

Western Markets Exploratory Group

Public Talking Points

June 2023

What is WMEG?

The Western Market Exploratory Group (WMEG) is exploring pathways to Western organized markets, including developing a roadmap for potential options up to and including operating in a Regional Transmission Organization (RTO), depending upon what each state and/or utility determines is in the best interest of its customers.

As part of the effort, some members of the WMEG group are evaluating new market services and market footprints, including the day ahead offerings under development by the CAISO and SPP, as well as considering potential transmission expansion and coordination, and other power supply and grid solutions consistent with various state regulations and policies.

Current WMEG membership includes 25 utilities across the Western Interconnection, in total, the group represents over 95 GW of peak load and over 16.5 million customers in the Western Interconnection.

Which utilities are participating in WMEG?

The group includes: Arizona Electric Power Cooperative, Arizona Public Service, Avista Corp., Balancing Authority of Northern California, Black Hills Energy, Bonneville Power Administration, Chelan County PUD No. 1, El Paso Electric Company, PUD #2 of Grant County, Idaho Power Company, Los Angeles Department of Water & Power, NorthWestern Energy, NV Energy, PacifiCorp, Platte River Power Authority, Portland General Electric, Public Service New Mexico, Puget Sound Energy, Salt River Project, Seattle City Light, Tacoma Power, Tri-State Generation & Transmission Association, Tucson Electric Power, Xcel Energy Colorado, and Western Area Power Administration.

Why are these utilities participating in WMEG?

Many of the WMEG members are actively participating in the ongoing discussions of potential new market, transmission, and governance structures for entities operating in the WECC. Most of the WMEG members are currently participating in either the Western Energy Imbalance Market (“WEIM”), operated by the California Independent System Operator (“CAISO”), or the Western Energy Imbalance Services (“WEIS”), operated by the Southwest Power Pool (“SPP”). WMEG members are also participating in the ongoing market development discussions for both the CAISO Extended-Ahead Market (“EDAM”) and the SPP Markets Plus Market (“Markets+”). These ongoing discussions have created a desire for both qualitative and quantitative analyses to support those WMEG members who are in the process of determining the best path forward for their respective organizations.

What is the purpose of WMEG?

The purpose of WMEG is to support members’ analyses of ongoing discussions of potential new market, transmission, and governance structures for entities operating in the WECC.

The WMEG is developing a Roadmap to consider how various future potential markets and other regional constructs could support member utilities. The Roadmap considers several different paths, with each path having different financial and operational impacts on the WMEG members and their customers.

Some of the WMEG members agreed to collectively commission a cost-benefit study of these different paths. Those results are now available to members who are using the economic analysis from this study as one source of information to support their decision-making related to the Roadmap.

Additionally, the WMEG members are interested in reviewing the costs and benefits of potential market and transmission related functions that are typically provided through, or are necessary for, an RTO type of structure. The WMEG members established subject matter expert teams to develop reports that will assist in determining which of these various components and structures would bring the most value.

How was WMEG supported? What kinds of external resources were utilized and what are their qualifications for supporting WMEG?

WMEG members chose to retain two professional service firms to support the organization, dialog and analyses.

WMEG retained Utilicast to provide project management, facilitate the group's discussion, and provide expertise on wholesale market and RTO design and features. In this role, Utilicast reviewed different market and RTO design elements and features and developed materials to support WMEG analyses and consideration of these features. Utilicast organized the group's discussion and supported the creation of various papers on Roadmap elements, including Market Design, Seams, Cost Benefit Study and Balancing Authority topics for the group to consider. Utilicast also supported WMEG in preparation of an RFP to select a cost-benefit study provider through which Energy & Environmental Economics, Inc. (E3) was selected to provide additional quantitative analyses. Utilicast worked closely with members and E3 to define the study inputs and assumptions.

Utilicast is a premier provider of consulting services to the energy and utilities industry and has deep expertise and experience in regional electricity market solutions, power systems operations, project implementation, analytics, energy services, and related Information Technology (IT) infrastructure. Utilicast has supported utilities, power generation and marketing firms and market operators in every ISO/RTO in the United States as well as those in several other countries.

WMEG retained E3 to study the potential change in variable production cost over a variety of footprint and market functionality cases, as defined in the Roadmap. E3 worked with each member to review data and assumptions as well as engaged in extensive discussion of market elements and how they could be modeled. E3 then configured the Plexos model and executed thousands of cases to tune and refine it. The results of the core cases, and various sensitivities commissioned by the members, were published and reviewed with members.

E3 is a leading energy consulting firm that helps utilities regulators, policy makers and investors make the best strategic decisions possible as they implement new public policies, response to technological advances, and address customers' shifting expectations. E3 has extensive expertise in providing cutting

edge approaches to analyze to analyze potential market design changes in the Western U.S. and throughout North America. For WMEG, E3 performed the analysis to quantify the production cost impact to each WMEG member of different market options and market footprint configurations. WMEG defined the scope of cases and criteria the members wanted to assess, and E3-with support from Utilicast - translated these considerations into a set of working scenarios in the PLEXOS production simulation environment, gathered relevant data from WMEG members, and produces results for each case for each member.

What did the WMEG effort entail? What work products were created?

The WMEG effort entailed wide-ranging discussions on wholesale electricity market design elements and features as well as functions and features of Regional Transmission Organizations. Though many topics were covered in dialog and presentations, the main work products created by WMEG include a Roadmap, a Seams whitepaper, a Consolidated BAA whitepaper, a Consolidated Tariff whitepaper and the cost-benefit study.

a. What is the Roadmap?

The Roadmap documented the functions and features of interest to WMEG and provided a foundation for the cost-benefit study and common understanding among the members. In particular, through workshops, WMEG members considered different functional elements of interest and how they could be sequenced for consideration in the cost-benefit study.

The Roadmap considered both wholesale electricity market design elements and features as well as the required characteristics and features of an RTO. These characteristics and features were further documented in supporting materials to support greater common understanding among members.

The Roadmap elements were then grouped into potential time periods for further study in the cost-benefit study.

During the course of the WMEG effort, the Markets+ and EDAM proposals, the Western Resource Adequacy Program, as well as other potential opportunities for regional collaboration proposed by the SPP and CAISO advanced and many WMEG members engaged in these efforts were analyzed.

Following the completion of the CBS and initial analysis of the results by members, the Roadmap was updated.

b. What is the purpose of the Seams White Paper?

The purpose of the Seams White Paper is to provide members with background on key types of seams which have been observed in other regions in the country as well as mechanisms which have been used to attempt to reduce their impact.

c. What is the purpose of the Consolidated BAA White Paper?

The purpose of the Consolidated BAA whitepaper is to provide members with background on key topics which would need to be addressed if members choose to consolidate BAAs. Members might choose to consolidate BAAs with a Market Operator or independent of one.

d. What is the Cost Benefit Study?

The cost-benefit study was created by WMEG as part of a quantitative and qualitative analysis of functions and features defined in the Roadmap. There are two main parts – those that are created from production cost simulation studies and those that were not evaluated through the production cost simulation techniques.

The production cost simulation approach, assumptions, inputs and results are covered in detail in the E3 Report, titled *Western Day-Ahead Market and Variable Production Cost Study*. This production cost study is focused specifically on *dispatch cost savings*.

Members engaged on many market design features such as fast-start pricing, GHG modeling, transmission assumptions, hydro availability and dispatch, cross-market effects, market footprint permutations, load and VER forecasts, planned generation build-out, and many other inputs.

The Study started with the WECC Anchor Data Set topology but extensive updates were made to create new “Tie Zones”, which are similar in concept to trading hubs in that they allow multiple entities to connect to them and transact. It also facilitated modeling joint restrictions. This more accurately represents the adjacencies – both bilateral and market – which exist in the WECC today. This allowed improved flow through, for example, BPA and Palo Verde, and other key locations where there are multiple BAA or TSP adjacencies. Transmission experts from each member were engaged in an extensive process to validate both the topology and the supplied limits.

The WMEG CBS carefully considered GHG policy across different regions. In particular, a reference pass based on the EDAM design was conducted to ensure that transfers into the California GHG zone were based on a proper baseline of unit commitment and dispatch. From this framework, a market clearing was developed to determine which Resources would receive “GHG Awards” based on the demand for imports to the

California zone. Each member's financial results then reflected their GHG revenues and compliance costs.

Another key market design innovation was the introduction of Fast Start Pricing (FSP). WMEG carefully reviewed the SPP Integrated Marketplace implementation of FSP, which begins with a traditional unit commitment based on three-part offers. From there, the model detects whether the conditions for FSP are triggered based on commitment of eligible Resources. The offers of those Resources are then modified to reflect the commitment costs as adders to the energy offer and a post-processing pass is conducted to adjust the LMPs accordingly. FSP is cost-neutral in aggregate but can have important impacts to individual participants' results based on their load and asset profiles.

One important element considered in the cost-benefit study is the allocation of benefits to individual members through market transactions and not just overall production cost savings to the combined footprint. To support this analysis, a multi-pass settlement process was created to calculate the effect of purchases and sales of both energy, flexibility, reserves, GHG, and transmission service as well as distribution of GHG and congestion revenues. The study also examines impacts to entity wheeling costs and revenues resulting from these market transactions. The simulation took place over three time periods to evaluate the incremental nature of market and RTO features which are likely in the West.

It should be noted that production cost savings represent one category of potential benefit from market development, and other types were not included in the cost-benefit study created by WMEG. In particular, the members decided to not evaluate the generation capacity benefits, or optimized resource procurement, as part of this effort. It was acknowledged that the reduction in investment in generation capacity which can be achieved with a larger footprint and the related rules which bind members together such that they can rely on each other for capacity are likely large. In other studies, the reduction in installed generation capacity costs have provided between two and ten times as much cost savings as the dispatch cost savings. For example, the State Led Study Market Studies prepared by Energy Strategies showed a two-market day ahead option, relative to a BAU case with only real-time markets, could yield \$85 million in adjusted production cost savings and \$416 million in capacity savings¹. Also, the 2016 Senate Bill 350 Study by Brattle and E3 on the impact to California of a regional CAISO-led Western power market identified \$104 to \$523 in adjusted production cost savings versus \$680 to \$800 million in annual capital cost investment savings related to renewable procurement,

¹ <https://www.energystat.com/s/Final-Roadmap-Technical-Report-210730.pdf>

plus \$120 million in annual capacity savings due to load diversity². Additionally, for an example in the Eastern Interconnection, MISO's 2022 Value proposition estimates that the MISO market facilitates \$890 to \$923 million in Energy and Ancillary Services savings compared to \$1,942 to \$2,866 million in Resource Capacity Sharing plus \$409 to \$479 in Renewable Resource Optimization, which is procurement related³.

However, members determined that other forums, such as WRAP, would be better to study these effects. Similarly, though transmission expansion is considered in the final study period, 2035, this evaluation only considered energy transaction cost savings rather than the full set of transmission benefits nor the cost of the transmission expansion.

Additionally, this study considered more detailed modeling of some of the elements of the Markets+ and EDAM proposals, included as sensitivity studies undertaken by some members.

The study included an evaluation of functions and features that were not suited to evaluation using production cost simulation in a Non-Product Cost Report. Many of these elements are difficult to quantify but the report provides a greater foundation for members to evaluate the costs and benefits which might arise from these features.

What is the purpose of the Cost Benefit Study?

The purpose of the Cost-Benefit Study is to provide WMEG members additional information on how they might benefit from different market footprints, market features, and other modeling considerations.

Who participated in the Cost Benefit Study?

22 of the WMEG members participated in the Cost Benefit Study.

- Those members who chose not participate: BANC, PRPA and PAC.
- Please contact them if you'd like to discuss their perspective for not participating in the CBS.

How does this study differ from past studies?

See the explanation of the Cost Benefit Study above / the E3 Western Day-Ahead Market and Variable Production Cost Study report which describes many of the study features.

² https://www.caiso.com/documents/sb350study_aggregatedreport.pdf

³ <https://cdn.misoenergy.org/2022%20Value%20Proposition%20Annual%20View%20-%20Detailed%20Report628393.pdf>

What scenarios did the Cost Benefit Study examine?

Three main scenarios expected to have varying functionality and financial impacts on the WMEG members were studied.

- **EDAM vs Markets+:** Evaluates the impact of the current EDAM and Markets+ proposed market designs and how those results may differ based on several WMEG member market footprints.
- **Enhanced Market Functionality:** Evaluates the benefits of adding select market functionality based on WMEG member market footprints.
- **RTO Functionality:** Evaluates the ongoing impacts of a fully functional market plus additional functionality that meets the requirements for an RTO, based on several WMEG member market footprints.

What footprints did the Cost Benefit Study Examine?

The cost-benefit study examined a Business as Usual (BAU) case, including current real-time market participation (WEIM and WEIS) with only bilateral markets in the Day-Ahead, as well as aligned Day-Ahead and Real-Time market participation in a WECC-wide case and a split footprint. Some members chose to evaluate several additional split footprints to consider how their individual benefits might change in different plausible market footprint configurations with other WMEG members.

What method did WMEG use to evaluate the associated costs and benefits of the various footprints studied?

The WMEG used an industry-proven production cost modeling tool to determine both the Adjusted Production Cost (APC) savings and the individual benefit results for the various footprints compared to the Base Case(s) for the following three study years: 2026, 2030 and 2035.

To implement this study, E3 created multiple scenarios using the PLEXOS production cost model to simulate both day-ahead and real-time market operations. E3 worked closely with WMEG to make the study assumptions closely follow the details defined in the current market design proposals for EDAM and Markets+, while also maintaining the most appropriate apples-to-apples comparison in modeling approaches.

E3 customized the modeling to reflect specific market design features of each market option, including fast start pricing within Markets+, and allocation of GHG revenue through the EDAM system associated with imports into GHG-regulated states.

E3 worked closely with WMEG to incorporate generation, load and transmission data provided and reviewed by individual WMEG members to most accurately represent the current and expected Western power system.

For this day ahead stage model, E3 reflected day-ahead forecast error in the load, wind, and solar profiles simulated, and used an ancillary services modeling method to hold day ahead forecast error reserves in the day ahead time period—which E3 calibrated to historical actual forecast errors and calculated to reflect regional diversity of forecast error. The real-time simulation stage then deploys these reserves to respond to differences in the real-time output versus what was anticipated in the day ahead.

E3 also simulated a range of additional market integration steps in the later year scenarios to explore potential changes in the system as well as features such as improved market to market coordination, consolidation of balancing authorities with a regional ancillary services market, and coordination of transmission development such as would take place in an RTO.

The combination of modeling sophistication together with data and review by WMEG members make the results of this study an important additional datapoint when exploring Western market questions.

What were the key assumptions and inputs to CBS?

The study incorporates a wide range of assumptions developed through extensive discussion between WMEG members, Utilicast and E3. See the E3 Report *Western Day-Ahead Market Cost Benefit Study* for more detail.

How did the WMEG memorialize the study results?

WMEG, along with their consultants, prepared a final report summarizing the approach, input assumptions, and results of the CBS effort. The final report will not disclose any confidential or market sensitive information provided by the various WMEG members.

When will the public report be released?

No WMEG-sponsored public release is planned. Please contact your WMEG member utility.

How do I get a copy of the public report?

No WMEG-sponsored public release is planned. Please contact your WMEG member utility.

Which market produces the greatest benefits; EDAM or Markets+?

Market benefits will depend on a variety of factors and varies for each WMEG member utility. Benefits are highly dependent on the resulting footprint(s) of the market(s). The various assumptions in these studies and scenarios also highly impact results. The CBS, conducted by WMEG uses the best information available at this time about fuel pricing, transmission and resource availability, and the market design of theoretical future markets, but the study cannot perfectly predict the design of those markets. In addition,

some factors cannot be simulated. The CBS is one important data point to provide information to member utilities. Please contact your WMEG member utility for additional information.

Is WMEG considering a third RTO or organized wholesale market based on the CBS?

Not currently. During the analysis WMEG members considered the current Day-Ahead Market offerings being developed by SPP and CAISO, as well as whether those offerings could evolve to include RTO features and services. At this time, the members prefer to continue evaluating how the SPP and CAISO Day-Ahead Markets will be implemented, and what additional RTO services they might offer in the future.

What are the next steps for the WMEG CBS effort?

This concludes the planned studies for the CBS. The WMEG members will review and analyze their respective results from the cost benefit study and use the results, as well as additional internal and external information to decide what next steps to take on an individual basis. Some WMEG members may choose to commission additional scenarios. The WMEG members continue to be committed to evaluating additional market steps and options to effectuate reliability, customer cost savings, and clean energy integration.

Who do I contact if I have more questions?

Please contact your WMEG member utility.

Is it better to have one or two markets in the Western Interconnection?

WMEG is not taking a position on the merits of one or more markets. This topic was debated at the April 2023 CREPC meeting. Whether there will be one or two markets in the Western interconnection, are both viable possibilities, both of which come with different concerns and considerations. The information provided in the cost benefit study provides a data point for WMEG members to consider as they determine their next steps.

Each WMEG member has unique viewpoints and considerations for each of the day ahead markets.

Is this study “all encompassing” – should I be able to look at it as comprehensive?

The CBS that was done by E3 on behalf of WMEG members is not all encompassing. Although many scenarios were performed, there are too many variables, assumptions, and abstractions in any Study to claim the study is “all encompassing” or exactly represents the market rules, human behavior or the intricacies of operational decisions – that is the nature of these kinds of Studies.

For example, friction in transactions between areas is modeled based on hurdle rates that, once overcome, transactions always flow. This is a common abstraction and is widely used in similar studies.

Another example was the choice to focus on variable production cost changes and not include the impact of resource adequacy and regional markets constructs on generation investment. In other Studies, and in benefits reported by RTOs, generation investment savings have generated between 2 to 10 times the benefit of optimization of the market commitment. WMEG chose to focus on variable production cost for this particular Study in part due to the complexity of determining how to represent the effect of generation investment savings over a broad range of members and circumstances.

The study also makes assumptions about proposed market designs that are not yet implemented, or fully designed, in some cases. WMEG members worked with E3 to model these elements based on the best available information at this time.

The CBS results do provide valuable information to help members understand different pieces of markets and how they contribute to the bigger picture.

Please contact a WMEG member for further information.