

**Comments of Powerex Corp. on
2018-19 Transmission Planning Process Informational Study on
Increased Capabilities for Transfers of Low Carbon Electricity
Between the Pacific Northwest and California**

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on CAISO’s November 26, 2018 presentation on the *Information Study: Increased Capabilities for Transfers of Low Carbon Electricity between the Pacific Northwest and California* (“Study”). The Study offers a relatively broad examination of the multiple ways in which transmission capability between the Pacific Northwest and California is crucial to enabling a greater quantity, and broader scope, of products and services to be provided from northwest hydro resources to California.

Powerex strongly agrees with the foundational premise that northwest hydro systems are ideally positioned to provide products and services that can help California continue to integrate renewable resources into its grid, thus helping meet the state’s ambitious environmental policy objectives. Moreover, Powerex believes that products and services such as capacity, flexibility, and battery-like arrangements that better utilize solar energy production can likely be provided by northwest hydro resources at substantially lower total cost—and with no GHG emissions—than obtaining these same services from new facilities.

But while the Study clearly conveys that transmission between the Pacific Northwest and California represents a vital link to enabling a wide range of mutually beneficial inter-regional transactions, it is less clear whether current transmission limitations are a key barrier standing in the way of such arrangements. In certain cases—particularly 15-minute scheduling on the Pacific DC Intertie (“PDCI”)—the current scheduling capability of the intertie does seem to be an important barrier. But in most other cases, Powerex believes the key obstacle is the lack of an *adequate forward market framework* for the procurement of the products or services required by California to integrate additional renewable resources.

In Powerex’s view, forward arrangements and forward products and services are essential to achieving the mutually beneficial inter-regional transactions the Study contemplates; such arrangements both “lock in” the services needed by California and also enable northwest entities to plan their systems well in advance of delivery, potentially unlocking far more flexibility than the limited residual capability that can be made available without advance planning.

While the Study focuses largely on the technical attributes of transmission facilities, it falls short in its more general assumptions about the availability and characteristics of northwest hydro resources, which are based largely on historical data and observations of past activities. Such

data are likely to be highly inaccurate predictors of future availability. This is quite simply because the entire western interconnection, and not just California, is experiencing substantial changes in its resource mix, its load patterns, and its related grid challenges. In particular, the upcoming retirement of some major coal facilities in the northwest, continued installation of renewable resources, changing demand levels and patterns, and evolving environmental policies are leading to significant changes in grid conditions across the northwest, making the past a poor predictor of the future. Thus in those areas where the Study makes assumptions about the continued future availability and capabilities of northwest hydro, the Study's conclusions may erroneously assume higher levels of northwest hydro participation in California's markets than may be realized in the future.

Absent the development of robust forward procurement programs for capacity, flexibility, and battery-like services, the CAISO grid will remain on a path that appears inconsistent with California's environmental policy goals and is not least-cost for California's ratepayers. Without well-designed forward procurement programs, California may face:

1. Increasing reliance on higher-cost out-of-state renewables (and new transmission infrastructure) in order to achieve the state's Renewable Portfolio Standard and greenhouse gas ("GHG") goals, as the grid is already struggling to manage oversupply and ramping challenges associated with the in-state solar fleet;
2. Continued and increased reliance on fossil resources, primarily in the Desert Southwest, to provide balancing services through the EIM (and potentially through an expanded day-ahead market); and
3. Aggressive build-out of new in-state storage resources, potentially at a cost to consumers that is far higher than that cost of a more gradual build-out that benefits from declining unit costs as technology improves and economies of scale are realized in the industry.

In contrast, forward procurement of capacity, flexibility and battery-like services from northwest storage hydro entities can provide California with large scale renewable integration services that are low-risk, cost-effective, and can be implemented quickly. Such arrangements would support California's continuing transition to clean, renewable resources, including enabling the continued expansion of in-state solar generation and the gradual adoption of in-state storage solutions.

In the following sections, Powerex provides more detailed comments on each of the following:

- Powerex strongly supports enabling sub-hourly scheduling on the PDCI as a high priority.
- Powerex supports efforts to increase the dynamic scheduling capability of the California-Oregon Intertie ("COI"), provided it is achieved in a manner that does not introduce new or expanded limits on dynamic scheduling elsewhere on the Bonneville primary network, or increase the risk of schedules being restricted in real-time.

- Powerex believes the analyses related to increasing transfer limits and to the “RA value” of northwest supply contain significant gaps, and lead to conclusions that are not valid.
- Powerex believes that expanding and strengthening market frameworks for the forward procurement of renewable integration services—including capacity, flexibility, and battery-like services—is needed to unlock the very substantial benefits of increased inter-regional transactions between the northwest and California. A robust forward procurement of a full range of renewable integration services will also more accurately and credibly signal the need for—and benefits from—future incremental expansion of transmission facilities over the longer term.

I. Powerex Strongly Supports Enabling Sub-Hourly Scheduling On The PDCI

The PDCI has a path rating of 3,220 MW, of which approximately 1,600 MW is available for scheduling through the CAISO operated markets. The PDCI is the only high-voltage transmission line directly interconnecting the northwest to Southern California. This should make the PDCI ideally suited to supporting increased renewable resource integration into the CAISO grid, as it enables transfers from the area of California with the largest concentration of solar resources—and hence where oversupply and ramping needs are most acute—to and from the flexible, non-emitting hydro systems of the northwest.

In practice, however, the actual ability of the PDCI to be used to help manage solar oversupply and/or to help meet morning and evening net load ramps is severely limited, since flows on the line may only be scheduled on an hourly basis. This makes the line wholly ineffective in accessing flexible resources on an intra-hour basis, including through either intertie bidding in the CAISO’s Fifteen Minute Market or through 15-minute (and 5-minute) EIM transfers. Moreover, the lack of price certainty for block hourly schedules in real-time, under the CAISO’s current real-time market rules, discourages even hourly-level participation in the CAISO real-time market. In other words, despite its seemingly “perfect fit” as a conduit for real-time transactions that support renewable integration, the PDCI is currently used almost exclusively for hourly schedules arranged on a forward and/or day-ahead basis.

An interconnection limited to hourly scheduling is an anachronism, providing only outdated functionality at a time when grid conditions and markets have evolved to arranging energy transfers on a sub-hourly basis. This is particularly regrettable in the case of the PDCI, whose northern terminal was fully upgraded and replaced as part of a \$450 million upgrade completed by Bonneville just two years ago.¹ The lack of sub-hourly scheduling on the PDCI represents a significant impediment to realizing the full benefits of the investment that has been made in those facilities.

Powerex believes there are significant operational and economic benefits associated with overcoming the existing scheduling limitation. Moreover, unlike other aspects of the Study,

¹ <https://www.bpa.gov/news/newsroom/Pages/BPA-strengthens-backbone-of-West-Coast-transmission.aspx>

realizing these benefits depends only on completing the facility upgrades, and does not depend on other market enhancements.

For these reasons, Powerex believes that the upgrades necessary to enable sub-hourly scheduling on the PDCI should be pursued with high priority.

II. Powerex Supports Increasing Dynamic Scheduling Capability Across COI And Bonneville's Primary Network

The Study explores ways in which the current limit on Dynamic Transfer Capability ("DTC") on the COI may be increased, or eliminated altogether.² Powerex is generally supportive of exploring measures that enable a higher level of dynamic scheduling between the northwest and California. Powerex notes that enabling greater dynamic scheduling requires more than raising or eliminating the DTC limit, however. Powerex understands that the DTC limit on the COI is not solely the result of conditions on the COI facilities alone, but rather reflects that dynamic COI schedules must be consistent with maintaining stable operating conditions throughout the Bonneville system. In that regard, eliminating the COI DTC limit could potentially require Bonneville to implement other forms of limitations on its transmission system, such as limiting dynamic transfers within its primary network, imposing new or more expansive rate-of-change limits, and/or "crimping" dynamic transfers in real-time. Powerex believes that the current DTC limits—which are known in advance and allocated to COI rights holders on a day-ahead basis—may be preferable to the introduction of more complex or uncertain restrictions that are known only in real-time.

Powerex therefore supports exploring ways to increase dynamic scheduling on the COI, but only if achieved in a manner that does not introduce new or expanded limits on dynamic scheduling on the Bonneville primary network, and only if such increases do not lead to increased risk of schedules being further limited or "crimped" in real-time.

III. The Analysis Of Increased Transfer Capacity Contains Significant Gaps

The majority of the Study presentation focuses on the potential for increasing the transfer capacity of the COI and PDCI. As a general matter, Powerex supports exploring whether the transfer capacity of the interties can be increased **on a firm and year-round basis**. Powerex believes the Study does not adequately examine the potential benefits of any such expansion, however. In particular, Powerex believes that both the Study's near-term assessment and its long-term assessment contain critical flaws and require further review.

The Study's near term assessment does not appear to address the chronic inability of the COI to achieve its *current* capacity rating. For instance, despite having a full rating of 4,800 MW, the COI has been de-rated by at least 100 MW in over 50% of hours during 2018 to date, and in more than 70% of hours in 2017. In fact, de-rates on the COI were so common and so large

² Study at 47-53.

that the *average* rating in 2018 was approximately 4,200 MW, while in 2017 it was approximately 3,800 MW. The Study's near-term assessment appears to focus only on increasing the COI rating above 4,800 MW under specific, favorable conditions, but it does not appear to address the factors that frequently limit flows on the COI to less than this quantity during the majority of hours. In other words, it appears that the near-term opportunities to achieve an increased transfer capacity may be extremely limited unless the root causes of chronic de-rates are addressed. Indeed, increasing the rating of the path without addressing chronic de-rates could result in additional firm rights being issued, requiring higher levels of pro-rata curtailments to all firm transmission rights-holders during the frequent circumstances when the full rated capacity is not available.

The near-term assessment also examines south-to-north flows. However, given that flows on the COI and PDCI have been consistently (and almost exclusively) in the north-to-south direction, it is unclear that the northbound capacity rating presents a binding limitation in the near future.

The Study's long-term assessment is predicated on production cost modeling. While recognizing that hydro modeling is critical to the study, it appears that the analysis consists of highly simplistic assumptions of available energy based on historical information, with more detailed modeling of only those northwest hydro resources whose output is marketed by Bonneville.³ Although Powerex recognizes Bonneville's importance to the examination of inter-regional trade benefits on the COI and PDCI—as both the key transmission provider as well as a key hydro participant in the region—the Study fails to include consideration of numerous other hydro entities and numerous other firm transmission rights holders on the interties.

Powerex supports further dialog and analysis of the potential benefits that may be achieved through increased inter-regional trade in products and services, including the benefit of any proposed expansion of the COI and/or PDCI. However, for any such analysis to provide meaningful insights, it must be based on a sound and realistic representation of the capabilities of all hydro entities in the northwest and of all entities with reserved long-term transmission rights on the interties.

IV. Unlocking RA And Other Value Of Northwest Resources Requires A Robust Forward Procurement Market Framework, Not Transmission Upgrades

The Study examines the potential “RA value” that could be assigned to firm zero-carbon imports from northwest resources. The Study appears to conclude that there is little or no “RA value” for such resources, based on two observations:

1. RA capacity procured by California load-serving entities (“LSEs”) on the COI and PDCI have been below the maximum import limit for those interties; and

³ Study at 29-41.

2. Low-carbon energy from the northwest “is already coming into California” despite not being assigned any RA value.⁴

Powerex strongly disagrees with the Study’s analysis and its conclusions in this area.

First, as has been discussed extensively elsewhere, the process for allocating the maximum import capacity (“MIC”) of each intertie to California LSEs has been a barrier to procuring RA capacity from external resources. The observation that RA showings have been less than the MIC *reflects* this barrier, whereas the Study appears to interpret this outcome as indicating that external resources are simply not valuable for meeting RA requirements.

Second, any analysis based on historical outcomes—whether regarding RA procurement activity or the availability of external supply in the CAISO’s short-term markets—cannot reflect the rapidly evolving conditions experienced both within and outside the CAISO. For instance, until very recently, the total qualifying capacity of generation resources located within the CAISO balancing authority area generally exceeded the aggregate contracting requirement for System RA capacity. California LSEs have thus generally been able to obtain RA capacity from existing in-state resources (with little or no opportunity to sell its capacity to any other entity) at a lower cost than procuring RA from physical resources external to the CAISO (which do have alternative opportunities to sell their capacity elsewhere in the region, and which face additional costs associated with arranging deliveries to the CAISO grid). But this situation is rapidly changing as a result of retirements of in-state fossil generation, improvements to the methodology for calculating qualifying capacity of certain types of resources, and increases in forecast peak demand. With aggregate in-state resources no longer being sufficient to meet the entire RA needs of California LSEs, an increasing amount of RA capacity needs to be procured from either new in-state resources or from external resources. Rather than having no RA value, as suggested in the Study, Powerex believes northwest hydro resources may be one of the most cost-effective sources of incremental RA capacity in the years ahead.

Powerex also cautions against reliance on historical data to conclude that supply from northwest resources “is already coming into California” without the need for any RA compensation, and that it will continue to do so going forward. As conditions throughout the northwest continue to evolve, historical trends are likely to be an increasingly poor predictor of future activities. In particular, retirements of larger coal generation facilities, increasing installations of renewable resources, and stronger environmental policies outside of California are leading to tightening supply/demand balances during peak load conditions in both the northwest, and throughout the western interconnection. Entities that may previously have had uncommitted residual supply to offer into the CAISO day-ahead or real-time markets may have less available supply to offer in the future; and those entities that do have available supply may elect to commit those resources to load-serving entities elsewhere in the western region under forward capacity and/or forward energy contracts, reducing the residual supply available to be offered in the spot markets (including the CAISO markets). While it is likely that *some* amount of residual northwest supply will be offered into the CAISO markets on many days and hours, the critical question from a

⁴ Study at 66.

reliability perspective is whether such uncontracted supply can at all be relied upon to be available during the *specific hours* of peak CAISO loads, which often coincides with high loads in other regions in the west. The Study appears to assume that it can, whereas evolving market and grid conditions strongly suggest otherwise.

V. Transmission Infrastructure Is Not The Primary Barrier To The Northwest Providing Renewable Integration And Capacity Services To California

Powerex strongly supports the basic premise of the Study: that there is mutually beneficial value to enabling transfers of energy, capacity and flexibility from resources in the northwest into California. But Powerex believes that the Study errs in focusing on transmission infrastructure as the primary barrier to unlocking these benefits. With the exception of enabling sub-hourly scheduling the PDCI, Powerex does not believe that expansion of transmission facilities should be the primary focus of efforts to increase inter-regional transactions and coordination in the coming years.

Instead, Powerex believes the real barrier is the lack of a forward market framework that enables California LSEs (or the CAISO) to procure products or services from northwest hydro resources on a forward basis, thus ensuring these resources will be available to be dispatched through the CAISO day-ahead and real-time markets. Forward arrangements could be used to procure not only capacity (*i.e.*, such as through System RA), but also flexibility and battery-like services that enable improved utilization of (and continued growth of) California's expanding solar generation fleet. The fact that such arrangements do not occur today is not due to a lack of transmission capacity, but because there are either significant obstacles or disincentives to doing so (in the case of System RA), or because there is no forward procurement framework for those products to be provided at all (in the case of Flexible RA or battery-like services).

Forward procurement of these types of services over defined durations is necessary not only to ensure that California secures the availability of those services in advance, but it critically enables the advanced planning of large storage hydro systems, which can greatly increase the capability that is made available. Large storage hydro systems are generally planned well in advance of the day-ahead and real-time timeframes of organized markets. Consequently, the amount of hydro system capability that is accessible through voluntary participation in day-ahead and real-time markets is simply the residual capacity remaining as a result of the planning and operational decisions made further in advance. But forward commitments of capacity, flexibility and battery-like services enable the advanced planning and positioning of the relevant hydro system in a manner that unlocks potentially much larger capabilities than just the residual capacity that is generally available in the short-term markets.

As an example, a large storage hydro system may be able to enter into forward arrangements whereby it commits to offer to absorb up to a defined quantity of California solar oversupply during the midday hours throughout the winter and spring periods. Knowing of this commitment well in advance, the operator of the hydro system may manage its reservoir levels very differently earlier in the season, so that both native inflows and California surplus solar energy can be absorbed throughout the winter and spring seasons without approaching maximum

reservoir elevations or running up against other binding constraints. Similarly, generation maintenance outages may be scheduled differently to ensure that sufficient resources are available to meet capacity and flexibility commitments and also to manage inflows, reservoir levels and discharge levels, with consideration of additional mid-day winter and spring energy imports into the system. These are just a few high-level examples that illustrate that advance planning can open up a large number of additional opportunities to optimize the capabilities of a hydro system, whereas these opportunities are largely unavailable within the timeframe of the CAISO's day-ahead and real-time markets.

Forward arrangements not only provide a longer lead time than day-ahead or real-time transactions, but the longer duration of forward transactions provides a stronger and more certain opportunity for large storage hydro resources to earn necessary compensation for the products and services being provided. This is particularly important where the operations of a hydro system need to be substantially modified ahead of time, in order to provide capacity, flexibility, or battery-like services; such advanced changes to hydro operations are highly unlikely to be undertaken merely in the hopes of making future hourly or sub-hourly sales in the day-ahead or real-time CAISO markets (where both the quantity of sales and the prices paid may be highly uncertain). In contrast, a forward transaction for a term of a season, a year, or longer provides both the lead time needed to properly plan large storage hydro operations, as well as the more certain and sustained revenue stream necessary to make these changes worthwhile to the supplier of the services.

Powerex strongly supports continued dialogue between CAISO and northwest stakeholders to explore appropriate forward market frameworks that can enable hydro systems to provide a greater quantity and range of products and services to help California achieve its reliability and environmental objectives in a cost-effective manner. Powerex believes that current CAISO stakeholder processes, particularly the RA enhancements initiative, provides an important opportunity to consider improvements to the procurement of forward capacity. The forward procurement of flexibility and of battery-like services, however, may need to be addressed through new initiatives, and in coordination with other agencies including the California Public Utilities Commission and the California Energy Commission.