

Center for Energy Efficiency and Renewable Technologies
Comments on the California ISO's
Integration Market Vision & Roadmap Revised Straw Proposal of August 29, 2011

Submitted by:	Company	Date Submitted
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The Center for Energy Efficiency and Renewable Technologies (CEERT) appreciates the opportunity to comment on the California ISO's Renewables Integration Market Vision & Roadmap Revised Straw Proposal of August 29, 2011 and the corresponding Renewables Integration Phase 2 Market Vision & Roadmap Stakeholder Meeting of September 12, 2011. This work establishes a forum for the development of significant market enhancements needed in part to manage changes in the operating characteristics of the grid expected to result from California's 33% Renewable Portfolio Standard. CEERT would like to commend the ISO for proactively addressing and for creating an efficient and open forum for discussion of these issues.

Our comments are generally focused on the need to provide a level playing field for all resources to participate in the markets, and with market features that lead to the lowest cost integration solutions for Variable Energy Resources (VERs). Specifically, we advocate for those market enhancements and principles that promote the efficient and just and reasonable integration VERs into the grid.

The ISO's "Cost Causation" Principle Must Be Applied Equally to All System Resources, If At All: The ISO's "Cost Causation" principle states that the ISO market will allocate costs based on cost causation. CEERT has some significant reservations about the application of this principle to future market design.

Our first concern is not necessarily over the principle itself, but over the manner in which it may be applied. All generation requires ancillary services to maintain grid reliability. Said another way, all types of generation have some cost associated with their integration into the grid. This is due to the fact that no generation resource is 100% reliable, and no generation resource responds perfectly to operator control. But because the grid was historically designed to manage nuclear, hydro, coal and gas resources as well as the intrinsic variability of load, the cost of providing ancillary services for these key system services is already deeply embedded not only into system costs – costs that are currently socialized and paid for by load – but also into the consciousness of those currently operating the grid.

Increased penetration of VERs onto the grid clearly pose a significant challenge to the system operator. However, given the fact that all resources impose an integration cost to the system,

applying the cost causation principle only to VERs is *per se* discriminatory. If the ISO is committed to applying the cost causation principle to future market enhancements, then it must take a look at the integration costs for *all* generation resources, not simply VERs. Furthermore, another ISO principle claims they are committed to being technology agnostic. However, this principle is clearly violated by discriminatory application of an integration charge to one class of generators and not another. If the ISO insists on applying an integration charge to any system resources, which for reasons outlined below we do not support, then it is the responsibility of the ISO to come up with a logical framework for assessing integration charges *for all system resources* in order to justify application of such integration charges.

A recent study by the National Renewable Energy Lab (NREL)¹ has outlined the challenges of assessing system integration charges, primarily because of the difficulties in developing a credible proxy resource with reduced or no variability. “The concept of integration cost may be simple. But it may be impossible, or at least difficult, to calculate.”² The challenge of realistically calculating integration charges should give pause to those attempting to apply these charges in a just and reasonable manner, and is perhaps one reason why the current ISO market has evolved until now without relying on adherence to such a principle.

It is perhaps interesting to compare the ISO’s proposed cost causation principle to the cost causation principles recently advocated by the Federal Energy Regulatory Commission (FERC) in their Transmission and Planning Cost Allocation proceeding Order 1000. In Order 1000, FERC states that transmission facility costs must be allocated “...in a manner that is at least roughly commensurate with estimated benefits.” Furthermore, the cost allocation method and data requirements for determining benefits and beneficiaries must be transparent enough to allow a stakeholder to determine how they were applied to each proposed facility. The FERC cost allocation principle is clearly based on transparency and a ‘beneficiary pays’ viewpoint. In direct contrast, the ISO cost allocation principle is based on a ‘cost causer pays’ viewpoint, and at least for the case of integration charges, based on the arguments made above, such cost allocation would be far from transparent, if even possible. In fact, directly and broadly assessing integration charges to load is entirely consistent with the FERC cost allocation principle reflected by Order 1000: It is an application of the ‘beneficiary pays’ viewpoint, and is transparent in allocating the costs to those directly benefiting from the respective generation resources.

The ISO markets have evolved to their current state without adhering to the proposed ISO cost causation principle. CEERT would therefore like to ask the ISO to justify whether adherence to this principle has either effectively promoted market evolution in any other markets within the United States or elsewhere, or upon which frame of logical reference, beyond the desires of

¹ Cost-Causation and Integration Cost Analysis for Variable Generation, M. Milligan, E. Ela, B. Hodge, B. Kirby and D. Lew, National Renewable Energy Laboratory with C. Clark, J. DeCesaro and K. Lynn, U.S. Department of Energy, NREL Technical Report TP-5500-51860, June 2011

² Ibid, p. 7

existing market participants, could justify adherence to this principle. Furthermore CEERT would like to ask the ISO to demonstrate how their cost allocation principle is consistent with the cost allocation principle advocated by FERC in their Order 1000. CEERT instead believes that, based on the arguments given above, application of this principle to future market design will induce unnecessary transactional friction that may impede efficient market evolution.

One argument in support of integration charges, renewable or otherwise, is that generation resources that provide more dispatchable or baseload services are of lower cost to the system, and therefore ought to be compensated accordingly. Integration charges could provide such a compensation mechanism. However, even without integration charges, baseload generation services are already compensated for their higher capacity contributions to the system through the capacity compensation mechanism. Therefore the absence of integration charges would not eliminate such a compensation mechanism.

Our other significant concern with the ISO's cost allocation principle is around the issue of effective market design, and risk pooling. When risk is pooled, as in the example of health insurance, overall system costs tend to go down. This is the rationale behind insurance, health and otherwise. If, however, the risk pool is segregated into more risky individuals (or more variable generators) and less risky individuals (or less variable generators), then overall system costs may go up, in part because it is much more expensive to insure (or balance) a group of participants that carry most of the risk (or variability). It should be noted, however, that this example is only illustrative, in part because load represents a significant contribution to system variability which this simple example does not capture. But the fact remains that segregating different risk profiles may tend to increase overall system costs. We therefore assert that the ISO cost causation principle may serve to impede the market participation by those generation resources that will need to contend with not only higher transactional costs but also with the increased financial uncertainty resulting from departure from the risk pooling model.

Given that load is served by the grid, it makes logical sense that load should ultimately and most efficiently be able to absorb any system integration costs, whether from renewable resources or conventional resources. Such an approach is consistent with the historical evolution of the grid to date and therefore provides a reasonable proof of concept that such an approach may work in the future. Furthermore this approach is also consistent with the 'beneficiary pays' cost allocation mechanism recently advocated for by FERC.

Aggregation of Uncorrelated Risk Reduces the Overall Variability: CEERT is puzzled by the assertion by the ISO that they are "...not persuaded by the 'spatial diversity' argument which asserts that for the system as a whole, the variations in resource output will tend to cancel each other and thus mitigate the operational impacts of variability."³ It is a fact of statistics that aggregating uncorrelated variables will reduce the overall variability of the ensemble when compared to the sum of the variability of the individual variables. The implication of this

³ California ISO's Renewables Integration Market Vision & Roadmap Revised Straw Proposal, August 29, 2011, p. 2

statement to VER integration costs is that aggregating the output of geographically distributed VERs will tend to lower overall system integration costs. This is because geographically distributed VERs will tend to be uncorrelated. And the larger the geographical region over which the VER outputs are aggregated, the more uncorrelated the VER outputs are, so the more overall system costs will be reduced. This assertion has also been documented elsewhere.⁴

If only firmed and shaped energy were allowed to be imported or exported at the interties, then the whole concept of sharing variability across multiple balancing areas would be moot: Each balancing authority would essentially be required to balance its own balancing area, as has been the practice to date. With the introduction of dynamic scheduling, the ISO has introduced the possibility of importing variability across the interties. A significant and real concern is who ultimately pays for balancing this variability. In one example,⁵ variable energy is imported into the ISO footprint, and then firmed and shaped energy is exported back to the adjacent BA. In this example, if load were responsible for the cost of firming and shaping the imported energy, then load would essentially be paying for the firming and shaping service. While this example does represent a case where California load (ie ratepayers) would essentially be paying for the firming and shaping of external resources, it represents an idealized case which may not actualize to the extent that it would give rise to significant system costs. Furthermore, it needs to be compared to the benefit of reduced overall system integration costs: By allowing the sharing of variability of energy imbalance across the interties and throughout a large geographical region, the system integration cost reduction benefits may be significant. To not allow such a physically justifiable low cost solution to be implemented simply because there may be rare and possibly preventable instances of gaming may be like ‘...cutting your nose off to spite your face.’

Within the ISO Balancing Authority (BA), transmission and balancing resources are optimally utilized, and efforts such as those proposed under this current initiative are already underway to schedule resources closer to flow, as well as other market enhancements that will tend to minimize VER integration costs within the ISO BA. However, by not sharing their imbalance energy with the rest of the WECC, the ISO may be missing a critical opportunity to significantly reduce renewable integration costs to California ratepayers. Within WECC there is an effort currently underway⁶ to develop a framework for sharing energy imbalances regionally. This effort is known as the Energy Imbalance Market, and has the double advantages of not disturbing existing revenue streams of participating BAs, as well as optimally utilizing otherwise

⁴ See, for example the Western Wind and Solar integration Study, prepared by GE Energy for the National Renewable Energy Laboratory, May 2010

⁵ Marc Ulrich, Southern California Edison, from remarks made at the California ISO Stakeholder meeting panel discussion “Next Steps on the Road to 2020,” September 7, 2011, Sacramento, CA

⁶ See, for example:

http://www.wecc.biz/committees/BOD/EDTSC/EDTTRS/EDTTRS032411/Lists/Presentations/1/E3_EDT_Phase1_2011-03-24_EDTTRS-FINAL.pdf

unused transmission assets in real time. The goal of this system is to preserve the operational and financial independence of all participating BAs, while providing a regional market for sharing imbalance energy that may lead to significantly reduced regional integration costs.

Unfortunately, the regional benefit decreases significantly if even a single balancing areas does not participate.

If all BAs in the Western interchange participate in an Energy Imbalance Market (EIM), then the need to firm and shape imports and exports at the interties becomes less significant as the EIM is able to optimally dispatch balancing resources in order to balance the net variability of all generation resources and load across the entire region. This may lead to the lowest integration costs across the entire system, and the lowest overall integration costs to ratepayers. If the FERC 'beneficiary pays' cost allocation model is applied, then the costs of balancing the system will naturally fall to ratepayers in proportion to the size of their load. That is, regions of greater load will tend to incur greater costs for balancing system variability. This is a naturally just and reasonable cost allocation mechanism. If however, even a single BA chooses not to participate in the EIM, and if system integration costs are allocated to load, then load in those BAs participating within the EIM will tend to subsidize the balancing costs of the non participating BAs. Stated in another way, if even one BA chooses to not participate in a regional EIM, then there will not be a level playing field, and balancing inequities will occur. Such market inefficiencies currently exist even within California, which itself is comprised of multiple BAs.

Shorter Scheduling Intervals and Scheduling Closer to Flow: Shorter scheduling intervals and scheduling energy transactions closer to the time at which the corresponding energy flows into the grid will tend to reduce forecasting errors associated with VERs. Reducing forecasting errors leads to lower renewable integration costs. For this reason CEERT strongly encourages the ISO to continue to support the timely development of these market enhancements. We recognize this is a formidable task, but note that this task might be enhanced further by a uniform scheduling interval throughout the Western interchange. Such a uniform fifteen minute scheduling interval throughout the Western interchange may help minimize the complexity of developing scheduling interfaces at the interties, and could significantly reduce VER integration costs.

Summary: The ISO is at the forefront of developing market mechanisms for the efficient integration of increasing amounts of VERs onto the grid. Such market enhancements include shorter scheduling intervals and scheduling energy closer to flow, among others. And while the ISO's efforts are to be commended, their efforts will fall far short of providing the lowest VER integration costs to California ratepayers should they choose to not participate in a regional Energy Imbalance Market (EIM). Such an EIM provides a mechanism for balancing the net variability of all resources and load across the entire region, and will tend to reduce overall system balancing costs. And while it is not necessarily the ISO's primary responsibility to look for the lowest cost solution for California ratepayers, it should be recognized that development

of market mechanisms that support participation in a regional Energy Imbalance Market will tend to be of significant benefit to the low cost integration of VERs within California and the rest of the Western Interchange, and may also provide regional reliability benefits.⁷ For this reason, CEERT would like to encourage the ISO to continue engaging with the efforts currently underway to develop an EIM in the West. Unfortunately participation in an EIM involves not only moving away from conventional and deeply embedded concepts of firmed and shaped energy transaction at the interties, but also requires participation of most if not all BAs, without which the potential significant benefits of such a regional market may not be realized due to the lack of a level playing field. Ironically, even within California, multiple BAs hamper efforts to provide low cost balancing services to California ratepayers even under current operating conditions.

The energy markets within the ISO BA have developed over time without application of the cost allocation principle being proposed by the ISO. As a case in point, most if not all pumped hydro facilities have been developed to support the inflexibility of nuclear generators, at a cost socialized to ratepayers, not the nuclear industry. Had the costs of these expensive pumped hydro balancing resources been allocated to the nuclear industry, it is not clear whether the nuclear generation facilities could have been built. Socializing integration costs has been and is still currently a significant part of the ISO market, and the proposed cost allocation model would be a reversal from this historically viable approach. Furthermore, the 'beneficiary pays' cost allocation mechanism currently being advocated by FERC through their recent Order 1000 is entirely inconsistent with the ISO's cost allocation principle, which allocates cost to the cost causer. We therefore ask the ISO to justify the basis upon which this cost allocation principle is based. And if indeed the ISO insists on applying such a cost causation principle, we must insist that it be applied to all resources equally. Failure to apply a cost causation principle to all resources in a uniform and justifiable manner is *per se* discriminatory.

We recognize that moving to an era of increased VER participation is creating significant challenges to the traditional way in which the grid has historically been operated, and are confident that the California ISO will find solutions that provide for the reliable and low cost integration of these resources into the grid.

⁷ See, for example: <http://www.westerngrid.net/2011/07/how-a-westwide-eim-helps-reliability/>