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Comments of TransWest Express LLC on
February 20, 2014 Draft of California ISO 2014-2015 Transmission
Planning Process Unified Planning Assumptions and Study Plan
and
2014-2015 TPP Study Plan, Economic Planning Study Request

Introduction

TransWest Express LLC (TransWest) appreciates the opportunity to comment on the Draft 2014-2015 Transmission Planning Process (TPP) Unified Planning Assumptions and Study Plan (Draft Study Plan) prepared by the California Independent System Operator (ISO).

TransWest has requested the ISO in past TPP cycles to perform an economic analysis to consider the potential benefits of a new inter-regional transmission solution that would provide California consumers with access to Wyoming wind resources. The ISO responded to last year's request stating that conducting the study was not reasonable at the time and that the ISO would reassess the request if circumstances change in the future. TransWest believes the circumstances have changed and requests the ISO to reassess the request to perform an economic analysis of transmission solutions to access Wyoming wind resources. Below are details on the new information and changed circumstances since last year followed by TransWest's Economic Planning Study request.

Studies Performed by Other Entities

An Economic Planning Study¹ recently released by the National Renewable Energy Laboratory (NREL) and attached to these comments provided an economic assessment of a new 730-mile, 3,000 MW high voltage direct current (HVDC) transmission solution to access Wyoming wind resources. The CA/WY Study found significant economic benefits to consumers. The benefit-to-

¹ National Renewable Energy Laboratory , *California-Wyoming Grid Integration Study Phase 1—Economic Analysis*, March 2014, available at: <http://www.nrel.gov/docs/fy14osti/61192.pdf>

cost ratios for was calculated to be 2.2 with a range between 1.6 and 3.6 depending on various sensitivities calculated by NREL as guided by a Technical Review Committee made up of Californian and Western transmission planning experts. This CA/WY Study was sponsored by the Wyoming Infrastructure Authority in part to supplement TransWest's request to the ISO to perform such a study. TransWest submits the attached CA/WY Study to the ISO for consideration in the development of the Transmission Plan in accordance with Section 24.3.4.2 of the Tariff.

The CA/WY Study examined four hypothetical renewable portfolios, compared them in pairs where the Wyoming wind portfolio included the building of the transmission solution and calculated the comparative benefits from pursuing the CA/WY portfolio is greater than the cost for the transmission solution under a wide range of sensitivities. The analysis relied on a benefit-to-cost analysis and used elements from the ISO's Transmission Economic Assessment Methodology (TEAM). The Study Report identifies several Study Limitations and potential Future Analyses that may be considered in the future. The basis for the TransWest Study Request below is for the ISO to consider the CA/WY Study and address several of these limitations and any other improvements the ISO may desire.

NREL released a separate study² that looked into the Western market conditions in a future time frame after existing RPS policy goals have been reached. This study was based on work NREL performed for the Western Governors' Association. This Post RPS Study found that Wyoming wind resources supplying the Desert Southwest market states of California, Nevada and Arizona to be the Highest Value Regional Resource Paths in the Post RPS timeframe.

2013-2014 TPP Economic Planning Studies

The ISO 2013-2014 revised Transmission Plan includes an overview of the five High Priority Studies conducted in last year's TPP. Three of these studies found that the path upgrades considered, Midway – Vincent 500 kV #4, PDCI 500 MW upgrade and North Gila – Imperial Valley 500 kV #2, to be "uneconomic". The benefit-to-cost ratios for these three projects ranged from 0.03, 0.12 to 0.65. TransWest notes that all three of path upgrades were the subject of High Priority Economic Planning Studies in the 2012-2013 TPP were they were found to be uneconomic in essentially the same range of ratios as in the 2013-2014 Transmission Plan. Given the ISO's extensive work load and the amount of work to analyze these High Priority Economic Planning Studies, TransWest suggests that these same Path Upgrades should not considered as High Priority Studies as the 2013-2014 Transmission Plan outlines unless the circumstances materially change.

² NREL, Beyond Renewable Portfolio Standards: An Assessment of Regional Supply and Demand Conditions Affecting the Future of Renewable Energy in the West, August 2013

TransWest commends the ISO for utilizing cost-based assumptions to reflect how an efficient market would operate for assessing long term transmission investments. The use of instant market data, which is often quite biased, used on other planning processes is not appropriate for these Economic Planning Studies. TransWest does note one study limitation within the economic assessment of the two out-of-state transmission projects found to be economic in the 2013-2014 Transmission Plan. The implied assumption that only gas generation plants would utilize the incremental import capacity may be overly optimistic in this analysis particularly given the value renewable energy resource's place on full deliverability status. The limited full deliverability capacity made available by these upgrades may be more sought after by renewable resource developers seeking long term interconnection status than by gas generation plants. Using this capacity for renewable resources would likely impact the economic assessment of these projects, yet the potential for this use is not considered in the Economic Planning Studies.

These important attributes should be applied to future Economic Planning Studies conducted by the ISO. The ISO should also consider addressing the study limitation in future studies.

Analysis of potential Policy Implementation and Changes

The Draft Study Plan identifies the overarching public policy objective is the state's mandate for 33% renewable energy by 2020. The ISO conducts analysis to ensure sufficient transmission is identified and recommended for approval of policy-driven transmission elements in the ISO's 2014-2015 Transmission Plan. The process developed to identify these policy-driven transmission elements are well established and involve coordination between the ISO and the CPUC and CEC on alternative portfolios that all meet this 33% RPS level. The TPP analysis for the public-driven category has reached a degree of stability as the portfolios provided by the CPUC and CEC have been largely become stable as well and the identified transmission elements, which are currently in the process of being permitted or constructed.

Several entities are now turning their focus to examine more aggressive renewable energy levels. The CA/WY Study and the Post RPS Study cited above all look at the economics and of renewable resource deployments beyond the 33% by 2020 RPS public policy. California agencies are also focusing more and more in their respective processes at broader expansion of renewable supply. The 40% by 2024 RPS scenario included in the 2014 LTPP scope is good example of these more aggressive scenarios being considered.

The Draft Study Plan includes the following statement within the Section 3.1 Public Policy Objectives:

It was also recognized that new transmission needed to support the state's renewable energy goal would most likely not meet the criteria for two predominant transmission categories of reliability and economic projects. [Emphasis added]

While this may be true with the policy-driven transmission projects to meet the 33% by 2020 RPS, TransWest believes that transmission solutions to meet the needs of the ISO in the future, particularly out-of-state transmission projects, can and should meet the criteria for economic projects. The benefits to consumers should outweigh the cost to consumers to invest in transmission infrastructure.

The two out-of-state economic projects from the 2013-2014 Transmission Plan demonstrate that the ISO can apply cost-based market assumptions and arrive at a determination if the overall costs to consumers can be reduced by certain transmission investments. In the case of the two projects from the 2013-2014 Transmission Plan, the ISO examined non-renewable resources in one location versus non-renewable resources in another location and examined the both the energy and capital costs of these resources to assess the economics. The ISO did not examine renewable resources from these two locations and assumed only non-renewables would utilize this line. This study limitation could be easily addressed in the same manner the ISO used to derive the other parameters in the study.

The CA/WY Study in particular demonstrates how an economic analysis that compares various renewable resource portfolios would be organized to follow the ISO's TEAM. The CA/WY Study may use different values for several parameters, however the approach is consistent with the one taken by the ISO and we would expect the ISO would arrive at similar findings through full implementation of TEAM.

TransWest believes it is prudent for the ISO to conduct economic analysis of the Wyoming Wind alternative portfolio for a 40% by 2024 RPS scenario as a High Priority, Economic Planning Study in the final 2014-2015 TPP Study Plan due to:

- A. Recent studies, in particular the NREL CA/WY Study, provide data that strongly suggests Wyoming wind resources delivered by an HVDC transmission solution offer an economic alternative over the business-as-usual alternative at renewable resource penetration levels above the 33% by 2020 RPS,
- B. The 2013-2014 Transmission Plan includes results for several proposed project upgrades that have very poor to poor economics over a two year planning cycle that should not be considered as High Priority for re-examination unless circumstances change,
- C. The 2013-2014 Transmission Plan includes two out-of-state proposed transmission solutions that provide a similar framework for utilizing cost-based market assumptions comparing the business as usual versus a transmission upgrade solution to provide an economic assessment,
- D. The stated policy objective in the Draft Study Plan is limited to the 33% by 2020 RPS,
- E. The CPUC and other entities are looking at potential impacts and implementation plans with higher renewable resource levels including a 40% by 2024 RPS,

- F. The ISO is the most appropriate of the California agencies to examine the potential economics of such large out-of-state, inter-regional transmission infrastructure, and
- G. These large transmission projects take years to develop and build and require proactive analysis to allow policy makers flexibility to consider various policy options that may impact the markets.

Study Request

TransWest requests the ISO to review, consider and improve upon the California – Wyoming Grid Integration Study, Phase 1-Economic Analysis study conducted by NREL as an Economic Planning Study in the final 2014-2015 TPP Study Plan. TransWest requests the ISO to analyze the potential network transmission facilities intended to access an out-of-state Energy Resource Area (ERA) in south-central Wyoming within a 40% by 2024 RPS scenario.

TransWest is making this request due the reasons cited above and would ask the ISO to consider the request with respect to our understanding that such economic request are in keeping with the Tariff in particular Section 24.3.4.1 and the definition of an ERA as it applies to out-of-state areas considered for economic analysis that requires the CAISO Governing Board to determine whether the ERA is appropriate. TransWest encourages the ISO to consider the information provided above, however TransWest does not wish to limit the viability this Study Request based on this singular and narrow reading of the tariff and asks the ISO to consider how to get such an Economic Planning Study conducted in the 2014-2015 TPP. The new information contained in the CA/WY Study should provide compelling evidence that the ISO should designate this Study Request as a High Priority Study in the final 2014-2015 TPP Study Plan.

CA/WY Study Details

The CA/WY Study examined both a 33% by 2020 RPS scenario and a 35% by 2020 RPS scenario and found very little material difference in the economic assessment between the two scenarios. TransWest's Study request involves a 40% by 2024 RPS scenario, which will require an update of the expected California portfolio. The NREL study utilized the LTPP RPS Calculator to develop these California portfolios including both resources and transmission projects used as the base case in the economic assessment.

The CA/WY Wind Study found that the bulk of the comparative cost savings between the two alternative portfolios were associated with the fixed costs associated with capital investments for renewable resources and transmission assets. The assumptions and calculations of the comparative fixed costs was the largest driver in the economic assessment. These comparative costs are heavily in favor of the CA/WY wind portfolio. The sensitivities around these fixed cost drivers, including assumptions about future resource capital costs, federal tax policy and potential California transmission deferment proved to be larger drivers than the next two largest drivers, capacity valuation and production costs. The comparative Capacity (or Resource

Adequacy) valuation was found to be an order of magnitude smaller than the fixed capital cost driver and in favor of the CA portfolio. The comparative production cost driver was found to be about half of the Capacity valuation driver and in favor of the CA/WY wind portfolio.

The CA/WY Study had several study limitations that the ISO should consider within its own Economic Planning Study. These study limitations included reconciliation with transmission associated with the CA portfolio, a comparative assessment of the operational integration benefits/costs, potential downstream transmission needs and potential transmission project phasing alternatives.

California transmission within the CPUC's RPS Calculator

NREL identified over \$2.5 billion in estimated capital costs for transmission projects within the RPS Calculator associated with the two base cases. The ISO may be able to help determine whether any of these transmission projects could be deferred if the out-of-state transmission solution was approved. The CA/WY Study included sensitivities where either none or all of the related California transmission solutions identified with the base case was deferred.

Operational Integration Benefits

The difference in production costs between the two cases is a comparatively small driver because both cases feature the same amount of very low operating cost renewable resources. The difference in the portfolios is the type and location of the renewable resources. Production cost differences may capture some of the comparative differences in operating costs, however detailed operational integration cost analysis would likely provide a more accurate assessment of the relative benefits. Wyoming wind's high capacity factor and day-time output profile, which is not correlated with typical PV solar outputs mid-day ramp cycle, would very likely result in complementing the California resources by providing both technology and geographical diversity. The ISO should consider what the flexible capacity needs would be for each portfolio and include the difference as a benefit (or negative benefit if the California portfolio is lower cost) in the economic assessment.

Downstream transmission Upgrades and Capacity Benefits

The CA/WY Study did not account for the potential downstream transmission needs to integrate a 3,000 MW transmission project or portion of a 3,000 MW project (see below) into the ISO system. Production cost analysis did not uncover congestion on these downstream transmission paths indicating that transmission upgrades may not be necessary for energy-only integration into the ISO system. Given that the relatively low Net Qualifying Capacity of the Wyoming wind resources, TransWest suggests the ISO should first determine the available downstream capacity (similar to the process used for the two out-of-state Economic Planning Studies in the 2013-2014

Transmission Plan) and then calculate the CA/WY wind portfolio's capacity valuation based on that amount of downstream capacity. Given the difference in capital cost drivers and the Capacity valuation drivers, it is unlikely that the WY wind resources would want to trigger transmission upgrades to secure a higher Capacity value in the economic assessment.

Alternative Project Phasing and Configurations

The CA/WY Study looked a single transmission project configuration consisting of a 730-mile, 3,000 MW, HVDC transmission line between south-central Wyoming and southeastern Nevada. The CA/WY Wind Study utilized transmission cost data developed for the WECC Transmission Expansion Planning Policy Committee to determine the transmission project costs. The estimated capital cost for this project is \$3 billion.

A 3,000 MW transmission solution connected to Wyoming's high capacity wind resources would deliver approximately 12,000 GWh/yr. This is a rather sizeable amount of energy for the California market to integrate in even a three year span once the project was completed. Given the very favorable economic assessment for a 3,000 MW HVDC transmission solution, it would be prudent (and not very difficult) for the ISO to look at two alternative 1,500 MW (6,000 GWh/yr) configurations.

The first alternative configuration would include an initial HVDC mono-pole build-out, which could be upgraded by installing the additional equipment (Pole2) at the terminals when additional capacity was needed. The second alternative configuration could include a 1,500 MW, 500 kV AC configuration.

TransWest estimates the capital cost of this initial 730 mile, 1,500 MW, mono-pole HVDC transmission solution at \$2.1 billion. The estimate to complete the project is an additional \$1.0 billion. TransWest estimates the capital cost of a 730 mile, 1,500 MW 500 kV AC transmission solution at \$3.0 billion. The benefits for each of these 1,500 MW projects would be on the order of one half of the benefits for the full 3,000 MW transmission solution. The phased HVDC approach has a lower initial capital cost plus a lower build-out cost than the 500 kV AC project at this long (730 mile) distance. Both of these configurations are likely to also have positive benefit-to-cost ratios with the mono-pole HVDC solution having higher values than the 500 kV AC project.

TransWest has conducted similar internal economic planning analysis and has worked with other organizations that have conducted very similar Economic Planning Studies. TransWest is available to assist the ISO. The ISO also may also wish to contact the authors of the CA/WY Wind Study or members of the Technical Review Committee to get further insight and discuss potential future analysis to refine and improve upon work performed by the NREL team and the Technical Review Committee.

Contact Information

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