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BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

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| IN THE MATTER OF IDAHO POWER COMPANY'S APPLICATION TO UPDATE SOLAR INTEGRATION RATES AND CHARGES | CASE NO. IPC-E-16-11<br><br>COMMENTS OF THE IDAHO CONSERVATION LEAGUE AND RENEWABLE NORTHWEST |

The Idaho Conservation League (ICL) and Renewable Northwest submit the following comments on Idaho Power's 2016 Solar Integration Study and associated integration rates in proposed Schedule 87. Our organizations have participated in Idaho Power's solar integration studies for years. We intervened in the Commission review of the 2014 Solar Study and negotiated a stipulation that included the parameters of the 2016 Solar Integration Study. Renewable Northwest was a member of the Technical Review Committee for the 2016 Study, and reviewed the 2014 Solar and 2013 Wind integration studies. This long participation in integration issues informs our organizations' comments below.

We appreciate and support the changes that Idaho Power made to the methodology in the 2016 Solar Integration Study. Specifically, three primary improvements rise to the top: (1) the advances made in developing a very granular data set of diverse solar build-out scenarios; (2) accounting for the net variability and forecast error for both diverse solar projects and among solar, wind, and load on Idaho Power's system; and (3) Idaho Power staff's development of a "persistence-based, hour ahead solar production forecast" that can be "readily adopted in practice." *Study at 22.* These improvements, among others, are the likely source of Idaho Power's conclusion:

> "The solar integration costs identified in this study are relatively small. The small costs suggest solar PV resources can be inexpensively integrated without significant impact to system operations." *2016 Study at 2.*

The 2016 Study builds a solid foundation for analyzing solar integration questions in the future for Idaho Power and other utilities. In general, we support updating the Schedule 87 rates

to reflect the results of the 2016 Study. However, like any study, there are areas to improve. Below we comment on two topics: applying an incremental versus average cost approach to integration rates and the Energy Imbalance Market sensitivity.

**Incremental Versus Average Integration Rates**

The study reveals that, in general, integration rates change with various levels of cumulative solar generation. Interestingly, we note that between 800 and 1200 MW the integration costs level out, suggesting increasing solar penetration is manageable. *See Youngblood Di at 5 (chart).* Because integration costs change based on cumulative solar generation, the issue arises of how to calculate a fair integration charge for each subsequent project.

One method, the incremental approach, assumes the next project causes more costs than the prior project and applies a corresponding higher integration charge. Idaho Power proposes to use the incremental approach in Schedule 87. *See Youngblood Di at 5 – 7.* Another method finds the average integration cost based on the cumulative nameplate solar and applies an equal cost to each operating project. As new projects join the system, this changes the average integration cost and results in an update to all operating projects. Under either method, the goal is to collect the full integration cost from the cost causer.

We believe applying an average integration rate to all projects is more fair and accurate. The incremental approach does provide some contractual certainty to the generator owners. However, it is divorced from the operations of the system and the methodology used to calculate the integration costs. The 2016 Study methodology accounts for all of the diversity and netting benefits between solar projects. But the incremental cost approach assumes that, just because one solar project comes on line after a different solar project, the newcomer inherently brings higher incremental integration costs. Similarly, the incremental cost approach assumes earlier projects are less costly to integrate, when in fact integration costs account for the net variability of the entire system, not just individual projects. Further subsequent projects may have features that reduce integration costs such as better forecast and scheduling accuracy, strong coincidence of the specific project's generation profile with loads, inverter technology that can address power quality, or location benefits on the grid. Accurate integration costs would account for these improvements by project developers, and smart policy would encourage them to make such improvements. Applying an incremental cost approach does neither. The Average approach provides an incentive to reduce integration costs and treats each project in the cumulative solar capacity fairly.

However, we recognize that adopting a full average integration cost approach may not be feasible at this time. Based on our understanding of existing power purchase contracts, the Commission would have to reopen these contracts to adjust the integration charge. Similarly, we recognize that calculating a unique integration cost for each plant may not be practicable at this time. Accordingly, for now we recommend the Commission direct Idaho Power to revise Schedule 87 to apply an average cost approach to all future projects. Current projects would apply to calculating the nameplate capacity of solar on the system when calculating the average integration cost. Future contracts would use an average integration rate based on existing cumulative capacity and be updated as cumulative solar generation changes. This average cost approach provides a more accurate rate and treats all developers reasonably fairly. We note the average cost approach is standard utility practice for calculating balancing costs under FERC's Schedule 9 ("Generator Imbalance Service") of the *pro forma* Open Access Transmission Tariff.

**Energy Imbalance Market Sensitivity**

The 2016 Study did not directly consider the ability of the growing Energy Imbalance Market (EIM) to reduce the costs of intra-hour generation and forecast error. However, Idaho Power did include an "energy imbalance market sensitivity analysis" described on Page 22 of the 2016 Study, describing likely further decreases in integration costs. This sensitivity is likely conservative in at least one way: Idaho Power considered the benefits of a 15-minute market only, but the current western EIM has the ability to dispatch on both a 15-minute and a 5-minute basis.[1]

As Idaho Power explains on page 22 of the 2016 Study, because the precise market structure is still evolving, it is appropriate to review the solar integration costs again as the EIM becomes better defined. Further, as Idaho Power continues to study the EIM, we recommend they include the solar integration benefits when considering the merits of joining this evolving marketplace. By enabling efficient dispatch of regional energy sources, and expanding the footprint for balancing loads and generation, the EIM is poised to facilitate integration and reduce costs for participants. In fact, the most recent benefits report from the EIM operator calculates that participating in the market reduced the amount of megawatts, and thereby avoided significant costs, of flexible ramping capacity required for each individual balancing area by 35%.[2] We recommend the Commission direct Idaho Power to expand on the EIM sensitivity

[1] *See* general overview of the EIM at: http://www.caiso.com/informed/pages/eimoverview/default.aspx
[2] *See Benefits for Participating in EIM*, 2016 Q1 Report, California ISO at pages 7-8 (attached to these comments).

done here through a complete evaluation in the 2017 Integrated Resource Plan of the costs and benefits of joining the EIM.

**Conclusion**

ICL and Renewable Northwest appreciate the challenges and opportunities associated with integrating variable generation into the electric grid. As the generation portfolio of the Northwest continues to evolve, finding better and cheaper integration techniques will continue to be important. Idaho Power's 2016 Solar Integration Study is a positive contribution to the effort by having the hallmarks of good study: a resource output forecast that is granular in time and widespread in geography; accurately accounting for the net variability of load and each generation resource collectively; and applying a range of integration tools. ICL and Renewable Northwest recommend that Idaho Power continue to examine integration issues and apply the lessons learned in this study to updating the wind integration study.

Until then, ICL and Renewable Northwest recommend the Commission:

- Adopt Schedule 87, but instruct Idaho Power to develop an average cost approach to apply to new solar projects.
- Instruct Idaho Power to expand on the EIM sensitivity with a complete review in the 2017 IRP of the costs and benefits of joining the EIM.
- Direct Idaho Power to apply the improved methodology and analysis used in the 2016 Solar Integration Study to update the wind integration study.

Respectfully submitted,

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Idaho Conservation League

*/s/ Dina Dubson Kelley*
Dina Dubson Kelley
Renewable Northwest

## CERTIFICATE OF SERVICE

I hereby certify that on this 30th day of June, 2016, I delivered true and correct copies of the foregoing COMMENTS to the following persons via the method of service noted:

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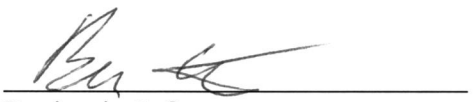

Benjamin J. Otto

# Benefits for Participating in EIM

# April 30, 2016

# Revision History

| Date | Version | Description | Author |
|---|---|---|---|
| 04/30/2016 | 1.0 | | Lin Xu |

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## Executive Summary

This is the "Quantifying EIM Benefits" report for the first quarter of 2016. The estimated gross benefits for January, February and March 2016 are $18.90 million. This brings the EIM total benefits to $64.60 million since it expanded the real-time market to balancing areas outside the California ISO.

The total gross benefits for Q1 2016 increased significantly from the past with the addition of NV Energy (NVE). This growth reflects the economic value associated with the increase in inter-regional transfer capability.

The benefit calculation method is described in a separate document.[1] This analysis demonstrates the EIM's ability to select the most economic resources across the PacifiCorp, NVE and ISO balancing authority areas (BAAs) that comprise the EIM footprint. The benefits quantified in this report fall into three categories and were described in earlier studies.[2]

- ***More efficient dispatch, both inter- and intra-regional, in the Fifteen-Minute Market (FMM) and Real-Time Dispatch (RTD),*** by automating dispatch every fifteen minutes and every five minutes within and across the EIM footprint, including the California ISO, PacifiCorp, and NV Energy.
- ***Reduced renewable energy curtailment,*** by allowing balancing authority areas to export or reduce imports of renewable generation when they would otherwise need to be economically curtailed, and
- ***Reduced flexibility reserves needed in all balancing authority areas,*** which saves cost by aggregating the load, wind, and solar variability and forecast errors of the combined EIM footprint. This report quantifies the diversity benefits of flexibility reserves for the entire EIM footprint.

Table 1 shows the estimated gross benefits summary for the first quarter of 2016 in millions of dollars per EIM entity.

| Region | January | February | March | Total |
|---|---|---|---|---|
| **CAISO** | 1.97 | 1.19 | 3.18 | **6.35** |
| **NV Energy** | 0.34 | 0.75 | 0.62 | **1.70** |
| **PacifiCorp** | 2.21 | 4.95 | 3.69 | **10.85** |
| **Total** | **4.53** | **6.89** | **7.49** | **18.90** |

[1] EIM Quarterly Benefit Report Methodology, https://www.caiso.com/Documents/EIM_BenefitMethodology.pdf. This report includes one enhancement to allow commitment of ISO short start units in the counterfactual dispatch.
[2] PacifiCorp-ISO, Energy Imbalance Markets Benefits, http://www.caiso.com/Documents/PacifiCorp-ISOEnergyImbalanceMarketBenefits.pdf

Table 1: Estimated gross benefits shown are in millions and accrued in the first quarter of 2016

One of the significant contributions to the EIM benefits are transfers across the balancing areas which provide lower supply cost, even while factoring in the cost of compliance with greenhouse gas (GHG) emissions cost when it is transferring into the ISO. As such, the transfer volumes are a good indicator of a portion of the benefits attributed to the EIM. Transfers can take place in both the Fifteen Minute Market (FMM) and Real-Time Dispatch (RTD). Generally, the transfer limits are based on transmission rights and interchange rights that participating balancing authority areas make available to EIM, with the exception of the PACW-ISO transfer limit in RTD. The RTD transfer capacities between PACW and the ISO are dynamically determined based on the allocated dynamic transfer capability driven by system operating conditions. This report does not quantify a BAA's opportunity cost that the utility considered when using its transfer rights for the EIM.

Balancing authority areas may submit base scheduled transfers. These transactions occurred between NVE and PACE. The EIM inter-regional benefits are calculated based on the transfer difference between the EIM and the base schedule. This is because the benefits associated with base scheduled transfers, to the extent that they exist, should be attributed to decisions made prior to the EIM, not to the economic efficiencies gained through the EIM.

While market conditions will vary, the EIM continues to provide benefits to participating entities and their customers as demonstrated in this report.

## Background

The EIM began financially-binding operation on November 1, 2014 by optimizing resources across the ISO and PacifiCorp BAAs, which includes portions of California, Oregon, Washington, Utah, Idaho and Wyoming. NV Energy, operating in Nevada, began participating in December 2015. The EIM facilitates renewable resource integration and increases reliability by sharing information between balancing authorities on electricity delivery conditions across the EIM region. The ISO started publishing quarterly EIM benefit reports in January 2015. As other BAAs join the EIM, this report will expand to include the benefits associated with their participation.

## EIM Benefits in Q1 2016

Table 1 breaks out the estimated EIM gross benefits by each BAA per month. The savings presented in the table show $4.53 million for January, $6.89 million for February, and $7.49 million for March. The increase of EIM benefit from month to month may be driven by variations in supply and demand.

### Inter-regional Transfers

One of the significant contributions to the EIM benefits is transfers across the balancing areas which provide lower supply cost. Table 2 provides the 15-minute EIM transfer volume and the 5-minute EIM transfer volume, both with base schedule transfer excluded. NVE and PACE had submitted base

schedule transfers. The EIM benefit is only attributable the transfers that occurred with EIM, but not the base schedules submitted prior to the EIM.

The transfer from BAA_x to BAA_y and the transfer from BAA_y to BAA_x are separately reported. For example, in an interval, if there is 100 MWh transfer on top of base transfer from CISO to NEVP, it will be reported as 100 MW with from_BAA=CISO and to_BAA=NEVP, and it will be reported as 0 MW with from_BAA=NEVP and to_BAA=CISO in the opposite direction. The 15-minute transfer volume results from EIM optimization in the 15-minute market with all bids and base schedules submitted into EIM. The 5-minute transfer volume results from EIM optimization in the 5-minute market with all bids and base schedules submitted into EIM, and unit commitments determined in the 15-minute market optimization.

NV Energy's EIM benefits mainly reflect inter-regional transfer benefits resulting from intra-hour transactions. This is attributed to NV Energy's optimization of its base schedules prior to submission to the EIM.

The ISO exported a significant amount of energy to NV Energy and PacifiCorp in this quarter. This compares to past quarters when the ISO had been mainly an importer. It is also worth noting that a significant level of energy that was exported by the ISO consisted of renewable generation.

| Year | Month | from_BAA | to_BAA | 15m EIM transfer (15m - base) | 5m EIM transfer (5m - base) |
|---|---|---|---|---|---|
| **2016** | January | CISO | NEVP | 100,643 | 69,845 |
| **2016** | January | CISO | PACW | 31,606 | 34,024 |
| **2016** | January | NEVP | CISO | 48,895 | 93,833 |
| **2016** | January | NEVP | PACE | 84,902 | 65,572 |
| **2016** | January | PACE | NEVP | 36,387 | 51,786 |
| **2016** | January | PACE | PACW | 39,612 | 58,139 |
| **2016** | January | PACW | CISO | 59,035 | 60,965 |
| **2016** | February | CISO | NEVP | 70,729 | 75,587 |
| **2016** | February | CISO | PACW | 15,617 | 17,377 |
| **2016** | February | NEVP | CISO | 69,461 | 92,008 |
| **2016** | February | NEVP | PACE | 62,732 | 65,937 |
| **2016** | February | PACE | NEVP | 48,928 | 49,354 |
| **2016** | February | PACE | PACW | 26,490 | 43,735 |
| **2016** | February | PACW | CISO | 74,595 | 83,854 |
| **2016** | March | CISO | NEVP | 136,887 | 139,781 |
| **2016** | March | CISO | PACW | 11,347 | 11,413 |
| **2016** | March | NEVP | CISO | 49,315 | 79,251 |
| **2016** | March | NEVP | PACE | 95,008 | 88,972 |
| **2016** | March | PACE | NEVP | 38,034 | 46,286 |
| **2016** | March | PACE | PACW | 9,278 | 23,291 |

| | | | | | |
|---|---|---|---|---|---|
| **2016** | March | PACW | CISO | 93,571 | 97,051 |
| There is no PACW to PACE transfer capability | | | | | |

**Table 2: Energy transfers (MWh) in the FMM and RTD for the first quarter of 2016**

## Reduced Renewable Curtailment

The EIM helps avoid renewable curtailments within the ISO, which has both economic and environmental benefits. The EIM benefit calculation includes the economic benefits that can be attributed to avoided renewable curtailment within the ISO. If not for energy transfers facilitated by the EIM, some renewable generation located within the ISO would have been curtailed via either economic or exceptional dispatch. The total avoided renewable curtailment volume in MWh for Q1 2016 was calculated to be 17,261 MWh (January) + 41,287 MWh (February) + 54,399 MWh (March) = 112,948 MWh total. The energy being exported by the ISO included a significant level of renewable generation.

The environmental benefits of avoided renewable curtailment are significant. Under the assumption that avoided renewable curtailments displace production from other resources at a default emission rate of 0.428 metric tons CO2/MWh, avoided curtailments displaced an estimated 48,342 metric tons of CO2 for Q1 2016. Avoided renewable curtailments may also have reduced the volume of renewable credits that would have been retracted. However, this report does not quantify the additional value in dollars associated with this benefit.

## Flexible ramping procurement diversity savings

The EIM facilitates procurement of flexible ramping capacity in the FMM to address variability that may occur in the RTD. Because variability across different BAAs may happen in opposite directions, the flexible ramping requirement for the entire EIM footprint can be less than the sum of individual BAA's requirement. This difference is known as the flexible ramping procurement diversity savings. Starting in March 2015, the ISO implemented an automated tool to analyze historical uncertainties and calculate the flexible ramping requirement for each BAA in the EIM. In Q1 2016, the flexible ramping requirement for the ISO varied from 300 MW to 500 MW, the requirement for PACE varied from 80 MW to 150 MW, the requirement for PACW varied from 60 MW to 100 MW, and the requirement for NVE varied from 80 MW to 100 MW. Due to the reduction in flexible ramping requirement associated with the larger EIM footprint, the total requirement across the four BAAs varied from 300 MW to 530 MW.

The flexible ramping procurement diversity savings for all the intervals averaged over a month are listed in Table 3. The percentage saving is the average MW savings divided by the sum of the four individual BAA requirements.

| | January | February | March |
|---|---|---|---|
| **Average MW saving** | 255 | 261 | 265 |
| **Sum of BAA requirements** | 758 | 752 | 753 |
| **Percentage savings** | 34% | 35% | 35% |

**Table 3: Flexible ramping procurement diversity saving for the first quarter of 2016**

Under the current flexible ramping constraint design, the procured flexible ramping capacity can be fully accessed in RTD. If the flexible ramping procurement in the FMM is beneficial, it will reduce the RTD dispatch cost. With the EIM benefits being quantified on a 5-minute level, the benefit of flexible ramping is fully captured in the RTD dispatch. The EIM benefits calculated at a 5-minute level includes the savings from procuring and deploying flexible ramping. However, this analysis does not breakout the dollar savings separately because the savings are tightly integrated with the RTD dispatch.

## Conclusion

The EIM continued to show significant benefits during the first quarter of 2016. The total benefits for the quarter of $18.90 million are consistent with pre-launch studies, and reflect the transfer benefits of a more robust EIM footprint, that includes both PacifiCorp and NV Energy.