However, like most tools, the inputs assumptions are critical. For example, PG&E notes that its distribution substation power factors have been leading, thereby contributing to the high voltage problem. The CAISO tariff includes load power factor requirements so that distribution systems do not overly burden the transmission system. PG&E should maintain the distribution power factors within the CAISO tariff requirements, and it should be verified that the optimal power flow base case assumptions are consistent with the CAISO tariff and whether further improvements to the distribution voltage control can serve as an alternative. Secondly, the generation unit commitment should be reviewed to assess whether the commitment reflects expected conditions. Committing fewer generation units reduces the voltage control on the system and can result in high off-peak voltages.

⁴ All cost data is from PG&E's AB970 Report Oct 2, 2017

Although past Request Window proposals by PG&E have documented that operational studies indicate a high voltage problem exists, as indicated above BAMx believes the CAISO should complete a comprehensive study that proposes a system wide mitigation to the problem. Although we believe that shunt reactors in appropriate locations will likely end up being proposed, the current method of proposing particular installations as stand-alone projects is insufficient. All reasonable solutions should be investigated and reported to stakeholders and needed mitigations should be approved as a package of projects to relieve the high voltage problem. A partial list of mitigation measures that should be investigated are operational changes, altered tap settings on 500/230kV and 230/115kV transformers, requiring increased voltage control capability for new generators connecting to the system, and installing shunt reactors at various substations. Assuming multiple reactor locations are feasible, combinations of locations should be studied for both performance and cost effectiveness. There is nothing available now to stakeholders to indicate this has been done.

Interregional Transmission Project (ITP) Evaluation and 50% RPS Out-of-State (OOS) Portfolio Assessment

BAMx appreciates the effort in this planning cycle to test the system outside of CA using OOS portfolio of resources and leverage the findings to gain insights about ITPs. This effort has provided valuable information as to where infrastructure improvements may be required, but it has also provided guidance to the procurement process as to how some potentially costly upgrades may be avoided. BAMx acknowledges the commendable efforts of the CAISO in performing the production cost modeling (PCM) analysis as well as power flow studies to provide valuable information on the extent of curtailment of OOS renewables, identification of transmission constraints outside of California and comparison of the performance of the candidate ITPs, etc.

BAMx supports the CAISO's plans to utilize the results obtained from this study for future OOS RPS portfolio creation. BAMx sees these continued CAISO efforts as further indication of its desire to integrate its work with that occurring as part of the CPUC's Integrated Resource Planning (IRP) process (Rulemaking 16-02-007). As the CAISO knows, this proceeding is currently contemplating whether the out-of-state wind should continue to be studied as a special study or included as a policy-driven scenario for the 2018-19 TPP.⁶

The RESOLVE model currently utilized in the IRP proceeding indicates that cost associated with the OOS wind scenario are significantly higher than the default and recommended reference

⁶ The Administrative Law Judge's ruling seeking comment on proposed reference system plan and related commission policy actions, Rulemaking 16-02-007, 9/19/2017, pp.32-33, 35.

system plans.⁷ And this is occurring even though the RESOLVE model is not allowed to select energy efficiency measures or demand response as part of the optimum portfolio of resources. Even with this limitation, any resource portfolio that forces OOS wind that requires new major transmission to deliver results in overall cost increases except under the most stringent GHG targets. Given this result, BAMx believes it would be premature for an ITP or OOS transmission project to be considered for approval as a policy-driven transmission as part of the 2018-19 TPP, as it is not a least-cost best-fit solution in meeting the State's GHG reduction and RPS goals. Any future transmission needed to import OOS renewables should be part of the LSE procurement plan that justifies its cost as part of the total resource costs. Based upon the above, any study of the OOS transmission in the 2018-19 TPP should purely be an *information only* special study. The CAISO should be comfortable with this proposal because, as stated in the September 21-22 TPP meeting, an alternative to the CAISO potentially recommending an OOS project as a TPP policy-driven transmission is for the LSE's to include the cost of OOS resources and any corresponding upgrades needed as part of its resource plan.

PTO Request Window Project Applications

California High Speed Rail Interconnections

In response to an interconnection request for the California High Speed Rail Interconnection (CHSR), PG&E has proposed ten interconnection sites in addition to the two interconnection sites associated with the CALTRAIN electrification project presented in the 2016-2017 Transmission Planning Process. Eight of the ten interconnection sites entail building new stations or rebuilding existing stations with a new breaker and a half substation configuration. The total cost for the ten sites is estimate at ~\$500M or ~\$50M/site on average. The value of building the extra reliability/redundancy associated with a breaker and a half configuration is unjustified. All of these stations have 2023 load forecasts of 7 MW or less and four have a 2087 load forecast of under 10 MW. Furthermore, each interconnection appears to include redundant interconnections such that loss of a single element would not interrupt service to CHSR. Therefore, the reliability value of such a substation design appears excessive on its face.⁸ Further justification is needed to support the costlier design for these interconnections. If this design was requested by the CHSR, PG&E should describe amounts that will be funded by the CHSR because of its selection. If such configurations have been specified by PG&E and PG&E proposes to include any of these facilities in the TAC, PG&E should provide its reliability and cost analysis that supports such a design.

⁷ *Ibid*, Attachment A, p.101 and p.203. The net cost of OOS wind is \$211 million/yr and \$104 million/yr, respectively in the *Default* and *42MMT* cases, respectively.

⁸ In an interesting contrast, VEA, a customer owned cooperative, proposed a new 80 MVA two bank 138 kV station with a 1 mile loop using a four terminal, four breaker design with an estimated cost of \$10.5 million.

Oakland Reliability Proposal

A very extensive analysis conducted by PG&E's engineering staff was presented to prepare the East Bay transmission network for the potential retirement of the Dynegy Oakland Power Plant without dependence on the NCPA's Alameda combustion turbines. The project objective would also eliminate reliance on Special Protection Systems (SPS) per new ISO planning standards. The proposed project would make breaker additions within existing East Bay substations and fill the remaining reliability need with Preferred Resources and load transfers to manage the peak load within the expanded system capability.

While still working to fully understand the proposal, BAMx is generally supportive of non-wires solutions such as was presented for the East Bay. The load duration curves indicate that expansion of the transmission system in this area could lead to highly underutilized transmission assets.

BAMx is supportive of PG&E's effort to implement preferred resource alternatives as a solution to network planning standard violations. Moreover, in alignment with CAISO's previously stated policy of favoring preferred resources, BAMx encourages the CAISO to explore this approach for resolving network deficiencies in other areas.

General Comment on the high voltage SDG&E Request Window Submission

The CAISO assessment of the San Diego area identified several internal 230 kV reliability constraints. The CAISO identified options that included both preferred resources and flow control devices. SDG&E however has only proposed projects for flow control devices consisting of two series capacitor projects and a phase shifter project as well as 230 kV system upgrades. While BAMx questions the need for some of these projects as described below, if it is determined that mitigation is necessary, selection of Preferred Resources would have the additional benefit of reducing San Diego's reliance on imports that could eventually trigger a multi-billion transmission upgrade to increase the San Diego import capability. A better understanding of these impacts is needed before deciding what type of mitigation, if any, is needed.

SDG&E Request Window Submission: HVDC Conversion

Based on the scope of the project, the SDG&E proposed HVDC Conversion Project is the same Renewable Energy Express project proposed during last year's Transmission Planning Process. No cost estimates for this project were provided during this presentation but SDG&E provided a cost estimate of \$700-\$1000 Million last year. SDG&E's objective of the project would be to reduce congestion, increase the SDG&E import capability and reduce SDG&E Local Capacity Resource (LCR) requirement. No economic analysis has been presented to support the value of reducing the local generation requirement and nothing of this scope has been identified as needed for reliability mitigation in the preliminary Reliability Assessment Results for the SDG&E area. In fact, we would have concerns that importing 3,000 MW over this project would create new reliability issues for P7 contingencies involving the bipole DC line outage in both the San Diego

and SCE areas. Such a project is more properly considered in the CAISO Order 1000 process where the project can be considered along with other alternatives as to the benefits of increasing the CAISO import capability or considered by way of the CPUC portfolios for the 50% RPS, when they become available.

SDG&E Mission-San Luis Rey 230 kV lines Compensation

SDG&E proposes to install thyristor-controlled series compensation on the two Mission-San Luis Rey 230kV circuits. The driving factors for the project are P1 violations of Encina-San Luis Rey 230kV circuit for the loss of Palomar Energy Center-Encina 230kV circuit and Palomar Energy Center-Encina Overload for the loss of Encina-San Luis Rey 230kV circuit.

The CAISO assessment only identifies such criteria violations for a spring off-peak case and a sensitivity case forcing a high northbound flow. Given the conditions under which these violations occur, SDG&E needs to demonstrate that this a reliability issue that cannot be addressed by re-dispatching the generation.

SDG&E Miguel-Mission 230 kV lines Reconductor and Compensation

The scope of the Miguel-Mission 230kV line Reconductoring and Compensation project is to install 50-70% series compensation on the Miguel-Mission 230kV circuits as well as re-conductor portions of Miguel-Mission 230kV Circuits. The reliability justification for this project are two P6 (N-1-1) level overloads on Bay Boulevard - Silvergate 230kV circuit. However, based on CAISO’s assessment, these two overloads only appear in the summer peak 2019 case and are not observed in the later years.

22430 SILVERGT 230 22771	P1L-23014_ 22464 MIGUEL 230 22504 MISSION 230 1 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	106.5	96.1	91.7		103.1	100.8	103.0	91.7	90.9	126.8
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August 15, 2017

ISO Reliability Assessment - Preliminary Study Results

SDG&E Main

verload

Overloaded Facility	Worst Contingencies	Category	Category Description	Loading (%)									
				B1: 2019 Summer Peak	B2: 2022 Summer Peak	B3: 2027 Summer Peak	B4: 2019 Spring Light Load	B5: 2022 Spring Off-Peak	S1: 22SP High Load & Peak Shift	S2: 19SP Peak Shift	S3: 27SP Peak Shift	S4: 22SP High Renewables Output	S5: 22SP Heavy Northbound Flow
BAY BLVD 230 1 1	P1L-23015_ 22464 MIGUEL 230 22504 MISSION 230 2 1 and P1L-23033_ 22832 SYCAMORE 230 22652 PENSQTOS 230 1 1	P6	N-1-1	106.4	96.0	91.6		103.0	100.7	102.9	91.6	90.8	126.7

SDG&E also stated that the proposed project would reduce congestion on multiple circuits within their system. If critical to the project justification, the value of reducing this congestion should be quantified. BAMx would encourage the CAISO defer any action on the proposed project since neither the reliability value nor economic value of the proposed project has been demonstrated.

SDG&E Penasquitos Phase Shifting and the associated Four-Breaker Scheme Transformer

The proposed SDG&E project would construct a Phase shifting transformer on the Old Town-Penasquitos 230kV circuit. The reliability benefits for the project provided by SDG&E were to mitigate a P2.1 overload on the Silvergate - Old Town 230kV circuit and P1 overload on Polamar Energy Center - Encina 230kV substation. Based on CAISO's preliminary assessment result, these overloads are only observed for a spring off-peak case and a sensitivity case forcing a high northbound flow. Again, given the conditions under which these violations occur, SDG&E needs to demonstrate that this a reliability issue that cannot be addressed by re-dispatching the generation.

Conclusion

BAMx appreciates the opportunity to comment on the 2017-18 Transmission Plan Reliability Assessment Results and the PTO Request window submissions and acknowledges the significant effort of the CAISO and PTO staffs to develop this material.

If you have any questions concerning these comments, please contact Kathleen Hughes at khughes@SantaClaraCA.gov or (408) 615-6632.