Dynamic Transfers
Draft Final Proposal

Provided in Support of 2009-2010 Stakeholder Process to Consider Expansion of Dynamic Transfer Services in ISO Tariff

May 20, 2010

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1. Background

The objective of this Draft Final Proposal is to propose solutions to issues affecting dynamic scheduling as presently offered in the California Independent System Operator (ISO) tariff, and to develop solutions for extending the ISO's dynamic scheduling policy into tariff provisions for pseudo-ties.[1]

The ISO published its Dynamic Transfers Straw Proposal in this stakeholder process on March 10, 2010 (available at http://www.caiso.com/2755/2755e7b852d20.pdf), and discussed it in a stakeholder meeting on March 17.[2] The objective of the Straw Proposal was to describe the functions of dynamic scheduling and pseudo-ties, propose solutions to issues affecting dynamic scheduling as presently offered in the ISO tariff, and develop solutions for extending the ISO's dynamic scheduling policy into tariff provisions for pseudo-ties. A Supplement to the Straw Proposal (available at http://www.caiso.com/2787/2787c64b6e390.pdf) provided additional discussion with stakeholders on selected issues prior to this Draft Final Proposal. The Draft Final Proposal states the ISO management's conclusions, based on these stakeholder discussions, about the following policies to recommend to the ISO's Board of Governors to facilitate the use of the ISO's dynamic transfer services:

1. Clarifying tariff provisions for conventional resources,
2. Extending the existing use of dynamic scheduling for imports of conventional resources to include dynamic transfer of intermittent or "renewable" energy resources into the ISO from other Balancing Authority Areas (BAAs), and
3. Incorporation of pseudo-tie service in the ISO tariff, including intermittent resources, predicated upon the successful culmination of the two present conventional resource pseudo tie pilots.

A fundamental present day issue is the import of intermittent, renewable energy on the interties (i.e., between BAAs). Extending the ISO dynamic transfer and pseudo-tie service to intermittent renewable resources raises issues the ISO has not encountered with dynamic transfer of conventional resources. While the ISO faces many of these issues with intermittent resources that are native to the ISO BAA, significant growth of intermittent resources could involve bringing intermittent power into the control and responsibility of the ISO through dynamic transfer arrangements. Neither the North American Electric Reliability Corporation (NERC) nor Western Electricity Coordinating Council (WECC) policies directly address the implementation of dynamic transfers associated with renewable or "intermittent" resources. Accordingly, various efforts are underway within the WECC to consider how to implement, operate and account for

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[1] These documents apply to dynamic transfers as a category of market participation, and use the term "dynamic transfer" as a general term that applies to either dynamic schedules or pseudo-ties. ("Dynamic import" and "dynamic export" refer to dynamic transfers in a specific direction.) The term "dynamic schedule" refers to an interchange schedule in which the resource remains under the control of the native balancing authority (BA) where the source of transfer is electrically located, and the native BA includes the resource's output in its balancing of supply and demand. The term "pseudo-tie" refers to a transfer in which the source is accounted for in the attaining BA's balance. The attaining BA also performs other balancing area functions for pseudo-tie resources. Appendix A of the Straw Proposal explains these characteristics of dynamic transfers in greater detail. The ISO attempts to use these terms precisely to explain provisions of the proposal that apply to the respective terms.

The ISO also attempts to distinguish appropriately between the terms "balancing authority" (BA) and "balancing authority area" (BAA). A BA is an entity that manages a BAA. For example, the ISO as a company is a BA that maintains the balance of loads, interchange, and generation within the metered boundaries of its BAA.

[2] The stakeholder process began with the ISO's Issue Paper, which was published on November 30, 2009 (available at http://www.caiso.com/2476/2476ecfa5f550.pdf) and discussed in a stakeholder meeting on December 7, to identify the issues that should be considered in this stakeholder process.

the coordinated interchange of intermittent energy from source to sink BAAs. The use of dynamic transfer functionality to establish pseudo-ties under a market construct is also a relatively new and currently rarely used concept in the West.

With the advent of the 20 and 33 percent renewable portfolio standards for California load, the frequency of requests to the ISO for dynamic scheduling based import services has increased dramatically. Over the past year, multiple independent power project developers of external conventional and intermittent generation resources have inquired to the ISO about participation in various ISO markets and renewable energy programs, including the Participating Intermittent Resource Program (PIRP). In comments on the ISO's Issue Paper, PG&E states that dynamic transfer is essential for incorporating out-of-ISO renewable resources into PG&E's resource portfolio, and "Six Cities" (Anaheim, Azusa, Banning, Colton, Pasadena & Riverside) state they have already contracted outside the ISO and cannot get power to their cities due to the current ISO tariff and procedures.

Developers representing both conventional and renewable energy projects seek operating and scheduling services that face hurdles due to concerns for the potential grid reliability impacts and increased balancing energy burden. Their ISO service requests include the ability to dynamically schedule renewable energy imports into the ISO, dynamic imports from "single generator" BAAs, and the implementation of additional pseudo-ties for both conventional and renewable external resources. A particular concern in considering these requests is the ability of an external intermittent resource to be immediately responsive to interchange schedule (electronic tag, or "e-Tag") curtailment and decremental dispatch instructions in the event of real time intertie derate or contingency event.

To further address these issues, the ISO will discuss this Draft Final Proposal in a stakeholder meeting on May 27, 2010, after which the ISO will receive stakeholder comments and prepare its final recommendations to its Board of Governors. The key dates in the schedule of the dynamic transfer tariff initiative are as follows:

November 30, 2009	Issue Paper published
December 7, 2009	Stakeholder meeting on Issue Paper
December 14, 200	Stakeholder comments received on Issue Paper
March 10, 2010	Straw Proposal published
March 17, 2010	Stakeholder meeting on Straw Proposal
March 31, 2010	Stakeholder comments received on Straw Proposal
April 30, 2010	Supplement to Straw Proposal published
May 6, 2010	Stakeholder meeting on Supplement to Straw Proposal
May 13, 2010	Stakeholder comments received on Supplement to Straw Proposal
May 20, 2010	Draft Final Proposal published
May 27, 2010	Stakeholder meeting/conference call on Draft Final Proposal
June 3, 2010	Stakeholder comments due on Draft Final Proposal, to dynamictransfer@caiso.com.
July 26-27, 2010	Board of Governors decision on Dynamic Transfer initiative
August 2010	Tariff filing submitted to FERC for approval of Dynamic Transfer tariff changes.

The ISO has benefited from the comments that stakeholders submitted on the Issue Paper, Straw Proposal, and Supplement to the Straw Proposal, and thanks the commenters. The ISO now invites final inputs on this Draft Final Proposal's definition of the terms and conditions for dynamic transfer services.

2. Summary of Proposal

To address the needs described above, this Draft Final Proposal addresses the expansion of dynamic transfer tariff service to incorporate these additional uses of dynamic transfer functionality, considering both the potential benefits and maintenance of grid reliability. Proposals cover the following topics:

- Transmission reservations: To account for the variation in renewable resources' output, allow dynamic transfers to specify maximum deliveries exceeding their expected average delivery. Given that the ISO provides hourly firm transmission and requires external transmission to be procured only for each operating hour, discourage excess transmission scheduling through settlement of congestion charges and the Grid Management Charge for the greater of scheduled and actual delivery. [3]
- Congestion management: To efficiently dispatch all ISO resources over the real-time operating horizon, offer a scheduling option to intermittent resources to update their expected energy profile availability by 5-minute intervals, for a forward-looking two-hour period, to manage variability within operating hours and maintain high transmission utilization by dispatching other resources.
- Dispatchability requirements and curtailment rules: Ensure that dynamically transferred resources can immediately respond to interchange schedule (e-Tag) curtailment and

[3] A stakeholder comment on the Straw Proposal questioned why the ISO treats resources connecting to Palo Verde substation as imports that are subject to intertie scheduling constraints, which differs from resources that might connect to Eldorado substation being considered to be within the ISO BAA. This comment suggests that resources at Palo Verde should not be subject to intertie limits and other provisions that apply to pseudo-ties, since SCE owns the Palo Verde-Devers line and is part owner of Palo Verde substation, which it claims is similar to ownership at Eldorado. The difference between these locations is that even though both substations have multiple owners, the intertie point and associated metering at Eldorado substation establishing the boundary between the ISO BAA and its neighboring BAAs effectively place this substation inside the ISO BAA boundary, while the intertie points and associated metering at Palo Verde substation establishing the boundary between the ISO BAA and its neighboring BAAs effectively place this substation outside the ISO BAA boundary. Neither the Palo Verde nor Hassayampa substation has been placed under ISO operational control as either ISO BAA or ISO Controlled Grid, which requires that schedules from the Palo Verde Hub are subject to the same requirements as other imports, even when they are dynamic transfers. On the Merchant to Eldorado 230 kV intertie, the point of interconnection is at a transmission tower on the Merchant side of Eldorado substation. On the Palo Verde to Devers and Hassayampa to North Gila 500 kV intertie lines, the points of interconnection are at the boundaries of the 500 kV switchyards, not at the buses that terminate the 500 kV lines. Thus, a pseudo-tie resource that connects through generation ties to buses at Palo Verde or Hassayampa must first schedule as an export from the boundary of the pseudo-tie, and then import back to the ISO at these points of interconnection, where the resource is scheduled as an import to the ISO. The functions of dynamic schedules and pseudo-ties are described in NERC's Dynamic Transfer Reference Document, which is available at http://www.nerc.com/filez/rfwg.html, which states (among other provisions) that a pseudo-tie is used as a tie line flow in the AGC/ACE equation, and that pseudo-ties are accounted for as "actual interchange" while dynamic schedules are counted for as "scheduled interchange" (i.e., both are interchange calculations).

decremental dispatch instructions and orders in the event of real time intertie derate or contingency event. Develop operating procedures to reflect characteristics of new resources, and use operating orders to facilitate compliance with reliability needs.

- Locational pricing: Model and price dynamic resource-specific system resources (including pseudo-ties) at their actual locations, as the ISO does currently for the Sutter pseudo-tie (using the same mechanism that determines prices at scheduling points, such as Four Corners, that are not at the ISO boundary).
- Pro rata allocation of deviations among BAAs: Update tariff provisions to incorporate pro rata allocation of uninstructed deviations into the ISO tariff as an upper limit on the ISO's allocation of deviations.
- Limits of dynamic imports: Use technical studies, coordinated with other affected BAAs, to establish maximum dynamic transfer limits for intermittent resources.
- Management of requests for dynamic transfers: To ensure that dynamic transfers do not exceed the dynamic transfer capacity, determine queuing procedures for managing requests for dynamic transfer agreements.
- Aggregation of conventional and/or renewable resources: Support aggregation of resources that are electrically close together.
- Generator-only BAAs: As with any resource seeking to dynamically import into the ISO, the ISO will approve dynamic scheduling agreements in which performance terms and conditions, supported by successful management of inadvertent energy and sufficient contingency reserves, indicate that the resource will reliably perform as a dynamic schedule.
- Dynamic exports: Allow dynamic exports of supply resources that are geographically within the ISO's BAA.
- Layoffs from pseudo-ties: Continue to support exports to native BAAs from pseudo-tie generators, as the ISO has done in the pilot implementation.
- Multiple dynamic schedules: Allow an external generator to be split in fixed shares as dynamic schedules (not pseudo-ties) that would be scheduled on different interties in order to obtain transmission through external BAAs.
- Non-firm transmission: Allow dynamic schedules for energy to use non-firm transmission through external BAAs.
- Documentation for AS certification: Modify requirements to align certification processes.
- Coordination with neighboring BAAs: Coordinate development of similar market initiatives.

In most of these areas, the ISO's proposals in this Draft Final Proposal are the same as in the Straw Proposal, as modified in the Supplement to the Straw Proposal, and differences in this Draft Final Proposal mostly seek to clarify the explanation of the proposals if needed, as well to refine their details. This Draft Final Proposal adds detail concerning the ISO's technical studies of limits on dynamic imports of intermittent resources. This Draft Final Proposal further develops potential solutions for management of requests for dynamic imports, which the ISO anticipates will be a significant topic of discussion at the May 27 stakeholder meeting. The resolution of these issues will be formalized in the final proposal that will be recommended to the ISO Board of Governors, and as needed in revisions to the ISO tariff as approved by the ISO Board of Governors as they pertain to dynamic scheduling, and as an addition of standard contract terms for pseudo-tie imports and dynamic exports.

The overall scope of issues that affect dynamically transferred resources extends beyond the topics that are addressed in this Draft Final Proposal. The ISO maintains coordination among the staff teams that work on related projects, but it is necessary to divide topics among projects in order to keep each project's work manageable, rather than undertaking a global effort that would consider all issues, and thereby risk not achieving outcomes on the critical topics. After considering the alternatives on each issue as to whether to recommend a change in the ISO tariff in this stakeholder process, consider issues in a related stakeholder process, or establish business processes to improve the ISO's operations within its existing tariff provisions, the ISO has focused this stakeholder process on topics that are specific to dynamic transfers. More general issues that apply to both internal and external resources are being addressed through other stakeholder processes. By applying this guideline, the ISO has been able to manage the scope of this stakeholder process, so that it can come to conclusions on the critical topics that it needs to address.

Therefore, as discussed in the Straw Proposal, the ISO is not proposing changes in this document concerning the following issues:

- Management of increased load following and regulation requirements: Important consequences of receiving imports supported by intermittent resources, using dynamic transfers, are the variability of the energy delivered by intermittent resources, the difficulty of dispatching or anticipating the amount of delivered energy from intermittent resources, and the potential for increased responsibilities for regulation and load following. These impacts occur with increases in dynamic imports of intermittent resources, as well as with increases in intermittent resources within the ISO BAA. The ISO has concluded that it should maintain comparable charges to internal and external intermittent resources for their contributions to regulation and load following requirements, and will be initiating a stakeholder process that will be a more general review of requirements for intermittent resources, including cost allocation and cost-sharing mechanisms for regulation and load following responsibility. Any charges resulting from that stakeholder process will apply to dynamic schedules and pseudo-ties that begin operation prior to its completion, with no grandfathering exemptions.
- Extension or modification of PIRP: Similarly, an upcoming ISO stakeholder process on market issues concerning intermittent resources in general will review the PIRP program as a whole, including questions of whether the ISO should expand PIRP to include external resources. Inclusion of dynamic imports in PIRP will be considered in that process rather than in this one.[4]

[4] Generators outside the ISO are not currently eligible to participate in PIRP. The current limitation of PIRP eligibility to not include external resources is stated in Appendix Q (Eligible Intermittent Resources Protocol) of the ISO tariff, in which section 2.2.1 requires execution of a Participating Generator Agreement, whereas pseudo-ties execute Pseudo-PGAs instead, and section 2.2.2 requires that a PIRP resource must be connected to the CAISO Controlled Grid, which does not include the connections to pseudo-ties.

A broader category of resources in the ISO tariff is Eligible Intermittent Resources. The current tariff definition of Eligible Intermittent Resource refers to Generating Units (which by the tariff definitions are within the ISO) that are powered by wind or solar energy (with an allowance for a de minimis amount of energy from other sources). The ISO will extend the definition of Eligible Intermittent Resources to include similar generation sources that participate in the ISO's markets through dynamic transfers. On April 30, 2010, FERC conditionally accepted the ISO's proposed tariff revisions, subject to further compliance filings (FERC docket ER10-319-000), to improve its ability to forecast the production from Eligible Intermittent Resources, and to mitigate the operational impacts of variability and uncertainty by receiving specified forecasting and telemetry data and reporting of forced outages. Receiving the same information for dynamic transfers of intermittent resources will

- Interconnection standards and transmission planning. The ISO has recently completed stakeholder processes on interconnection standards for renewable resources, and on a revised transmission planning processes, both of which have been presented to the Board of Governors at its May 2010 meeting. Operational issues that the ISO faces as intermittent resources become more prevalent, such as ensuring that it has enough inertia through synchronized capacity to arrest frequency decline following losses of generation, and that apply to both internal and external resources, will similarly be considered in other forums. This stakeholder process on dynamic transfers excludes issues that overlap with the other stakeholder processes.
- Ancillary services and uninstructed deviations: The ISO will maintain its existing tariff provisions concerning responsibility for operating reserves,[5] certification of ancillary services, and financial settlement of uninstructed deviations.
- Dynamic transfers of load: The ISO maintains a willingness to develop pilot agreements for dynamic transfers of load, but has not had operational experience with dynamic transfers of load that would enable identification of appropriate tariff provisions.

Section 3 of this document describes the proposals offered in this Draft Final Proposal in further detail. The impact of most issues is quite similar for both dynamic schedules and pseudo-ties, and this discussion will distinguish between these scheduling options only if needed, with the proposals applying to both forms of dynamic transfers. For clarity, section 4 summarizes the applicability of the proposals to dynamic schedules versus pseudo-ties. Section 5 highlights areas in which the ISO will need to implement changes to its market and operations systems before the full functionality described herein is available, and identifies the functionality that will be available in the interim. Appendix A of the Straw Proposal described the overall characteristics of dynamic transfers, and will be incorporated into the ISO's Business Practice Manuals after the conclusion of this stakeholder process. Appendix B of the Straw Proposal contained the standard terms of service for pseudo-ties, which the ISO proposes to include in the ISO tariff as a pro forma Pseudo Participating Generator Agreement.[6]

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be important for maximizing the utilization of intertie capacity and maintaining sufficient unit commitment of dispatchable generation to manage variations in external as well as internal intermittent resources.

5 Under Section 6.4 of the ISO tariff's Appendix X, the ISO treats firm dynamically scheduled energy as a resource contingent import, and procures (or allows for self-provision of) operating reserves. ISO tariff section 11.10.4.2 states the unit-contingent imports' obligation for operating reserves.

6 Both the Sutter and New Melones pseudo-tie pilots have participated successfully in the ISO's markets. This experience has revealed limitations in market functionality, which have not deterred the success of the pilots and are now being resolved. The ISO has developed the Pseudo PGA for Copper Mountain by refining the terms of the initial pilots, and now proposes the terms of the Copper Mountain pilot as the basis for pro forma language to go into the ISO tariff to support pseudo-tie imports. The key part of the pro forma Pseudo PGA is the statement of terms of service, which the ISO has adapted from the Copper Mountain Pseudo PGA by simply removing resource-specific references, and is Appendix B of the Straw Proposal as the ISO's proposed pro forma contract terms.

An area where a refinement is currently being implemented is in the enforcement of intertie scheduling constraints. Congestion management includes enforcing both (1) flow-based constraints within the ISO BAA, to ensure that flows remain within thermal limits of transmission facilities, adequate voltage support is available throughout the grid, and inter-regional flows do not undermine regional stability, and (2) scheduling constraints that limit the volume of schedules that adjacent BAAs agree can be scheduled on a particular intertie, based on either thermal capacity or contractual limits, regardless of how the resulting energy flows through the grid. Intertie scheduling is limited by both what the ISO calls "market scheduling limits", which place boundaries around scheduling points or

3. Enhancements for Dynamic Transfers

ISO tariff section 4.5.4.3 (Dynamic Scheduling) allows imports of energy and ancillary services from Dynamic System Resources, provided that: (a) such dynamic scheduling is technically feasible and consistent with NERC and WECC reliability standards, including any requirements of the NRC, (b) all operating, technical, and business requirements for dynamic scheduling functionality, as set forth in the Dynamic Scheduling Protocol in Appendix X or posted in standards on the ISO website, are satisfied, (c) the SC for the Dynamic System Resource executes a dynamic scheduling agreement as provided in Appendix B.5 with the ISO, and (d) all affected native Balancing Authorities and intermediary Balancing Authorities each execute with the ISO an Interconnected Balancing Authority Area Operating Agreement or other operating agreement related to the operation of dynamic functionality.[7]

These requirements do not inherently limit dynamic scheduling to certain generation technologies (e.g., conventional vs. intermittent). Given the recent level of interest in dynamic scheduling of renewable resources, what needs to be addressed is to define the ISO's operating, technical, and business requirements, to ensure that dynamic scheduling is technically feasible and consistent with NERC and WECC reliability standards. Like conventional resources, intermittent resources will need to comply with the provisions of the ISO tariff's Dynamic Scheduling Protocol and all other applicable requirements that conventional resources must meet before they can establish a dynamic transfer with the ISO. The tariff provisions that apply to Eligible Intermittent Resources that do not participate in PIRP will also be applicable to dynamic transfers of intermittent resources, including communication, telemetry, and forecasting requirements and the provisions of the Eligible Intermittent Resources Protocol (ISO tariff Appendix Q). The ISO's Issue Paper and Straw Proposal identified several additional areas in which operating, technical, and business requirements need to be defined.

3.1. Transmission reservations

As dynamic transfers begin to include intermittent resources, a concern is how to maintain full transmission utilization, while recognizing the variability of intermittent resources' output. Electronic tags (e-Tags) for dynamic scheduling contain capacity values for both expected

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sets of scheduling points that can be defined flexibly, but only limit energy schedules, and "intertie" constraints that maintain the sum of energy and ancillary service schedules within the defined limits but have a restriction that a resource can be subject to only one intertie constraint, due to current software functionality. The Sutter pseudo-tie uses network transmission service to support its scheduling through the SMUD BAA, which allows delivery to the ISO at multiple alternative scheduling points. Until recently, the ISO was unable to define an intertie constraint that applies to Sutter, because the intertie constraint allows mapping of a resource to only a single intertie. In Sutter's case, this had not been an issue because sufficient transmission has been available across the SMUD to ISO boundary. The possibility of an alternative delivery point for Copper Mountain in the event of an outage of its normal delivery point led the ISO to identify a solution through a market setup script. This is a manually initiated work-around for use in the event of intertie outages, using either network or point-to point transmission service through other BAAs, but does not support alternative intertie mappings as a routine market function. This is an implementation issue that does not affect the definition of terms of service in the Pseudo PGA.

[7] Tariff changes to implement the policies resulting from this stakeholder process may include renaming the Dynamic Scheduling Protocol to "Dynamic Transfers Protocol", and similar renaming of other documents. Except for obvious changes such as reference to a Pseudo Participating Generator Agreement rather than a Dynamic Scheduling Agreement, the requirements set forth in the existing Dynamic Scheduling Protocol appear to be applicable to pseudo-ties as well as dynamic schedules.

delivery and maximum delivery. Issues of allocating transmission capacity using e-Tags apply to all interties but do not affect scheduling within the ISO BAA, and thus intertie schedules face requirements that do not apply to resources within the ISO. The ISO's market software manages dynamic schedules using only the value for expected delivery, and this represents the transmission reservation for purposes of the ISO market.[8] However, if (1) a dynamically scheduled intermittent resource were to schedule its average, expected delivery, (2) its reserved transmission matches its energy schedule, and (3) other interchange schedules were accepted up to its intertie's full capacity, the intermittent resource may be unable to deliver more than its initial expected energy schedule. A contrasting concern is that Scheduling Coordinators (SCs) could submit excessive self-schedules to obtain flexibility for exceeding their actual expected, but intermittent, deliveries to the ISO. In this event, the ISO's market systems could expect that it would receive more energy from the intermittent resources than they would actually be expected to produce, and may fail to commit sufficient dispatchable capacity to maintain the required energy balance. Excessive scheduling for the purpose of obtaining flexibility for intermittent deliveries could also result in unused transmission capacity that could be used by other market participants. As the use of dynamic transfers grows, the ISO needs to avoid reducing the utilization of the ISO's import capacity.

To resolve these concerns, the ISO will treat the capacity values for expected delivery and maximum delivery, which are separate values in e-Tags for dynamic scheduling ("energy profile" and "transmission profile"), as separate values in market bids and schedules for dynamically transferred resources. In the day-ahead market and hour-ahead scheduling process, both the maximum delivery and expected delivery are subject to the intertie scheduling constraint. If the maximum delivery exceeds the expected delivery, the difference is similar to a capacity reservation for imports of ancillary services. As such, the market bid component for maximum delivery will be supported in both the day-ahead and real-time markets, with a single bid segment. An example of the use of separate bid and schedule components for expected delivery and maximum delivery is a solar photovoltaic generator during morning hours. In a particular hour, the generator's output is expected to be 30 MW at the start of the hour and 50 MW at the end of the hour, with the average delivery being 40 MW. This generator may choose to submit a self-schedule for an expected energy delivery of 40 MW and a maximum delivery of

[8] Section 6.1 of Appendix X (Dynamic Scheduling Protocol) of the ISO tariff states: "For any Operating Hour for which Energy and/or Ancillary Services (and associated Energy) is scheduled dynamically to the CAISO from the System Resource, a firm (or non-interruptible for that hour) matching transmission service must be reserved across the entire Dynamic Schedule transmission path external to the CAISO Balancing Authority Area." The intent that the requirement for firm transmission along the external scheduling path does not extend beyond the operating hour is stated on page 10 of the cover letter for Amendment 59: "The ISO's proposed dynamic scheduling policy requires that the Scheduling Coordinator make arrangements for firm, or non-interruptible for the operating hour, transmission service from the host Control Area and through all intermediary Control Areas, if applicable, to the ISO." Section 6.11 of Appendix X further states: "In Real-Time the Dynamic Schedule may not exceed the maximum value established by the sum of the Day-Ahead Market and HASP/RTM accepted Energy and Ancillary Services Bids plus any response to the CAISO's Real-Time Dispatch Instructions. The composite value of the Dynamic Schedule derived from the Day-Ahead and HASP/RTM accepted Bids plus any Dispatch Instruction response represents not only the estimated Dynamic System Resource's Energy but also the transmission reservation on the associated CAISO Scheduling Point." Requiring dynamic transfers to be supported by firm transmission only for each operating hour avoids a concern that requiring long-term transmission contracts outside the ISO could limit the availability of transmission to get to the ISO boundary. The dynamic schedule remains subject to the scheduling practices of other BAAs between the ISO, and the value for maximum delivery may have other significance to other BAAs.

50 MW, thereby assuring that it will have a transmission reservation sufficient to support its 50 MW delivery at the end of the hour.

To discourage submission of self-schedules for intermittent resources that exceed their actual expected delivery, the ISO will base settlements of dynamic transfers for the congestion component of LMPs and the Grid Management Charge on the greater of scheduled transmission reservations and actual delivery.

The existing tariff section 11.10.1.1.1 and 11.10.9.1 establish the congestion charges and credits, respectively, assessed for a dynamic system resource that is providing ancillary services becoming undeliverable due to a transmission derate. The ISO will clarify these sections to be applicable to all dynamic transfers including pseudo-ties that are providing ancillary services. Furthermore, similar provisions will apply for credits for release of transmission reservation that occur prior to the hour-ahead scheduling process (HASP) due to a transmission derate.

3.2. Congestion management

The previous section has addressed a portion of the ISO's concern for maintaining full transmission utilization while recognizing the variability of intermittent resources' output, by allowing intermittent resources to reserve sufficient transmission to accommodate their realistic levels of variable deliveries, while informing the ISO of their actual expected delivery, and while discouraging excessive requests for transmission reservations. However, there is a remaining concern that transmission usage at any particular time could be just a fraction of the available capacity, at the same time that the market awards for maximum delivery have fully reserved the available transmission (i.e., appearing to be congestion). If the example in the previous section, in which a solar generator has an expected energy delivery of 40 MW and a maximum delivery of 50 MW, is extrapolated into hundreds of MW of dynamically scheduled intermittent resources whose average delivery is a small fraction of their maximum capacity, the concern becomes significant.

If the ISO has knowledge of how a dynamically scheduled resource's output will vary within the operating hour for which the market bid has been submitted, the ISO can minimize the underutilization of transmission capacity. For resources that are dispatchable through price-responsive bids or as regulation reserve, the ISO can manage the variation of the resource's output. The ISO proposes to offer a scheduling option for dynamic transfers of Eligible Intermittent Resources, which will allow these resources to adjust their dynamic schedules for variations in their availability within the operating hour, for reasons other than price-responsive dispatches or response as regulation reserve.[9] The proposed scheduling option will leverage the market functionality that was initially developed to support Metered Subsystems (MSS).[10] The dynamic schedule would not become an MSS. Rather, the dynamic resource would be recognized in some ISO software systems as having a variable self-schedule, which in this case would be reported to the ISO as its expected output during 5-minute time intervals during a two-hour look-ahead period. The ISO sends the value to the resource as the ISO's dispatch (assuming no reduction due to congestion), in somewhat the same manner that a MSS informs

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9 Non-intermittent resources already have the ability to report reductions in their availability through SLIC. Intermittent resources are also expected to report reductions in their availability that are due to equipment outages or derates, but SLIC is not designed to be able to handle the very frequent changes in meteorological conditions that affect wind and solar generators.

10 An MSS is an electric utility system located within the ISO, which has operated before the ISO's formation as a municipal utility, water district, irrigation district, state agency or federal power marketing authority.

the ISO where its load-following resources will be operating, after which the ISO echoes back the operating point as a dispatch. SCs representing dynamically transferred resources would initially submit hourly self-schedules and/or economic bids for their forecast of expected delivery, concurrently with the ISO receiving bids for static interchange schedules in the Hour-Ahead Scheduling Process, allowing the ISO to optimize transmission reservations for static and dynamic schedules before using the updated forecasts of expected delivery during real-time interval dispatch.

By adding this capability, the ISO allows Eligible Intermittent Resources that are dynamically transferred into the ISO to choose between two scheduling options:

1. The resource may designate its expected delivery and maximum delivery in its day-ahead and real-time bid submission. During the operating hour, the ISO will use its internal systems to forecast the resource's delivery, for use in its overall unit commitment and dispatch for the ISO BAA as a whole.[11] Initially, the ISO will use the most recent available telemetry reporting of the resource's output as its expected deliverability and real-time dispatch for the next dispatch interval (adjusted downward if necessary due to congestion), and will continue its efforts to improve its forecasting capability for intermittent resources. This option uses existing ISO market software functionality.[12]
2. Using the new functionality, the resource may designate its expected delivery and maximum delivery in its day-ahead and real-time bids, and then submit its own forecast of its availability during the operating hour. Its reported availability would perhaps be based on its own forecast or other arrangements such as firming and shaping services that it receives outside the ISO markets. The ISO will return the reported availability during the next 5-minute dispatch interval as the resource's dispatch, adjusted downward if necessary due to congestion. The ISO will monitor the submitted forecasts of availability, compared to actual deliveries and the ISO's own forecasts of availability, and will expect the submitted forecasts to reflect the then-current capability of forecasting technology.

Using either option, the ISO's dispatch defines the instructed operating point for the resource during the next real-time dispatch interval, which is the basis for financial settlements of instructed and uninstructed energy. Such a mechanism will allow a dynamic resource to manage its real-time schedule, which affects its energy settlement. This mechanism also allows the ISO to maintain efficient operation of its interties and internal transmission by dispatching other resources that can respond to the availability of transmission, in two ways: (1) the ISO will be aware of upcoming changes in delivery from the dynamic transfers, and efficiently dispatch other resources to meet system requirements, and (2) if there is at least one separate, dispatchable dynamic transfer using the same intertie, the ISO can dispatch the other dynamic resource to use the available intertie capacity. The following examples illustrate these interactions:

- If a dynamic intermittent resource with an initial schedule of 100 MW uses an intertie with 400 MW of capacity, and other schedules using the same intertie have not used all of the

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[11] The ISO requires Eligible Intermittent Resources to provide meteorological data to enable the ISO to forecast the intermittent resource's output, comparable to data required under PIRP. The ISO will extend the definition of Eligible Intermittent Resources to include dynamically transferred resources with the same characteristics as for internal resources.

[12] Internally, the ISO's market systems flag the resource as being "non-compliant" in the sense that the resource does not expect the resource to follow an economic dispatch. Instead, the ISO issues dispatch instructions to remain at its current output, or in the case of real-time congestion of over-generation, instructions to reduce output. The term "non-compliant" in this context has no implication for other compliance monitoring, such as the ISO's rules of conduct

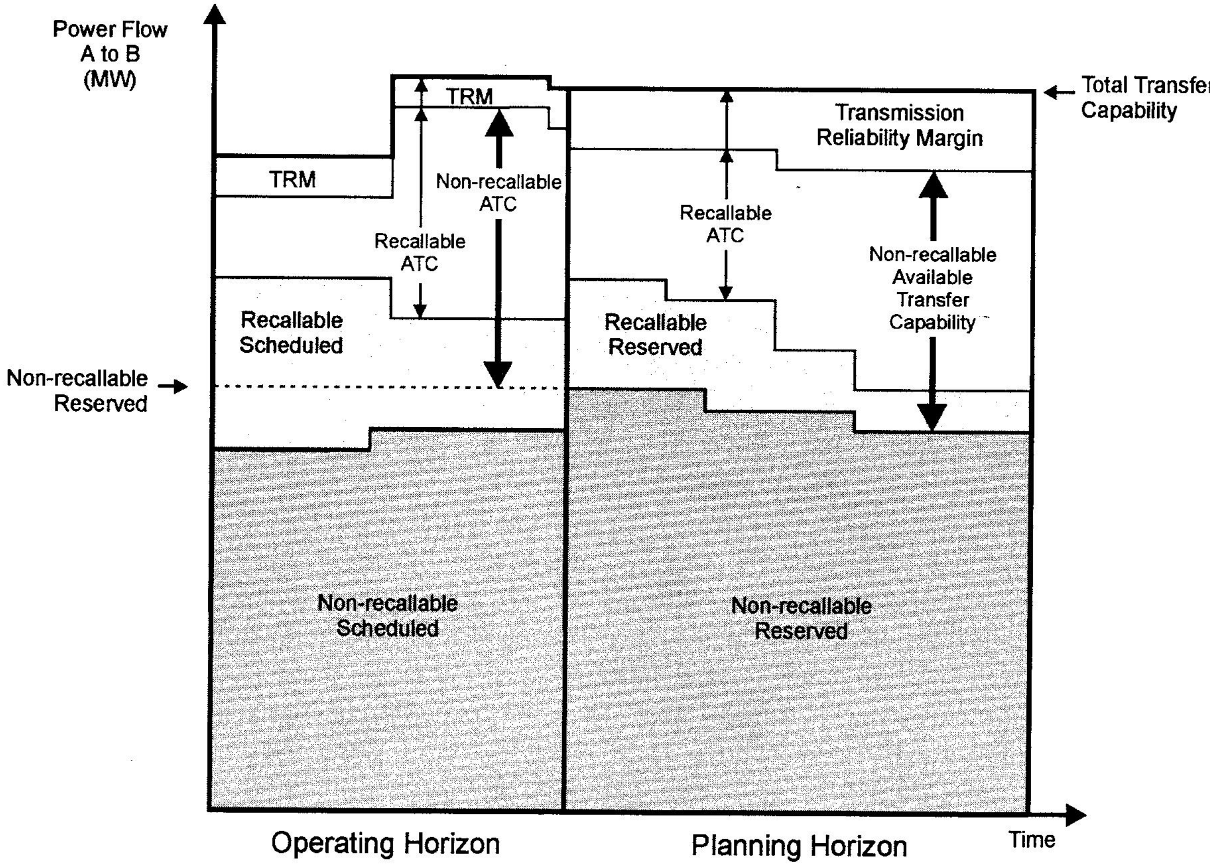
remaining intertie capacity, the intermittent resource will provide its forecasted delivery to the ISO, which will return the forecast to the resource as its dispatch. If the intermittent resource's forecast were for a decrease to 80 MW, the ISO would return a dispatch instruction of 80 MW. If the intermittent resource's forecast increases to 120 MW and there is available intertie capacity, the ISO's dispatch would be 120 MW.

- If static hourly schedules using the same intertie have been awarded schedules in the day-ahead market or HASP that fully utilize the remaining 300 MW of available capacity, and no other dynamic resources can be dispatched, the intermittent resource would not be able to increase its schedule. If the intermittent resource were to submit a forecast to the ISO that its delivery would increase to 120 MW, the ISO would return a dispatch instruction to remain at 100 MW.
- If there is a second dynamic transfer using the same intertie, which is dispatchable (for example, had submitted an economic bid with a $50/MWh bid price, and is not subject to operational constraints such as minimum run time that limit the economic bid's availability), the ISO would dispatch the second dynamic transfer to decrease its output to accommodate the intermittent resource's increase in delivery to 120 MW (assuming the intermittent resource has submitted a self-schedule or a bid price less than $50/MWh). This flexibility allows the ISO to maximize its utilization of intertie capacity.
- Extending the forecast of delivery by the intermittent resource beyond the current dispatch period allows the ISO to dispatch resources based on an understanding of future conditions. If the intermittent resource has a temporary decrease in a self-schedule to 80 MW, which is expected to return to its original level after a few dispatch intervals, the ISO will be able to avoid dispatching other resources that would be sub-optimal later, after considering their operating constraints. If (1) the intermittent resource's output were to decrease to 80 MW without providing a forecast that its delivery would return to 100 MW after 15 minutes, (2) the ISO were to dispatch the start-up of a second dynamic resource that has a 30-minute minimum run time and that uses the 20 MW of capacity represented by the intermittent resource's reduction in delivery, and (3) the intertie capacity has been fully utilized, the ISO would be unable to allow the intermittent resource to return to its 100 MW schedule.

The concepts of dispatching economic bids of separate, dispatchable dynamic transfers to maximize transmission utilization can be understood through the framework for determining available transfer capabilities of interconnected transmission networks for a commercially viable electricity market, that is stated in NERC's "Available Transfer Capability Definitions and Determination" report.[13] NERC distinguishes among reserved versus scheduled, and recallable versus non-recallable, uses of transmission as shown in the following diagram.

[13] NERC's "Available Transfer Capability Definitions and Determination" report is available at http://www.nerc.com/docs/docs/pubs/atcfinal.pdf

TTC, ATC, and Related Terms in the Transmission Service Reservation System



Using the concepts of the NERC framework, the day-ahead market and hour-ahead scheduling process are within the planning horizon, when intertie capacity is reserved but dynamic resources are not yet scheduled. Recallability is defined in the NERC report as the right of a transmission provider to interrupt all or part of a transmission service for any reason, including economic, that is consistent with FERC policy and the transmission provider's transmission service tariff or contract provisions. In the above diagram, in the operating horizon "recallable scheduled" transmission uses a portion of "non-recallable reserved" transmission when the "non-recallable scheduled" transmission is less than the "non-recallable reserved" transmission. The NERC report explains that the combination of "non-recallable reserved" and "recallable reserved" can exceed the total transfer capability, to more fully utilize transmission assets, subject to constraints and priorities including:

- The sum of "non-recallable scheduled" plus "recallable scheduled" transmission cannot exceed the total transfer capability,
- "Non-recallable reserved" itself cannot exceed the total transfer capability,
- Non-recallable service has priority over recallable service, and
- Reserved transfer capability may be used by recallable scheduled transfers.

In terms of the ISO's markets, awarded self-schedules can be considered "non-recallable scheduled" transmission, while dispatches of economic bids above self-schedules can be considered "recallable scheduled" transmission since they can be rescinded based on economics. "Non-recallable reserved" transmission is the maximum reservation, which will be subject to the intertie scheduling constraint in the day-ahead and HASP market runs, and then go in the transmission profile of e-Tags to the extent it is awarded. When the ISO issues a dispatch for an interval in the real-time market, the dispatch represents “recallable scheduled” transmission, for which the ISO has reserved “recallable reserved” transmission for that real-time dispatch interval. This framework supports the dispatch of dynamic transfers that have submitted economic bids, to make use of transmission that is within the e-Tag transmission profiles of intermittent resources but that is not used in that five-minute dispatch interval.

In the ISO’s markets, congestion is managed first by dispatches of economic bids. When economic bids that are effective in relieving congestion on transmission constraints are exhausted, the ISO will need to adjust self-schedules to further manage congestion. Over the time horizon during which the ISO economically dispatches resources’ bids, the ISO will be able to use the available forecasts of intermittent resources’ availability to award “recallable scheduled” transmission and “recallable reserved” transmission (maximum reservation, in the terms used above), within the available capacity. In the event that real-time flows exceed transmission limits, time is more limited, and the ISO may need to instruct resources whose outputs exceed their maximum transmission reservation to return to their schedules and dispatch points, and then use economic bids to manage congestion, before initiating pro rata curtailments of self-schedules that are the most effective at relieving the real-time congestion.[14] This reflects that, first, the schedules and dispatch points represent reserved transmission, and second, that economic dispatches represent recallable transmission with lower priority than self-schedules, which represent non-recallable transmission.

3.3. Dispatchability requirements and curtailment rules

In most instances, the market prices resulting from the ISO’s congestion management may be adequate to ensure compliance with dispatches. When the ISO’s market software determines schedules, it considers known transmission constraints, but sometimes conditions change after the market runs and changes to schedules must occur in order to maintain reliable operations. In the event of a real time derate on the designated intertie or other transmission contingency event in close proximity, it is imperative that the dynamic resource, either conventional resource or intermittent, be “dispatchable” so as to be able to respond immediately to the dynamic interchange schedule (e-Tag) curtailment.[15] Experience with the existing dynamic schedules has shown that critical real-time operational issues can arise very quickly, and that rapid response is required to maintain reliability, but the response by some market participants has not always occurred as needed. If a market participant causes the ISO to incur a penalty for non-compliance with standards, existing tariff provisions allow the ISO to charge the market

[14] An issue in the ISO’s market software has been obtaining pro rata adjustments of equally situated resources’ self-schedules. For the day-ahead market, there is much similarity between the schedules of dynamic and static resources, and the ISO is working to ensure equitable schedule adjustments. In the real-time market, dynamic and static resources are less similar due to scheduling of static resources at fixed amounts during operating hours (except for inter-hour ramping), while dynamic resources are dispatched using five-minute intervals, and further analysis will be needed before the ISO can commit to pro rata adjustments of self-schedules.

[15] E-Tagging of dynamic transfers is necessary for compliance with scheduling standards. The ISO is refining our administration of e-Tags for pseudo-ties within the market systems, based on our experience with the pseudo-tie pilots.

participant for the penalty, but these provisions only cover fairly extreme departures from reliable operation and may not be sufficient.

A key issue with the expansion of dynamic import services to renewable resources will be the ability of the resource to be "dispatchable" and to drop load in defined increments, to be immediately responsive to curtailment orders by the native or attaining BA. In addition to tariff provisions, this ability may require the use of special operating procedures that would be developed to reflect individual resources' individual characteristics, equipment that facilitates immediate response to such dispatch instructions, and the decisive reduction of output in pre-defined blocks of MWs. This agreement and unit ability will be particularly critical in the event of an overload condition at the associated pre-existing physical Intertie for grid reliability and NERC Interchange Standard compliance.

The market software currently has some provisions for performing contingency dispatch to respond to events including outages or unexpected derates of interties, although at times manual intervention by operators is necessary to reduce energy flows. Manual intervention may also be necessary if dynamic resources do not respond to dispatches, even if derates are foreseeable or allow response times that would otherwise accommodate normal ramping. Dynamic scheduling allows the ISO to respond to changing congestion conditions within operating hours more than its very limited ability to adjust static hourly intertie schedules, and the Dynamic Scheduling Agreement for Scheduling Coordinators requires compliance with the ISO's dispatches.[16] In addition, inadequate compliance with dispatches can result in issuing operating orders to dynamic resources, to reduce flows to within operating limits. The ISO will determine how it can most efficiently distinguish operating orders from routine dispatches, and communicate operating orders to the affected resources. One potential mechanism for communicating operating orders may be by using a comment field in communications that would be distributed through the Automated Dispatch System (ADS).

Recognizing these concerns, the Straw Proposal noted the existence in the current ISO tariff of Section 5.1 of the pro forma Dynamic Scheduling Agreement for Scheduling Coordinators (Appendix B.5 of the ISO tariff), which provides that except for operating emergency situations, real-time energy transfers may not vary from the day-ahead schedule as adjusted by any dispatch instructions by more than the greater of five MW or three percent of the net dependable capacity (PMax) of the System Resource, integrated across a ten-minute interval. If such defined performance band is exceeded by any amount in more than five percent of the ten-minute intervals on three successive days, then such deviations constitute one event of non-compliance with the CAISO Dynamic Scheduling Protocol. Section 3.2.2 of the Dynamic Scheduling Agreement allows the ISO to terminate the agreement after three instances of non-compliance with the Dynamic Scheduling Protocol (ISO tariff Appendix X).

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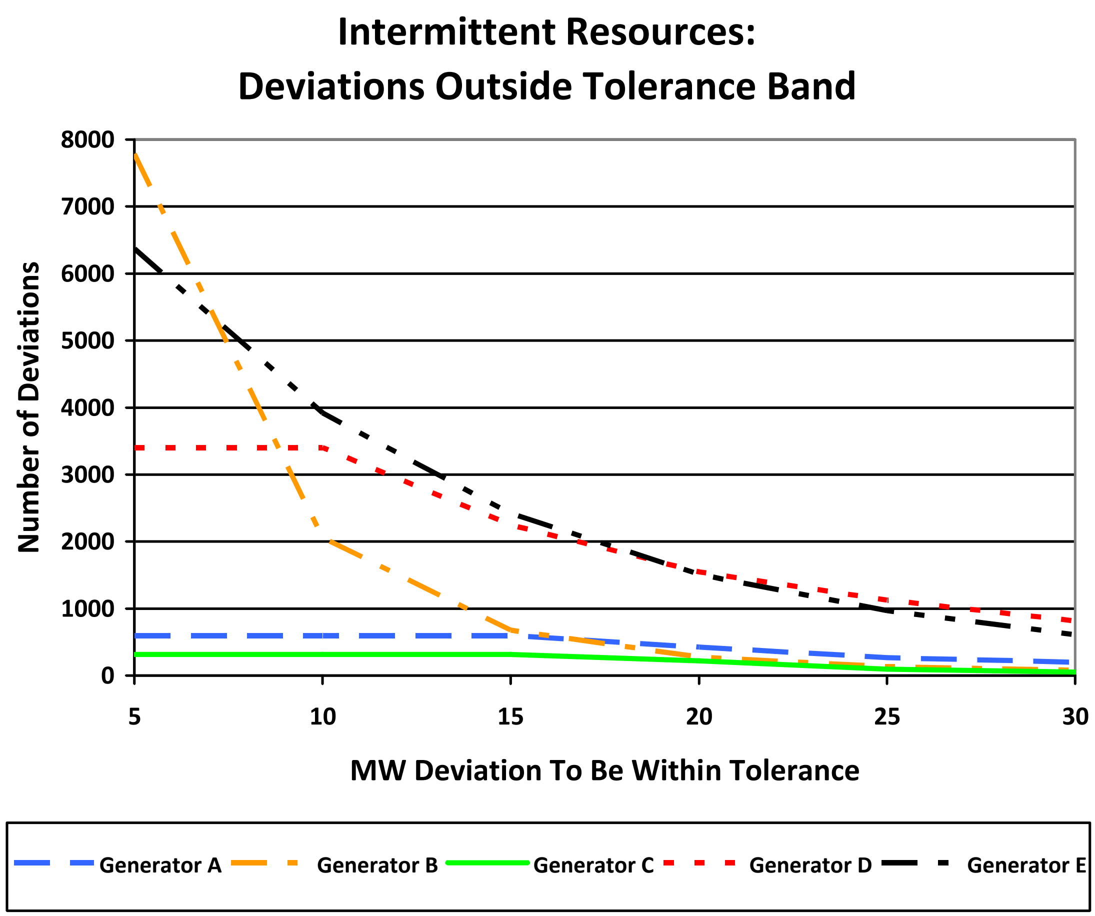
[16] Although the ISO will be modifying the terms of Section 5.1 of the Dynamic Scheduling Agreement for Scheduling Coordinators, which currently states a tolerance band for uninstructed deviations, sections 4.1 and 5.2 of the agreement are general requirements for compliance with the ISO tariff. Also, Section 8.3 of the Dynamic Scheduling Protocol (ISO Tariff Appendix X) states: "All Day-Ahead Market and HASP/RTM submitted Dynamic Schedules shall be subject to CAISO Congestion Management and as such may not exceed their transmission reservations in Real-Time (with the exception of intra-hour Dispatch Instructions of the Energy associated with accepted Ancillary Services Bids)." The ISO will determine the disposition of the current language in section 5.1 while developing the tariff amendment to implement the Board of Governors' upcoming Dynamic Transfers decision, but section 5.1's content may be limited to its existing reference to the ISO tariff's overall provisions for uninstructed deviations.

The ISO proposed the scheduling option discussed in section 3.2 with the initial intent of allowing intermittent resources to manage their schedules within this tolerance band. This option would allow an intermittent resource to update its availability every five minutes within the operating hour, by reporting its expected delivery to the ISO by 5-minute time intervals for a forward-looking 2 hour period, which the ISO would return to the resource as the ISO's dispatch unless it is limited by congestion or other conditions. There does not appear to be any alternative that could allow more accurate updates for the ISO's dispatch, given that the ISO's real-time dispatch interval is five minutes in duration.

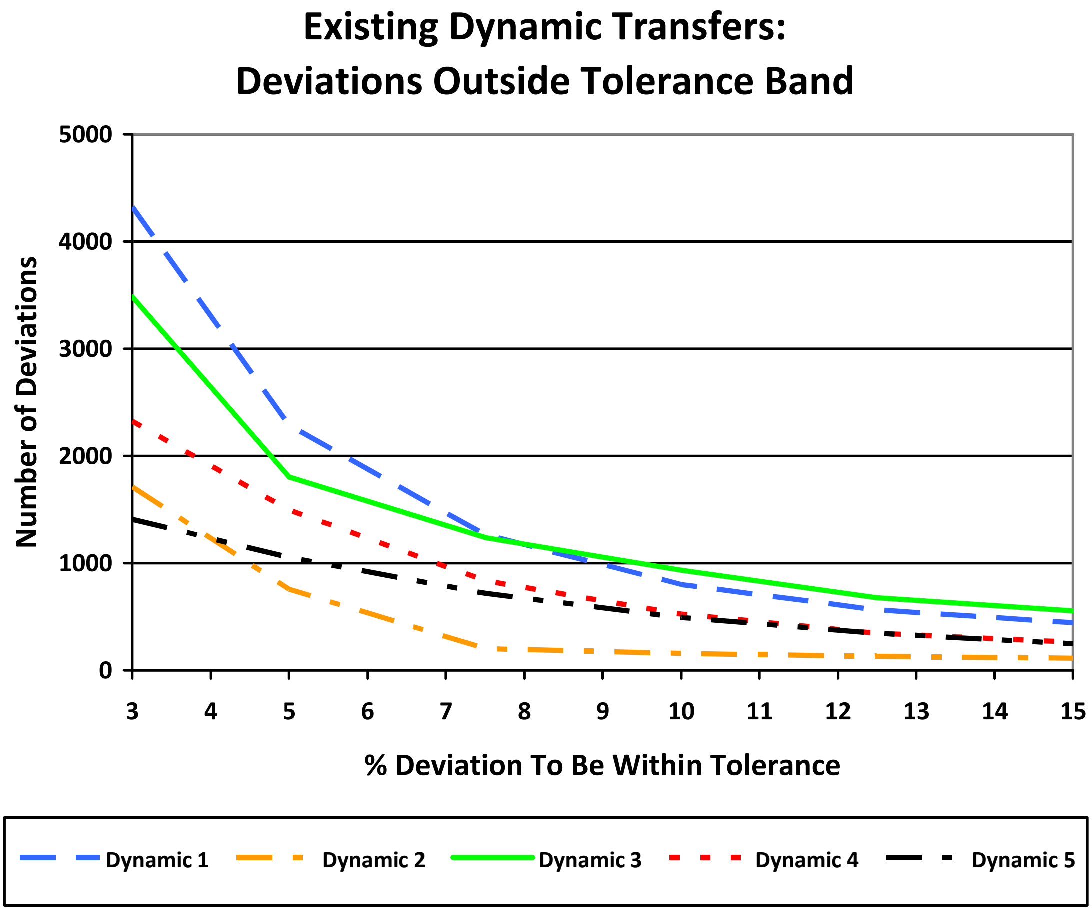
Nevertheless, discussion at the March 17 stakeholder meeting questioned whether the existing tolerance band is achievable, even with the proposed ability to update the ISO dispatch level. To analyze whether the tolerance band that now exists in the ISO tariff is appropriate, the ISO subsequently analyzed the performance for the 2009 calendar year of the ten then-existing dynamic transfers (nine dynamic schedules plus one pseudo-tie) and of existing intermittent generators within the ISO. The purpose of this analysis is to determine whether the ISO should consider changes to the existing tolerance band and/or to the provisions concerning non-compliance, given that the ISO has operated successfully with these resources in operation.

In the analysis of existing intermittent resources, the ISO was not able to use five-minute updates of forecasted output because the ISO had not forecasted at that granularity. During discussion at the March 17 stakeholder meeting, some participants suggested that they would not be able to forecast more accurately than to assume that current output would be the expected output during the subsequent interval. Therefore, this analysis assumes that for the forecasted output that would be sent during one five-minute interval would use the average output during the previous five minutes as the forecast for the following five minutes, and that this method would be performed regularly during each five-minute update during the year. The analysis then averaged the difference between the "forecasted" and actual delivery across ten-minute intervals, as currently stated in the tariff. The following graph shows the number of 10-minute intervals during the year in which this difference exceeds the tolerance band, out of the 52,560 ten-minute intervals during the year (8760 hours times six intervals per hour), versus the MW of deviation that defines the tolerance band (the current tariff definition being 5 MW), for five intermittent resources (wind and solar). (The comparison for intermittent resources is relative to the MW part of the threshold definition because most existing intermittent resources are less than 300 to 400 MW, so the MW part of the definition generally exceeds the percentage part of the definition. The five intermittent resources shown here are among the larger ones, although they are not necessarily the largest five resources because variability of weather at the generator's site can cause as much MW variability as simply being the largest resource.)



Note that it is not necessary to be within the tolerance band in all intervals to meet the existing tariff requirement, which counts the number of intervals with deviations outside the tolerance band during three-day periods. However, an examination of the events of non-compliance using the assumptions of this analysis, it would appear to be necessary to widen the tolerance band's percentage to at least 25 MW to avoid termination of dynamic scheduling agreements with intermittent resources similar to generation within the ISO.

For existing dynamic transfers, the ISO determined the difference between delivered output and the real-time dispatch point, as adjusted for regulation energy, by 10-minute interval. The following graph shows the number of 10-minute intervals during the year in which this difference exceeds the tolerance band, versus the percentage of deviation that defines the tolerance band (the current tariff definition being 3% of PMax), for five of the ten existing transfers. (The comparison for existing dynamic transfers is relative to the percentage of PMax because most existing dynamic transfers are at least 300 to 400 MW, so the percentage part of the threshold definition exceeds the MW part of the definition.)



As noted above, it is not necessary to be within the tolerance band in all intervals, but it is more difficult to meaningfully show the number of events of non-compliance as defined by the tariff. However, an examination of the events of non-compliance, after accounting for instances of reported outages and derates (including not counting reasonable extensions of time near the reported outages and derates as events of non-compliance), suggests that it would be appropriate to widen the tolerance band's percentage to at least 10% of PMax to reduce the exposure to potential termination for parties to dynamic scheduling agreements in the future.

In summary, if the ISO were to retain the tolerance band approach to measuring compliance, and attempt to make it workable under the existing tariff approach of exposure to potential contract termination after three events of "non-compliance," it appears that it would be appropriate to widen the tolerance band to at least the greater of 25 MW or 10% of PMax. Expecting new dynamic transfers to be able to routinely perform within this level of tolerance may be appropriate as a criterion for acceptance of new resources, but this would not be adequate performance for reliability purposes at times when the ISO experiences real-time congestion on its interties and resources' deliveries exceed their schedules. When there is no congestion, uninstructed deviations by dynamically transferred resources would be no more of a concern than they are for resources within the ISO. A more appropriate criterion for continued operation of a dynamic transfer agreement would be compliance with operating orders, including the existing provisions of section 37.2 of the ISO tariff ("Comply with Operating Orders"). The term "operating order" in section 37.2 can be presumed to be different from a routine dispatch instruction, and to be more focused on conditions when reliability requires a specific response to the ISO operator's instructions. Section 37.2.1.1 of the ISO tariff states a definition of the term "operating order": "For purposes of enforcement under this Section 37.2, an operating order shall be an order(s) from the CAISO directing a Market Participant to undertake, a single, clearly specified action (e.g., the operation of a specific device, or change in status of a particular Generating Unit) that is feasible and intended to resolve a specific operating condition."

The following examples illustrate the relative roles of dispatches and operating orders, in terms of the order of actions stated in Section 3.2 of this Draft Final Proposal that may be taken in the event that real-time flows exceed transmission limits, with limited time available for response.[17] To manage operating constraints when time does not allow control using only dispatches and economic bids, the ISO would first instruct resources whose outputs exceed their maximum transmission reservation to return to their schedules and dispatch points, and then use economic bids to manage congestion, before initiating pro rata curtailments of self-schedules that are the most effective at relieving the real-time congestion.

- First, assume that the available transfer capability (ATC) is 1000 MW, and the market schedules resulting from HASP include 600 MW of static hourly firm schedules. (All scenarios in these examples assume the 1000 MW of ATC and 600 MW of statis schedules.) In addition, dynamic schedules with expected average energy of 300 MW and maximum transmission reservation of 300 MW. In actual real-time operations, the dynamic resources deviate by +10 MW. There is no required ISO curtailment action in this first scenario because the 910 MW of actual flow does not exceed the 1000 MW flow limit.
- In a second scenario, the dynamic schedules have an expected average energy of 400 MW and maximum transmission reservation of 400 MW. If the dynamic schedules deviate by +10 MW in actual real-time operations, the actual flow becomes 1010 MW, which exceeds the flow limit of 1000 MW. The ISO would have the right to issue an operating order for the dynamic schedules to return to the 400 MW of transmission reservation. If further mitigation were needed, the ISO would dispatch economic bids, if effective bids were available from dynamic transfers or resources within the ISO BAA.
- In a third scenario, the dynamic schedules' maximum transmission reservation is 400 MW, but the dynamic schedules have an expected average energy of only 300 MW. In actual real-time operations, the dynamic schedules deviate by +110 MW above the scheduled energy, producing an actual flow of 1010 MW (exceeding the flow limit of 1000 MW). The ISO would be able to first use operating orders for the dynamic schedules to curtail by 10 MW, to produce a return to their transmission reservation of 400 MW. If further mitigation were needed, the ISO would dispatch economic bids, if bids were available.
- In a fourth scenario, both the average energy and maximum transmission reservation of the dynamic schedules' are 300 MW. In actual real-time operations, the dynamic schedules do not deviate above their scheduled energy, but unscheduled flow from other sources produces an actual flow of 1010 MW. In this scenario, the ISO will not issue an operating

[17] When adequate time is available for response, changes in transmission constraints' capacity or in intermittent resources' output would be accounted for through the ISO's normal economic dispatch, assuming that dispatchable resources comply with dispatch instructions. The real-time market software includes unit commitment with a forecast period of nearly five hours, and known changes in transmission capacity would be considered in unit commitment and dispatch. Similarly, observed changes in intermittent resources' outputs and forecasts of output in future dispatch intervals would be considered in the real-time market's normal functions. The scenarios illustrated here apply to more immediate needs for response, as well as to instances when the ISO has dispatched resources to maintain their outputs at certain levels but the resources have not complied.

order to curtail the dynamic schedules as the first response, because they are within their transmission reservations. To restore the actual flow to the flow limit, the ISO would dispatch economic bids as the first curtailment action. If economic bids were not available or were not sufficient to return the flow to the flow limit, the ISO would order pro rata curtailments across all schedules using the affected intertie to obtain the needed 10 MW flow reduction, as operating orders.

- A fifth scenario is similar to the third, with the addition of unscheduled flow as in the fourth scenario: the dynamic schedules' maximum transmission reservation is 400 MW, but the dynamic schedules have an expected average energy of only 300 MW. In actual real-time operations, the dynamic schedules deviate by +110 MW above the scheduled energy, which, in combination with uninstructed flows, producing an actual flow of 1100 MW. The ISO would have the right to initially issue operating orders to the dynamic schedules to curtail by 10 MW, to produce a return to their transmission reservation of 400 MW. To accomplish the remaining 100 MW of flow reduction, the ISO would dispatch economic bids, if bids were available, before issuing operating orders for pro rata reductions.

Tariff Section 37.2 provides financial penalties for non-compliance with operating orders issued by the ISO ($5,000 for the first instance, and $10,000 for subsequent instances), but ironically does not appear to provide contract termination as a result of non-compliance. Based on the analysis presented above, the ISO now proposes to eliminate contract termination as a penalty resulting from section 5.1 of the Dynamic Scheduling Agreement for Scheduling Coordinators. Instead, upon a third instance of non-compliance with an operating order, the ISO proposes to require the resource owner to install additional equipment or institute other measures to ensure compliance, potentially including direct equipment control, and consider contract suspension if these measures do not secure the necessary compliance. [18] The ISO will also determine how it can most efficiently distinguish operating orders from routine dispatches, and communicate operating orders to the affected resources, such as a distinguishing indicator in communications that would be distributed through the Automated Dispatch System (ADS).

In addition to being able to demonstrate response to operating orders, intermittent resources that use dynamic transfer should also satisfy the following requirements that the ISO Board of Governors approved on May 18, 2010, and that the ISO will propose to FERC, to apply to internal variable energy generators[19]:

1. Variable energy generators must have the ability to limit their active power output in response to a dispatch instruction or operating order from the ISO. This ability should apply to the resource's full range of potential output so that the resource's reduction in output can range from incremental to full curtailment.

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[18] Section 3.2.1 of the Dynamic Scheduling Agreement for Scheduling Coordinators states other grounds for contract termination, while section 3.2.2 addresses non-compliance provisions such as the tolerance band in section 5.1. A stakeholder comment that addressed the context of sections 3.2.2 and 5.1 suggests that contract suspension is more appropriate than contract termination. If the resource operator does not implement the necessary actions to ensure future compliance, the ISO will release any capacity assigned to the resource in queues that may exist for intertie capacity.

[19] These requirements are stated in the ISO management's recommendation to the Board, which is available at http://www.caiso.com/2793/2793abee1a0a8.pdf. The term "variable energy generators" should be considered synonymous with Eligible Intermittent Resource for purposes of this Draft Final Proposal.

2. The capability must be able to reduce active power output on step-sizes in no greater than 5 MW increments, which also should not result in voltage steps greater than 2% under normal system conditions.
3. The variable energy generator is expected to interface with the ISO in a manner similar to any other generating facility. As such, the resource must be able to receive and respond to automated dispatch system instructions and any other form of communication authorized by the tariff and in conformance with the time periods prescribed by the tariff.
4. If a variable energy generator is ordered off-line or curtailed, the plant operator must not reconnect the plant to the grid or increase output without prior approval from ISO operating personnel similar to other generating resources.
5. Variable energy generators must be able to limit and control their ramp rates at the request of the ISO, except for downward ramps resulting from the loss of wind or sun to fuel the generating facility. The ramp rate limiter should have the ability to set their ramp rate between a range of 5% and 20% of rated capacity/minute with a default setting of 10%.
6. Variable energy generators must have an over frequency control system that continuously monitors the frequency of the transmission system and automatically reduces the real power output of the generator in the event of over frequency. An intentional dead band of up to 0.036 Hz can be designed for the over frequency control system. The over frequency response design requires a droop setting of 5%, which means that a generator will change its output 100% for a 5% (3 Hz) change in system frequency.

3.4. Locational pricing

Although most of the ISO's dynamically scheduled resources began operation prior to April 2009, as of April 2009 the ISO's market models generation within the ISO at its physical location in the transmission network, and prices generation output at the point where it is metered. Similarly, the ISO includes significant transmission facilities outside the ISO BAA in its full network model to the extent that is practicable, and models and prices pseudo-tie generation at its actual location in the full network model. For dynamic resource-specific system resources, the ISO's dynamic scheduling agreements establish the actual location of the generation, and the ISO will model and price dynamic resource-specific system resources at these locations.[20]

Modeling dynamic resource-specific system resources at their actual locations allows the ISO to establish feasible interchange schedules and thereby maintain the reliable operation of the ISO's transmission system, by modeling the resulting flows as accurately as possible. A lack of modeling resources at their actual locations, when their locations are known, could cause consumers to pay inappropriate costs resulting from inaccurate real time re-dispatch costs, as the ISO would need to mitigate congestion that results from using inaccurate modeling. After establishing the scheduling and dispatch of dynamic resource-specific system resources based on their actual locations, it is then necessary to use the corresponding locational marginal prices (LMPs) to avoid disparities between the prices that are used for scheduling and dispatch and the prices that are paid in financial settlements.

An important attribute of the locational marginal prices (LMPs) that the ISO uses to schedule, dispatch, and settle resources at these locations outside the ISO is that they reflect only costs that occur within the ISO market. The calculation of the ISO's LMPs is described in detail in Section 27.1 and Appendix C of the ISO tariff. The ISO enforces congestion only for

[20] This is not a significant change for existing dynamic resource-specific system resources, because they schedule into the ISO markets at scheduling points that are close to their physical locations.

transmission constraints that are within the ISO's BAA and scheduling capacity rights that are available as ISO controlled grid outside the ISO BAA, and the ISO excludes losses on transmission facilities that are outside the ISO BAA.

Information for modeling dynamic resource-specific system resources consists of data concerning both the dynamically transferred resource and the transmission system that supports it. For a generation resource, most of the required data would be obtained from the resource operator and/or scheduling coordinator, for implementation of the Dynamic Scheduling Agreement for Scheduling Coordinators (Appendix B.5 of the ISO tariff), Pseudo Participating Generator Agreement (which will be added to the tariff), or similar agreement. The ISO currently bases its modeling of external transmission systems on base cases that are available on the WECC web site. If (1) a BA acts only in the role of a transmission operator and is not involved in the scheduling of a dynamic transfer, and (2) the WECC base cases contain adequate representations of the transmission systems that support delivery of the resource to the ISO boundary, at the level of detail that would normally be contained in a WECC base case, the ISO does not anticipate needing additional information about the transmission system. In most cases, the host BA for the dynamically transferred resource and any intermediary BAs will need process e-Tags and to receive data concerning the dynamic resource, such as telemetry, which it may need to relay to the ISO. These requirements are described in the Dynamic Scheduling Host Balancing Authority Operating Agreement (Appendix B.9 of the ISO tariff) or similar agreement.

3.5. Pro rata allocation of deviations among BAAs

Prior to 2007, the ISO assumed real-time balancing service for some dynamic resources that scheduled less than 100% of the resource output into the ISO, as the dynamic transfer equaled the actual plant output minus static schedules. For example, if an external resource was actually generating 490 MW in real-time but had a dynamic import schedule of 100 MW to the ISO and a static schedule of 400 MW with another BAA, the actual dynamic transfer into the ISO would have been 90 MW (490 – 400), which meant that the ISO assumed the entire 10 MW of deviation.

Recognizing that this methodology could result in excessive costs to the ISO's market participants, the ISO has subsequently incorporated pro rata allocation of deviations into agreements for individual dynamic schedules, producing a sharing of the real-time balancing burden from an external resource that is dynamically scheduled to the ISO (proportionate to the percentage of the resource that sinks to the ISO dynamically). Example: assuming an external resource is actually generating 490 MW in real-time but has a dynamic schedule of 100 MW import to the ISO and a static schedule of 400 MW with another BAA. The ISO would incur 2 MW of the 10 MW deviation (100/500 * 10). The native BAA maintains responsibility for the other 8 MW of deviation burden.

Stakeholder comments support the ability of dynamically scheduled resources to schedule only a portion of their output into the ISO's markets. The ISO will incorporate this treatment in its tariff as an upper limit on its allocation of deviations, rather than needing to use a contract-by-contract provision. The implementation of the pro rata allocation of deviations among BAAs may include tariff provisions that the ISO will not execute new Dynamic Scheduling Agreements for resources in BAAs that do not provide this limit to the ISO's exposure to deviations.

3.6. Limits of dynamic imports

Section 5.1 of the Dynamic Scheduling Protocol (Appendix X of the ISO tariff) establishes the right for the ISO to establish limits applicable to the amount of any ancillary services and/or energy imported into the ISO BAA, whether delivered dynamically or statically. To establish such limits, the ISO will coordinate technical studies with other affected BAAs within the WECC area (Western Interconnection) to determine the maximum transfer limits between BAAs.[21] The ISO is also committed to discussing the details and results of these studies with participants.

Studies are necessary to identify operational impacts and limitations on control, stability and response of the transmission system. The studies to support the dynamic transfer policy are not general studies of limitations related to intermittent resources in general, but need to evaluate the effects that the level of variability of dynamic transfers has on operational reliability. In other words, the studies proposed for determining dynamic transfer policy are intended to be specific to dynamic transfer limits and not replace, but rather be informed by, general studies addressing the system needs to accommodate all intermittent resources.

The ISO plans to study dynamic transfer to determine if there are any limitations as a result of supporting dynamic transfer of variable resources located outside of the ISO BAA while shaping and firming energy to support the variable delivery with resources within the ISO BAA. The study will attempt to answer the following technical questions:

a. Do variable dynamic transfers pose any impacts to existing path limits that are established based on static interchange models with an accommodation of planned hourly variation ramped over a 20 minute period?

b. Do variable dynamic transfers create any voltage control issues?

c. Does the level and nature of variability and dynamic transfers of variable resources pose any risk to stability or excitation of low frequency modes of oscillation? In order to answer this question, the ISO may have to gather more granular actual output data from some technology types.

The completion of these studies will extend beyond the completion of this phase of the Dynamic Transfers stakeholder process. In order to not delay the ISO's ability to consider new requests for dynamic transfers, the ISO will establish interim limits, which it will coordinate with its management of requests for dynamic transfers as discussed in the following section.

3.7. Management of requests for dynamic transfers

The studies discussed above may establish limits on dynamic imports of intermittent resources, but at any rate, imports will continue to be limited by the maximum intertie capacity. In some cases, so as to avoid the conduct of the studies from delaying the establishment of dynamic transfer policies, studies may not initially produce an actual result but rather identify a process or methodology for evaluating dynamic transfers. To avoid the potential of a large influx of dynamic transfers being introduced before the ISO has determined its technical limitations of supporting dynamic transfers, globally or by intertie, the ISO will prioritize studies to avoid extensive delay, and may set an interim limit prior to study completion.

Even if a limit on dynamic transfers of intermittent resources is not lower than the maximum intertie capacity, the ISO must decide how to allocate the available capacity for supporting

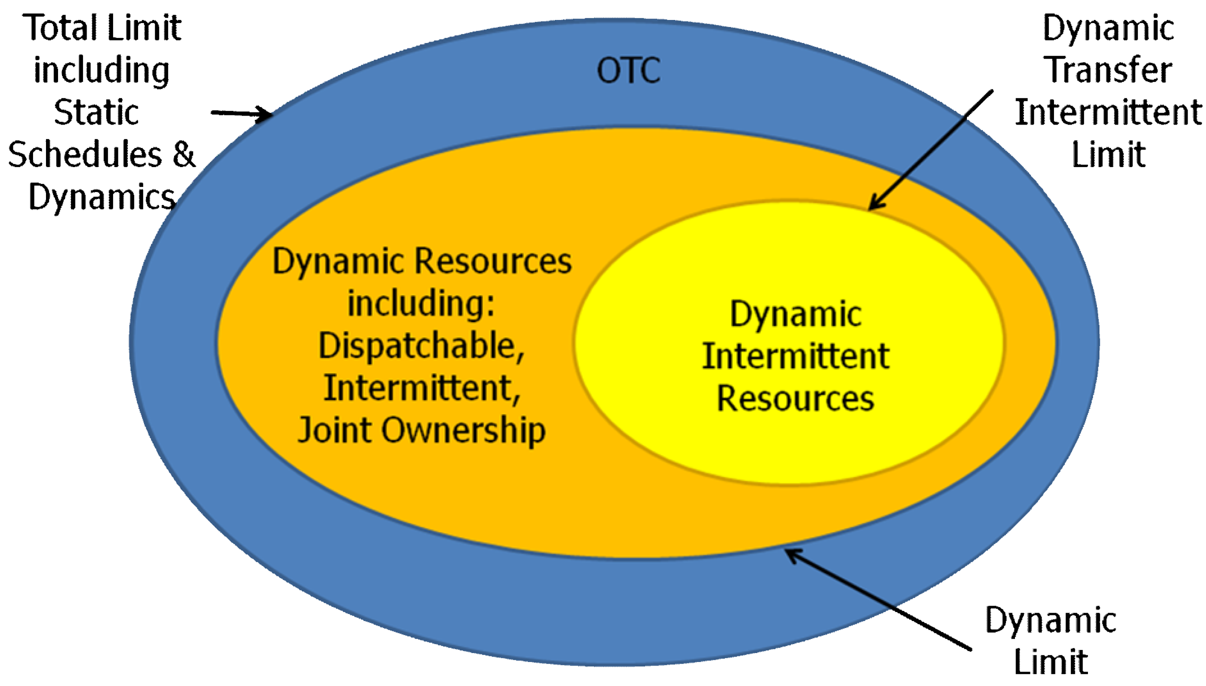
[21] For example, Bonneville Power Administration has conducted a study whose results are available at http://www.transmission.bpa.gov/wind/dynamic_transfer/default.cfm

dynamic transfers. Earlier documents in this stakeholder process identified possible solutions for managing any dynamic transfer limit, including (1) a queuing process, which would be similar to the ISO's existing generation interconnection process, or (2) a daily competitive approach for congestion management, which would avoid administrative limitations on market efficiency and transmission utilization, and use existing market functionality without needing to establish a potentially complex and inflexible queuing process. Some stakeholder comments have indicated a preference for establishing a queuing process. Among the possible approaches would be to limit pseudo-ties to the available capacity without limiting other dynamic schedules, which would be similar to the ISO's existing generation interconnection process of examining the ability of the transmission network to support new generation projects, even though interconnection studies do not restrict the submission of static interchange schedules. A queuing process will also need to clarify how any limits on dynamic transfers will differentiate between dynamic transfers from conventional or system resources that tend to be less variable, and dynamic transfers from renewable energy resources in which deliveries are intermittent.

Based on stakeholder feedback and discussion of the Supplement to the Straw Proposal, the ISO now proposes that a queuing process rather than a congestion management process be used to process requests for enrollment of intermittent resources that would use dynamic transfers. The ISO identifies the following as details of a queuing process that need to be be considered, and requests additional comments on the proposal and potential options for a queuing process.

In order for a project to be considered in the queuing process for dynamic transfers of intermittent resources, the ISO will establish a formal request entry point that will be similar to the process used for the internal resource interconnection process. Once a project has been enrolled to be a dynamic transfer, the intermittent project will be allowed to use a dynamic transfer to participate in daily and hourly scheduling processes, and will proceed to the process for establishing necessary agreements, data exchange and control in preparation for the project and dynamic transfer becoming operational. Enrollment for being a dynamic transfer does not provide the resource any special priority in the market allocation of transmission capacity, nor does it provide the intermittent resource and special financial protection from congestion or hedge for pricing. The process is intended to apply only to intermittent resources seeking to use dynamic transfers, and is not a process for limiting or enrolling dynamic transfers of dispatchable or conventional resources. In developing this process the following questions will need to be addressed through stakeholder discussions:

Illustration of Dynamic Transfer Limit as Part of Overall OTC



Question 1: Should the enrollment of a dynamic transfer of intermittent resources be performed with: 1) intermittent project owner, 2) the LSE that for which the project is arranging a PPA to satisfy its RPS or 3) joint project owner and LSE?

The ISO might expect the process to be between the ISO and the intermittent resource's developer who seeks to use dynamic transfer, but recognizes that options exist.

Question 2: How long should the enrollment of an intermittent resource use of a dynamic transfer be for: 1) 1 year, 2) longer than 5 years, or 3) until an event results in the resource being suspended as a dynamic transfer?

Question 2a: If a 1 year enrollment term is used, should the existing intermittent resource have a priority right to re-enroll?

The ISO is considering a 1 year enrollment period with an ability to re-enroll to be a reasonable balance between durability and insuring that unused use of dynamic transfer capability for intermittent resources are not underutilized.

Question 3: How much should the ISO initially enroll as dynamic transfer: 1) up to the limit established in the ISO's study, or 2) up to a phased-in amount of enrolled dynamic transfers, possibly coinciding with the RPS requirements by 2012 and 2020, respectively?

So as to allow the ISO to review impacts of dynamic transfers and validate results of the study and determine if there are any additional changes needed to the process, or as evolving technology creates opportunities to increase the amount of dynamic transfer that can be used to support intermittent resources, the ISO recommends a phase-in approach along the lines of approach 2.

Question 4: What criteria and priority should be given to criteria for enrollment?

1) Status of operation and expected commercial date (projects in operation would have priority to planned projects),
2) Status of interconnection study from the host BAA,
3) Status of power purchase agreement,
4) Ability to meet RPS, and/or
5) Status of external transmission.

The ISO recommends an approach that provides priority to projects that are in operation or are further along in the process for being operational.

Question 5: Should the ISO attempt to quantify the amount of intermittency for allotting limits during enrollment?

The ISO recommends quantifying the amount of project intermittency in terms of MW of variability. This approach will allow resources to consider ways to shape a portion of the delivery with other resources or storage, in order to reduce the projects' reliance on the limit of dynamic transfer for intermittent resources.

Question 6: Should the ISO allocate or auction the dynamic transfer limit in the enrollment process?

The ISO recommends that initially an allocation process be used, followed by considering a potential allocation process in conjunction with phase-in approach, allotting the dynamic transfer limit for intermittent resources.

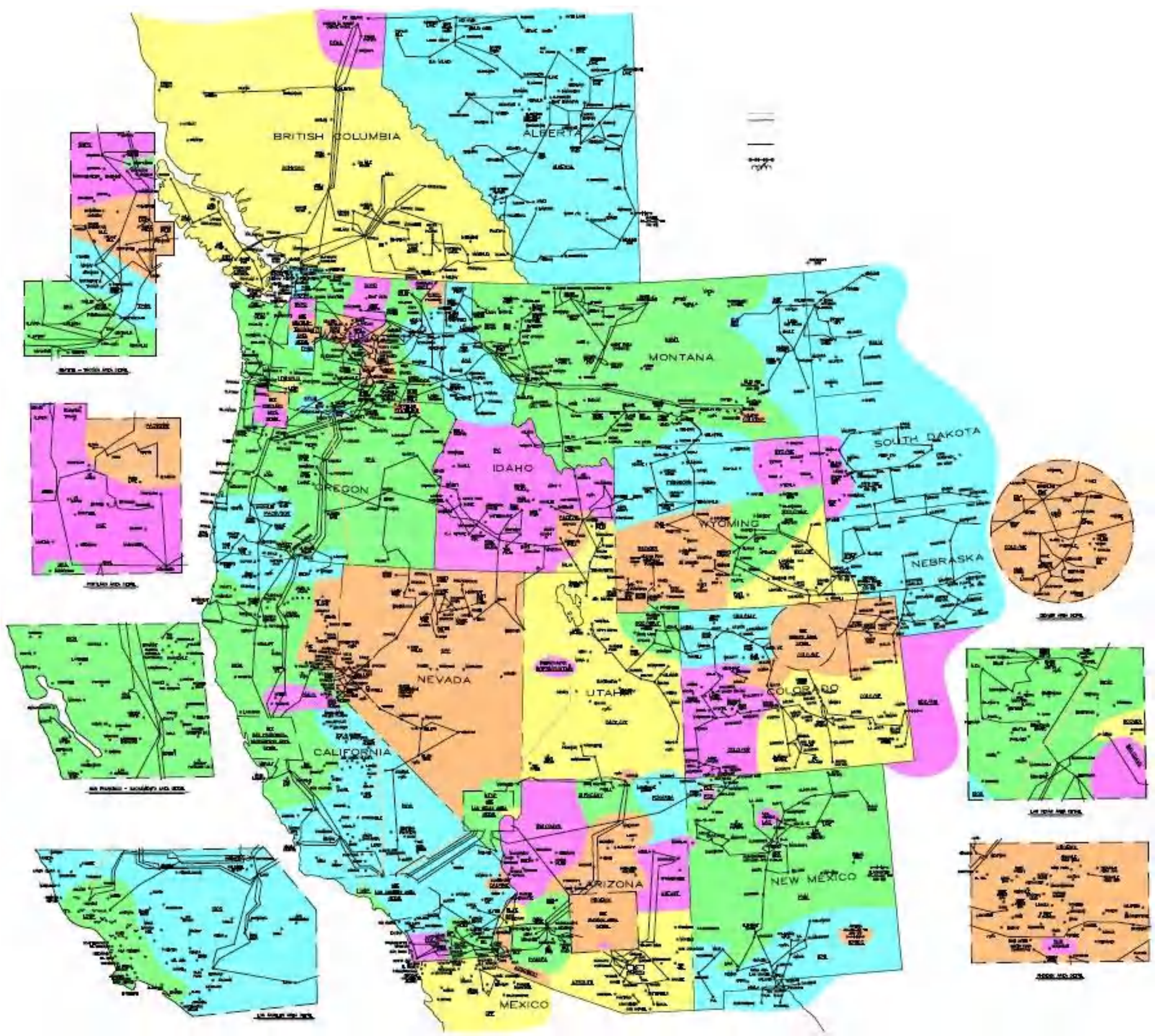
As the details of this queuing process need to further consideration, the ISO will commit to arranging an additional conference call on this topic before finalizing its proposal.

3.8. Aggregation of conventional and/or renewable resources

Some external intermittent resources are contemplating aggregating resources to take advantage of geographic diversity in order to reduce real-time deviations. In some cases a conventional resource could be aggregated with an intermittent resource. Advantages of aggregation include the ability of the dynamically transferred resources to combine resources together in a way that lessens the overall ISO regulation and load following burden. For example, if an intermittent resource wants to aggregate with a gas-fired generator, it would schedule the units as a package to use its dispatchable generator to "firm" or shape the intermittent resource's output. Scheduling these resources together obviates the need for the ISO to dispatch resources within our BAA to regulate or shape that dynamic transfer. Calpine's comments on the Issue Paper suggest a more elaborate approach, involving a "virtual control area" where several resources could be aggregated together into a pseudo-BAA and then scheduled into the ISO as a single resource. The ISO supports aggregation as a concept but sees limitations if sites were aggregated that are not "electrically close" to each other, since the impact on the ISO and LMPs at the scheduling points would vary among the resources' actual locations. Market initiatives that are developing elsewhere in WECC may affect the effectiveness of aggregation, which may create regional congestion management on more than the current Qualified Paths of the WECC Unscheduled Flow Mitigation Procedure and a regional energy imbalance energy market.

The ISO can support aggregation of resource sites that are electrically close together, subject to agreement by both the native BAA and attaining BAA, to provide certainty that aggregations will not conflict with other policies that are still being developed. Criteria for being “electrically close” are likely to vary between the perspectives of the ISO and the balancing authority in whose area aggregated resources are located, and both the native balancing authority and attaining balancing authority have legitimate interests in defining acceptable resource aggregations. To provide clarity in what the ISO would require, the ISO notes that the WECC’s current Unscheduled Flow Mitigation Plan (UFMP) uses an identification of a number of unscheduled flow (USF) zones within the WECC region, in which resources have very similar impact on the qualified paths that are managed through the UFMP. The qualified paths include the California-Oregon Intertie (COI) (Path 66), for which the ISO is the path operator, as well as interfaces in the Southwest such as Path 22, Four Corners-Central Arizona, and Path 23, Four Corners 345/500-kV Transformer. These zones are shown in the following map, which is available at http://www.wecc.biz/committees/StandingCommittees/OC/UFAS/Shared%20Documents/USF%20Zone%20Map.pdf. These zones define areas within which generators would have sufficiently similar impacts on the ISO to serve as boundaries of acceptable resource aggregations, from the ISO’s perspective. In addition, the ISO notes that a variety of functions that balancing authorities must perform to support dynamic transfers, such as exchange of telemetry on four-second intervals, would be difficult to perform if a resource aggregation were to span multiple balancing authorities.

WECC Unscheduled Flow Zones



As noted above, the acceptability of a resource aggregation needs to be determined by both the native balancing authority and the attaining balancing authority. Since a dynamic import to the ISO is a dynamic export for the native balancing authority, the determination of aggregation qualifications will partly fall on the native balancing authority where the resources are interconnected to the grid. The native balancing authority must determine the "electrical closeness" of a potential aggregation based upon the impact to the source balancing authority's system. In cases where the ISO would be the native balancing authority rather than the attaining balancing authority, the ISO would generally require that resources be at the same substation and voltage level to approve an aggregation for dynamic export. The ISO assumes native balancing authorities may establish similar requirements for dynamic transfers to the ISO.

3.9. Generator-only Balancing Authority Areas

Among the requests for dynamic transfers into the ISO are ones from single generator Balancing Authority Areas. Currently, single generators providing their own reserves and service are tagged and denoted as “unit-contingent” resources and transactions, which is a type of standard transaction that is recognized by the Western Systems Power Pool (WSPP). As discussed in the Straw Proposal, the challenges of dynamic transfers from these BAAs include (1) increased potential for increased requirements for the ISO to firm, shape and load follow for a single resource, particularly an intermittent resource, (2) proper accounting and compensation for inadvertent flows, (3) whether aggregation as described above offers a better solution than participation as a generator-only BAA, (4) whether NERC and WECC reliability criteria are met, and (5) impacts pertaining to intermittency. To the extent that the single generator BAA cannot self regulate, it imposes inadvertent interchange on the balance of the WECC.

The Supplement to the Straw Proposal provided further discussion about the criteria the ISO would use to evaluate dynamic transfers from generation-only BAAs. Given that a dynamic transfer requires approval of a Dynamic Scheduling Agreement, by default all dynamic transfers are approved on a case-by-case basis. For pre-existing BAAs or other resources that wish to dynamically schedule with the ISO, the ISO would be able to review their historical performance in order to be assured that the ISO can maintain reliability after entering the Dynamic Scheduling Agreement. For BAAs that would be created with the intent to use dynamic scheduling, the ISO would review the expected performance of their dynamic schedules regardless of their resource portfolios. To add clarity in this area, the ISO does not believe it is necessary to explicitly distinguish generation-only balancing authorities for unique designation. As with any resource seeking to dynamically import into the ISO, the ISO and the native balancing authority will approve the dynamic scheduling agreement in which performance terms and conditions are defined. Since generation-only balancing authorities are approved by WECC, the ISO will not duplicate WECC’s qualifications, but will validate data to support that the source balancing authority is successfully managing its inadvertent energy and providing sufficient contingency reserves, as indicators of reliable performance as a dynamic schedule.

3.10. Expansion of dynamic transfer based services – dynamic export schedules and pseudo-ties

Stakeholder comments on the Issue Paper have asked the ISO to consider expanding its dynamic transfer tariff provisions to include dynamic scheduling of exports and pseudo-ties of load. In the 2003-2004 timeframe when the ISO developed and filed Amendment 59 to its tariff to formalize its current provisions for dynamic scheduling, the ISO had received informal inquiries from market participants regarding the possible development of a formal dynamic scheduling program for exports from the ISO BAA to other BAAs. The 2004 filing of tariff amendment 59 did not establish a broader dynamic scheduling policy that would apply to exports because the short timeframe for preparing this filing required the ISO to focus on developing a comprehensive policy for imports. The ISO observed that a dynamic scheduling policy for exports would require different standards than those required for dynamically scheduled imports due to the different operational and business relationship of the ISO to resources within the ISO BAA, in contrast to imports from other BAAs. Moreover, unlike dynamically scheduled imports, the ISO had far more limited experience with the dynamic scheduling of exports, which would be instrumental in assessing potential future success of such a program. Nevertheless, the ISO offered in its filing of Amendment 59 to meet with parties who were interested in the dynamic scheduling of exports to discuss possible implementation of dynamic scheduling functionality for exports on an exploratory, pilot basis.

The ISO believed that it was reasonable and prudent to consider implementing an exploratory or pilot program for dynamically scheduled exports so that the ISO could gain necessary experience that could serve as the basis for developing more formal standards for dynamic exports in the future. The ISO has followed a similar approach both in (1) implementing the standards for dynamic scheduling of imports, where the combined experience from operating pre-existing dynamic schedules and from operating three pilots filed with FERC on January 9, 2004, provided enough operational confidence that the filing of standards for dynamic scheduling of imports became possible in Amendment 59, and (2) developing and implementing pilot agreements for pseudo-tie imports of both conventional and intermittent resources before developing tariff language through the current stakeholder process.

The pseudo-tie pilot for New Melones has proved successful as an export of hydroelectric generation, as demonstrated under both the prior and the present new market designs, and has provided the operating experience that the ISO lacked in 2004. The experience with the New Melones export and Sutter import pseudo-ties has allowed the ISO to identify needs for "dispatchability" to be immediately responsive to both e-Tag curtailments on their pre-determined interties and to operational dispatch orders in the event of over-generation or a real time intertie overload condition, competition on intertie scheduling constraints, and minor refinements to the ISO master file, interchange meter data processing, interchange transaction systems, and settlements, to more efficiently manage both market bids and interchange (e-Tag) schedules in ISO systems. The identified ISO system refinements are currently being implemented in support of the present pseudo-tie pilots, including the Copper Mountain Solar pilot project, which will serve as the prototype for future pseudo-tie services. In addition, stakeholders recognize the need for and assurance that pseudo-ties and dynamic schedules compete for transmission capacity on their designated intertie with static import schedules, to assure equal access to limited intertie Available Transfer Capability (ATC). Based on this operational experience, the ISO concludes that it can support dynamic export services for both conventional and renewable resources, as requested in stakeholder comments.

Although there will undoubtedly be differences between New Melones' use of existing transmission contract capacity and resources that obtain transmission service through the ISO's markets, and between pseudo ties and dynamic schedules, the Pilot Pseudo Tie Implementation Agreement for New Melones (available at http://www.caiso.com/186a/186ad4f757710.pdf) appears to be a useful prototype for dynamic transfer export agreements in general. One issue to be resolved when establishing agreements for dynamic exports is the allocation of uninstructed deviations between the native and attaining BAAs, for comparability with the practice that the ISO as the attaining BAA is responsible for 100% of the deviations of pseudo-tie generators but will limit its responsibility for dynamic schedules to a pro rata allocation of deviations. To ensure comparability, the ISO may require an export that is explicitly tied to a specific intermittent generator must be a dynamic transfer. Resource-specific requirements for both intertie curtailment and dispatch instruction responsiveness will be incorporated into dynamic and pseudo-tie contracts. All dynamic transfers must adhere to the applicable WECC and NERC reliability standards for dynamic interchange, and must compete for limited transmission access on the designated intertie.

To support dynamic exports, the ISO will need to enhance its current market software. The implementation of the new dynamic export functionality will be subject to the timeline for development and implementation of the necessary market design and bidding modifications, which will be identified as the ISO receives specific project proposals. The discussion of specific details with the involved market participants will ensure that the ISO appropriately identifies the needed software changes.

To date, no entities have offered specific proposals for pilot implementation of pseudo-ties serving load. Rather than attempting to develop tariff language without the benefit of actual operational experience with pseudo-ties of load, the ISO maintains its willingness to develop pilots for these scheduling arrangements. A pilot approach will allow the ISO, neighboring BAA and requesting participants to learn and revise if necessary rules that may generally be applied in the future, and for the ISO to identify and implement appropriate enhancements to its current market software.

3.11. Layoffs

Under the ISO's existing pseudo-tie pilots, layoffs (energy transfers of a portion of a pseudo-tie generator's output back to the native BAA) are allowed but the layoffs are treated as firm static exports from the ISO. For a conventional dynamic schedule, the portion of the generator's schedule that is not scheduled into the ISO is an external schedule that the ISO does not see. In the case of layoffs from pseudo-ties, the ISO assesses all export charges except wheeling charges to the layoffs since the layoffs do not actually flow through the ISO's transmission system. The ISO will continue to support layoffs from pseudo-ties as it does in the pilots.

One potential concern about the use of layoffs is that a resource could schedule into the ISO as a pseudo-tie generator, and then export its output as a layoff of firm energy, simply to market what would otherwise be a unit contingent energy sale and thus achieve a better energy price in the regional markets. The ISO's existing tariff provisions assess the costs of operating reserves to firm exports, but this marketing practice could increase the ISO's ancillary service market clearing prices. The ISO will develop provisions to address such operational and market conditions if they are found to be significant.

Another potential form of uneconomic bidding behavior would occur if a pseudo-tie generator were to receive a higher LMP at its physical location than the LMP that it would pay to export layoff energy at a "contract path" scheduling point. The ISO will address this issue by charging for layoff exports from a pseudo-tie at the same location (i.e., the same LMP) that the pseudo-tie generator is paid for its generation output.

3.12. Division of physical generators into multiple dynamic schedules

At the March 17 stakeholder meeting, one topic of discussion was whether a physical generator could be split into separate dynamically scheduled resources on different interties, to facilitate situations where a resource owner cannot obtain transmission on a single external transmission path for the resource's full capacity. The discussion did not ask to divide the physical generation according to market conditions, but rather to establish resources with fixed capacities for each share of a generator. The ISO observes that there is a precedent for supporting this arrangement, which is that when the ISO filed letter agreements for three dynamic schedules, prior to the filing of Amendment 59 to the ISO tariff, two of the agreements were for shares of ownership in the Merchant power plant.

With certain qualifications, the ISO is prepared to support other instances in which a generator outside the ISO's BAA is divided into separate dynamically scheduled resources. First, the resource owner would need to describe a clear business need for this arrangement. In addition to establishing a fixed proportion of the total capacity that would comprise each resource, the resource owner would need to establish a clear mechanism for allocating the generator's output between the separate dynamically-scheduled resources. The resource owner would need to separate the dynamic interchange communications into separate data streams that appear to the ISO as if the resources are actually separate.

The ISO's business systems (particularly metering, since the generator's physical metering would see the plant as a whole) would not be able to support separate pseudo-tie resources based on a single generator, just as the ISO cannot divide generators within the ISO BAA between multiple resources. However, in the ISO's understanding at this time, the resource owner's business needs could be satisfied through dynamic scheduling, rather than necessarily requiring a pseudo-tie.

3.13. Firmness of transmission

Currently, ISO tariff provisions including section 6.1 of Appendix X (Dynamic Scheduling Protocol) require dynamic transfers to be supported by firm transmission reservations in each operating hour, although this is not a requirement for long term firm transmission. Stakeholder comments on the Straw Proposal pointed out that for practical purposes, the requirement for firm transmission can create a requirement for day-ahead scheduling that the Straw Proposal does not otherwise require. The basis for this conclusion is that intertie capacity may not be available after the day-ahead timeframe, which can occur because either (1) available intertie capacity into the ISO is fully scheduled in the day-ahead market, or (2) a market participant can only obtain non-firm transmission through other BAs to get to the ISO's scheduling points, after the day-ahead timeframe. In the first case, the unavailability of transmission into the ISO after the day-ahead market is the result of market competition for limited intertie capacity, and the ISO cannot favor one class of market participants over others in awarding capacity (other than for contractual requirements such as pre-existing transmission encumbrances).

Concerning the possibility that a market participant can only obtain non-firm transmission through other BAs after the day-ahead timeframe, the ISO has examined what its actual needs are for the use of firm transmission. In the case of pseudo-ties, the resource essentially becomes part of the ISO BAA, and the ISO relies on the pseudo-tie resource just as it relies on generation within the ISO's geographic boundary, so the ISO will continue to require firm transmission. For dynamic schedules providing ancillary services, the ISO counts the awards to dynamic resources in meeting its reliability obligations, so the ISO must also require firm transmission. However, dynamic schedules of energy contribute to the ISO's balance of supply and demand similarly to the contributions of static interchange schedules, some of which use non-firm transmission to get to the ISO's scheduling points. Thus, the ISO proposes to not require firm transmission through external BAAs for dynamic schedules of energy (i.e., not including pseudo-ties and ancillary services, which require firm transmission).[22]

3.14. Documentation for ancillary service certification

In its prior efforts to implement dynamic schedules, the ISO has encountered concerns with the forms of documentation required by the Dynamic Scheduling Protocol in Appendix X of the ISO tariff, particularly some of the documentation required of affected BAs in conjunction with certification of the ability to provide ancillary services from a Dynamic System Resource. The ISO proposes to modify these documentation requirements to address some of the concerns previously encountered.[23]

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22 Allowing dynamic schedules of energy to use non-firm transmission does not change other tariff provisions related to the use of non-firm transmission, such as settlements of obligations for operating reserves. Schedules within the ISO continue to represent firm transmission.

23 The ISO has an existing certification process for dynamically scheduled ancillary services, including regulation, and balancing authorities from which such imports are to be scheduled. Applicable tariff provisions include but are not limited to section 8.3.4 (Certification and Testing Requirements),

3.15. Coordination with neighboring BAAs, to avoid creating seams issues

The final area to be noted in relation to market design options is that neighboring BAAs are currently facing similar issues with regard to integrating large amounts of intermittent resources. They face similar issues as those discussed in this document and are developing their own solutions to these issues, which the ISO continues to examine to identify potential common solutions. The current initiatives of other BAAs on which the ISO is examining as part of its coordination with neighboring areas include:

- Joint Initiatives efforts: In mid-2008, representatives from Columbia Grid, Northern Tier Transmission Group, and WestConnect joined forces to pursue a number of projects that would benefit from a broader level of participation and geographic economies of scale. Current initiatives sponsored by the collaborative include facilitation of intra-hour energy and transmission transactions, dynamic scheduling protocols, and sharing of ACE diversity. These mechanisms would allow a sharing of the regulation and operational burden beyond simply shifting the burden to the sending or receiving balancing authorities. Information is available at http://www.columbiagrid.org/ji-nttg-wc-overview.cfm. The ISO's implementation of future dynamic transfer agreements will consider use of the Dynamic Scheduling System (DSS), and the ISO sees its implementation of dynamic transfers as supporting the needs of intra-hour scheduling.
- The Bonneville Power Administration (BPA) has developed a set of Wind Integration Charges that are applicable to intermittent resources in its BAA. There may be merit in implementing similar charges for similar functions in BAAs such as the ISO that have significant amounts of interchange schedules with BPA, when a future ISO stakeholder process considers cost allocation issues. Further information is available at http://www.transmission.bpa.gov/wind/dynamic_transfer/default.cfm. As noted in section 2 of this document, a separate stakeholder process will include issues of cost allocation and cost sharing mechanisms for the ISO's regulation and load following requirements.
- WECC's Seams Issues Subcommittee has initiated the conceptual development of improved methods of regional congestion management, including creation of a real-time energy imbalance service covering areas where organized markets do not currently exist. The ISO is active in this effort, which is currently in early stages of its market design.

The ISO believes that the proposals contained in this document do not conflict with coordinating with these efforts, so that the ISO can proceed with this Draft Final Proposal while its coordination is ongoing.

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section 8.4 (Technical Requirements for Providing Ancillary Services), and Appendix K (Ancillary Service Requirements Protocol). These provisions apply to both generating units and System Resources that provide ancillary services across interties. In addition, dynamically scheduled resources are subject to Appendix X (Dynamic Scheduling Protocol), and dynamically scheduled resources that provide regulation are subject to the ISO's Standards for Imports of Regulation. This certification includes a requirement that the sending balancing authority and the SC representing the System Resource demonstrate that they have made appropriate arrangements and have put in place the equipment and services necessary to deliver the ancillary services to the point of interchange with the ISO BAA. In addition, the ISO requires the balancing authority from which the ancillary services are to be scheduled to enter into an agreement with the ISO for interconnected BAA operations. Minor modifications will clarify the documentation required for the certification process.

4. Applicability of Proposals to Dynamic Schedules and Pseudo-Ties

As stated in section 1, most proposals in this document apply to both dynamic schedules and pseudo-ties. Stakeholder comments have asked the ISO to specify which proposals apply to one or both of these forms of dynamic transfers, and the following table summarizes their applicability.

Topic	**Applies to:**	
	Dynamic Schedules	Pseudo-Ties
Transmission reservations	Yes	Yes
Congestion management	Yes	Yes
Dispatchability requirements and curtailment rules	Yes	Yes
Locational pricing	Yes	Yes
Pro rata allocation of deviations among BAAs	**Yes**	**No**
Limits of dynamic imports	Yes	Yes
Management of requests for dynamic transfers	Yes	Yes
Aggregation of conventional and/or renewable resources	Yes	Yes
Generator-only BAAs	**Yes**	**No**
Dynamic exports	Yes	Yes
Layoffs from pseudo-ties	**No**	**Yes**
Multiple dynamic schedules	**Yes**	**No**
Non-firm transmission	**Yes**	**No**
Documentation for AS certification	Yes	Yes
Coordination with neighboring BAAs	Yes	Yes

5. Interim functionality

As noted in previous sections, the ISO currently supports both dynamic schedules and pseudo-ties in its daily operations.[24] To the extent that new dynamic transfers use the same functionality that supports the existing dynamic transfers, the ISO will be able to support the new dynamic transfers under the existing tariff or once tariff amendments are approved by FERC. In

[24] In instances where the previous sections note that the ISO is currently refining its support for existing dynamic transfers, the enhancements are expected to be in place prior to the filing of the tariff amendment resulting from the proposals described in this Draft Final Proposal, so they are considered to be existing functionality for purposes of this section. This section does not discuss needs for interim functionality in instances where the ISO can implement tariff changes without substantial changes to its market or operations systems. Changes to business processes do not necessarily require significant software changes.

instances where the ISO will need to modify its existing market or operations systems, the ISO will need to determine its implementation schedule. Until needed system enhancements can be implemented, the ISO will use interim functionality, as follows:

- Transmission reservations: The ISO will need to implement software changes to allow dynamic transfers to specify maximum deliveries exceeding their expected average delivery, and to settle of congestion charges and the Grid Management Charge for the greater of scheduled and actual delivery, as discussed in section 3.1 of this Draft Final Proposal. Until these software changes can be implemented, the ISO will continue its existing market scheduling and settlement of transmission usage, including section 6.11 of ISO Tariff's Appendix X (Dynamic Scheduling Protocol).[25]
- Congestion management: Implement the scheduling option discussed in section 3.2 of this Draft Final Proposal, allowing intermittent resources to update their expected energy profile availability by 5-minute intervals for a forward-looking two-hour period, will require changes in the ISO's market software and communication of dispatches. Until these software changes can be implemented, the ISO will dispatch intermittent resources using the first scheduling option described in section 3.2, in which the ISO will use the most recent available telemetry reporting of the resource's output as its expected deliverability and real-time dispatch for the next dispatch interval (adjusted downward if necessary due to congestion), and will continue its efforts to improve its forecasting capability for intermittent resources.
- Management of requests for dynamic transfers: As discussed in section 3.7 of this Draft Final Proposal, queuing procedures to manage requests for dynamic transfer agreements are being further developed at this time.
- Dynamic exports: As discussed in section 3.10 of this Draft Final Proposal, the specific market software design and bidding modifications to allow dynamic exports of supply resources that are geographically within the ISO's BAA will be identified as the ISO receives specific project proposals.
- Non-firm transmission: The ISO will need to document its tagging procedures and related systems and processes to identify dynamic schedules for energy that use non-firm transmission through external BAAs as allowed in section 3.13 of this Draft Final Proposal.
- Coordination with neighboring BAAs: As discussed in section 3.15 of this Draft Final Proposal, the ISO coordinate development of similar market initiatives, and recognizes benefits to supporting the Dynamic Scheduling System (DSS) that has been developed through the Joint Initiatives project. The requirements for supporting DSS may not require significant changes in the ISO's systems, but are being evaluated in further detail.

[25] Section 6.11 of Appendix X provides: "In Real-Time the Dynamic Schedule may not exceed the maximum value established by the sum of the Day-Ahead Market and HASP/RTM accepted Energy and Ancillary Services Bids plus any response to the CAISO's Real-Time Dispatch Instructions. The composite value of the Dynamic Schedule derived from the Day-Ahead and HASP/RTM accepted Bids plus any Dispatch Instruction response represents not only the estimated Dynamic System Resource's Energy but also the transmission reservation on the associated CAISO Scheduling Point."