SPP Southwest Power Pool

MARKET MONITORING UNIT

WESTERN ENERGY IMBALANCE SERVICE (WEIS) MARKET

MARKET POWER STUDY

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1 EXECUTIVE SUMMARY

This report presents the results of a market power study conducted by the Southwest Power Pool (SPP) Market Monitoring Unit (MMU) for the proposed Western Energy Imbalance Service Market (WEIS Market). The study investigates whether, and to what extent, structural market power exists in the proposed WEIS Market. The study report includes recommendations to enhance the competitiveness and efficiency of the proposed WEIS Market prior to market implementation.

In conducting this study, the MMU primarily relied upon Federal Energy Regulatory Commission ("Commission") precedent in assessing structural market power for approval of market-based rate authority (MBRA) applications. The MMU analysis defined relevant product market(s) and a relevant geographic market, as two components of the relevant market under consideration, and then assessed structural market power with the help of market concentration, market share, residual supply index (RSI) and pivotal supplier analysis (PSA) metrics within those defined product and geographic markets.

Based on the calculated metrics using pre-market data for 2017 through 2019, the MMU concludes that the proposed WEIS Market presents significant structural market power concerns for both *energy* and *imbalance energy* that should be addressed prior to actual market implementation. The market share, the supplier concentration, residual supply index, and pivotal supplier analysis all indicate high potential structural market power in the WEIS Market. A brief summary of those findings is presented below:

Market share

- For *energy*, from 2017 to 2019 the market share of the largest supplier—in terms of hourly energy output—varied from nearly 24 percent to 54 percent, exceeding the generally accepted 20 percent threshold in all of the (8,760) hours. In 2019, the maximum share ranged from 24 percent to 52 percent. The largest supplier's market share is significantly higher than the 20 percent benchmark throughout the period studied, averaging 35 percent. The seasonal data for 2019 show that while shoulder

months typically possess relatively lower—but still high—levels of market share, much higher rates are prevalent throughout the rest of the year.

- For *imbalance energy*, in terms of hourly imbalance energy supplied, the market share of the largest supplier—that varies from hour to hour—was between 22 percent and 100 percent, exceeding the 20 percent threshold in all hours observed.

- The market share analysis shows the largest supplier's market share for both products is significantly higher than the 20 percent benchmark throughout the entire period studied. The high market shares reflect a general pattern that raises concerns prior to implementation of the WEIS Market where it can create opportunities for the exercise of market power.

Supplier concentration

- For *energy*, the Herfindahl-Hirschman Index (HHI) supplier concentration analysis—in terms of both nameplate capacity and hourly energy output—shows that the WEIS Market footprint was highly concentrated in all intervals from 2017 to 2019. The hourly minimum and maximum HHI values in output were 1,960 and 3,566, respectively, with an average level of 2,580, well above the 1,800 benchmark accepted as an indication of a highly concentrated market. The most recent year (2019) figures show similar pattern, with minimum and maximum values of 2,089 and 3,442, respectively. The nameplate HHI in 2019 for installed capacity in the proposed WEIS market is 2,470.

- For *imbalance energy*, HHI values in output varied between 1,742 and 10,000 from 2017 to 2019, with all but two hours considered highly concentrated in the three-year period. In 2019, the average HHI value for energy imbalance supply was approximately 4,854 with a standard deviation of approximately 1,753.

- In sum, for energy and imbalance energy, the market share and the HHI metrics both point to high levels of structural market power. Accordingly, the assessment of structural market power by pivotal supplier analysis (PSA) gains increased importance.

Pivotal supplier analysis and residual supply index

- The MMU took the WEIS footprint as one default relevant geographic market covering two Balancing Authority Areas (BAAs)—Western Area Colorado Missouri BAA (WACM) and Upper Great Plains West BAA (WAUW)—for security constrained economic dispatch of energy imbalance since there are no limiting interface transmission constraints between the two to create two separate markets. This was used in calculating market share, supplier concentration, and system-wide pivotal supplier analysis using RSI. Given the sparsity of intra-market congestion observed from real-time operational data, the MMU did not designate any sub-markets within the larger footprint for PSA analysis, instead electing to treat the dual-BA footprint as a single constrained area.

- PSA and RSI are closely related metrics that measure structural competitiveness either at the system or at the local market level. For the reasons explained in the study, the MMU used the *energy* data for the RSI and PSA studies. The results of one, two, and three firm RSI analyses at the system (i.e., WEIS Market footprint) level point to high levels of pivotal status by large suppliers that raise significant concern for structural competitiveness. The RSI duration curves indicate that in the absence of the largest supplier, supply conditions may leave the system unable to meet demand in nearly 50 percent of intervals. When the second and third largest suppliers are also removed, generation falls short of demand in all but a handful of hours over the three-year period. This further confirms significant system-level market power.
- In conducting the PSA, the MMU pursued three major methodologies: a "generation only" method, a "DC ties" method, and a "schedule cut" method. Within each major methodology, the analysis was conducted with two subsets of assumptions concerning the ability of hydroelectric resources, due to the high penetration of hydroelectric generation in the market. Three major methodologies, each with two different assumptions, provides for a total of six scenarios.
    - With the exception of the last two scenarios ("schedule cut" method scenarios), all scenarios demonstrated that a pivotal supplier was present in almost every interval. The last two scenarios—the "schedule cut" scenarios—employed the most aggressive assumptions (assumptions that may not hold in operational

reality), but still saw approximately 40 percent of peak demand intervals possess a pivotal supplier.

  - High-demand intervals provide generators a greater ability to exercise market power. Most of the scenarios rapidly approach 100 percent pivotality, even at relatively low levels of demand.

- The results are consistent with high levels of structural market power—even in the absence of transmission congestion—in a concentrated market, and are consistent with the results of other inquiries (market share, HHI, and RSI), each of which similarly point to a concentrated market.
- Given the unavailability of market-based data in the footprint prior to WEIS Market implementation, identification of Frequently Constrained Areas (FCAs) was not considered as part of the scope of this study. Therefore, the MMU has not evaluated if designating FCAs is warranted to supplement the automatic market power mitigation measures prescribed by the proposed WEIS tariff. However, going forward the MMU will perform separate and ongoing FCA analyses prior to and continuing after market implementation, as required under the proposed WEIS tariff, and increased understanding of the region—coupled with changing dispatch patterns—may warrant a revision of the MMU's outlook on network congestion.

Barriers to entry and exit

- From the vertical market power perspective, structural competitiveness can be impacted by erecting barriers to entry through control over the transmission system and control of fuel supplies, essential facilities or inputs. In an MBRA process, in addition to evaluating *horizontal market power*, the Commission also evaluates whether a seller has *vertical market power*. In the context of vertical market power, and particularly transmission market power, the Commission deems having an Open Access Transmission Tariff (OATT) on file sufficient to mitigate a seller's transmission market power.

- For the WEIS Market, all of the eight direct market participants signed the Western Joint Dispatch Agreement (WJDA) with SPP, and all of them own transmission assets in the footprint. While the WJDA does not amount to a requisite OATT, it is not clear if the individual participant's OATTs on file with the Commission satisfy the minimum terms

and conditions of the FERC Orders Nos. 888 and 890 with regard to the vertical market power concerns. A resolution of this point is ultimately for the Commission to determine.

- With respect to other barriers to entry, the Commission considers a seller's ability to erect other barriers to entry, including inputs to electric power production, as part of the vertical market power analysis. In terms of ownership or control of inputs to electric power production, areas such as *intrastate* natural gas transportation, storage or distribution facilities, sites for generation capacity development, coal supplies and the transportation of coal supplies, as required by the Commission, were considered by the MMU.
    - Because of the region's relatively small amount of large-scale in-market gas generation that is not located on major gas pipelines controlled or affiliated with the gas plant owners, the MMU does not anticipate that intrastate natural gas infrastructure facilities will be used to restrict entry.
    - Although, much of the region's coal supply is provided by a not-for-profit fuel supply cooperative, the Western Fuels Association (WFA), the MMU does not anticipate that market participants could collectively exercise their role as WFA members to the detriment of the rest of the region. Specifically, this would be challenging given the make-up of the WFA as well as access to alternative sources of coal, particularly in this region.
    - Regarding hydroelectric generation, given the multifunctional use of water storage and management projects in the West, and given the complexity, scale, cost, and overlapping jurisdictions governing large hydroelectric generation, with the exception of the unique challenges posed by construction of new large-scale hydroelectric generation, it is not anticipated that the control of hydro resources will restrict entry.
- Although not explicitly stated by the Commission, the balancing function can also be interpreted as one essential input in the production of relevant product(s) in this market.

Because energy balancing will continue to be done by the two Western Area Power Administration (WAPA) Balancing Authority (BA) entities, WAPA market participants, also functioning as BAs, could create a potential for preferential treatment. This aspect of vertical market power may be taken in the context of the OATT issue as well. The MMU intends to monitor for this type of behavior and report any suspected abuses to the Commission.

MMU recommendations

- Structural market power can be assessed both at the system and at local market levels. Given the results summarized above, the MMU has substantial concerns with structural market power in the WEIS Market, particularly at the system level. Therefore, the MMU recommends that SPP and the WEIS Market participants consider the following:
    - **Develop a system-wide mitigation measure.** Unlike the market share or HHI analysis, the RSI analysis shows that even with the largest supplier removed, generation can still meet demand about 50 percent of the time. This result can provide a basis for implementing mitigation measures for system-wide market power, similar to those implemented in other markets, including, for example, the mechanism used by ISO-New England (ISO-NE). ISO-NE uses a system-wide pivotal supplier test that identifies system market power. This approach is likely to be instructive in developing a similar mechanism for the proposed WEIS Market and can act as a blue print for the WEIS Market.
    - **Use cost based offers if a system market power mitigation measure cannot be implemented for go live.** In the event that structural mitigation measures cannot be implemented before market go live, the MMU recommends that WEIS Market participants offer in cost-based offers until such time that the structural market power approach can be implemented.
- The MMU believes that the mitigation measures in the proposed tariff and in the response to the Commission's deficiency letter will provide sufficient protections for participant conduct to exercise of market power with implementation of system wide mitigation measure(s) as recommended in this study.

2 INTRODUCTION

2.1 SPP CONTRACT SERVICES AND THE WEIS MARKET

Starting in February 2021,[1] SPP has proposed to provide market operator services for the WEIS Market,[2] as part of SPP's portfolio of contract-based Western Energy Services.[3] The WEIS Market footprint is geographically located in the easternmost portion of the Western Interconnection, bordering the SPP RTO which lies in the Eastern Interconnection to the east, and surrounded to the west by several entities, including the PacifiCorp East, Northwestern Energy, Public Service Company of Colorado, and Public Service Company of New Mexico Balancing Authority Areas.

The product in the WEIS Market will be five-minute imbalance energy, defined as the difference between supply and load obligation for each market participant. Imbalance energy, or the difference between the actual energy injections/withdrawals and the scheduled energy injections/withdrawals for each market participant, is calculated and settled at its locational

[1] Market go-live date, as of July 2020.

[2] As distinct from the Regional Transmission Organization (RTO)/Independent System Operator (ISO") framework. SPP states that, "… in the context of this filing SPP is acting only in the capacity of administrator for the WEIS Market. SPP is not taking on responsibilities for administering open access transmission service, [Balancing Authority] BA operations, transmission planning, or any other function that might normally require comprehensive agreements with neighboring entities performing similar functions." Submission of Western Energy Imbalance Service Market Tariff, Western Joint Dispatch Agreements, and the Western Markets Executive Committee Charter (Part 1 of 2) of Southwest Power Pool, Inc., Docket No. ER20-1059-000 (February 21, 2020) ("Tariff Filing") at p.13. SPP lists obligations of a market operator (or market administrator) that is implementing an energy imbalance market including "…calculating LMP and Imbalance Energy, issuing dispatch instructions, billing, and invoicing." *Ibid.,* at 23. *See* Section 1.3 of Attachment A of Submission of Western Energy Imbalance Service Market Tariff, Western Joint Dispatch Agreements, and the Western Markets Executive Committee Charter (Part 2 of 2) of Southwest Power Pool, Inc., Docket No. ER20-1060-000 (February 21, 2020) ("Rate Schedule Filing") for SPP's obligations. (From herein, Tariff Filing and Rate Scheduling Filing are collectively, the "February 21 Filings").

[3] *See* "A Proposal for the Southwest Power Pool Western Energy Imbalance Service Market (WEIS)," (released on June 17, 2019) (available at https://spp.org/documents/60104/a%20proposal%20for%20spp's%20western%20energy%20imbalance%20service%20market.pdf), ("Contract Proposal"), and the Tariff Filing, at pp. 1-51 for the scope of contract-based services. SPP's other contract-based services in Western Energy Services include administering the Western Interconnection Unscheduled Flow Mitigation Plan and reliability coordination services for some of the western utilities.

marginal price (LMP).[4] Similar to other energy imbalance markets,[5] the WEIS Market establishes an intra-hour, centralized real-time dispatch of energy from participating resources with the aim of more efficiently ensuring reliability while minimizing production costs of load serving entities' resource obligations.[6,7] The proposed WEIS design shares some similarities to SPP's existing Integrated Marketplace real-time market; however, the WEIS Market will be an independently functioning market in the Western Interconnection separate from the SPP market.

Transmission service in the WEIS Market will be administered under the Western Joint Dispatch Agreements (WJDAs) signed into between SPP and each of the applicable WEIS Market entities.[8] SPP will use both non-firm, as-available intra-hour transmission service under the Western Joint Dispatch Transmission Service (JDTS), and the existing transmission service arrangements within the participating Balancing Authorities (BAs) to provide imbalance service across the transmission facilities within the WEIS Market. SPP's security-constrained economic dispatch (SCED) optimization software will use unscheduled transmission capacity to redispatch resources. JDTS will be used to make intra-hour use of otherwise-unsold transmission capacity and the non-firm redirect of existing network and point-to-point transmission service that has

[4] Tariff Filing, Exhibit No. SPP-0001 at 4, 8. ("Kelley Testimony"). SPP explains that "[e]nergy imbalance service is provided to transmission customers when the amount of Energy actually delivered to/from a load or generator differs from the amount of Energy scheduled to be delivered to/from the load or generator.", Tariff Filing, at 4.

[5] For instance, California Independent System Operator's (CAISO) Western Energy Imbalance Market (WEIM) has been in operation since 2014, and SPP's Energy Imbalance Service (EIS) market, which operated from 2007 to 2014 prior to establishing SPP's Integrated Marketplace in 2014.

[6] Contract Proposal at 5. SPP states that "[a]n energy imbalance service market will provide a low cost, low risk solution while stakeholders consider a move toward development of larger, wholesale energy markets.", *Ibid*.,, at 3.

[7] In support of a market-based energy imbalance market, SPP states "[w]ithout a market-based approach, BAs manage Imbalance Energy obligations within their metered boundaries using their own resources or by purchasing energy through bilateral transactions and without automated processes to economically redispatch generation owned by others or in other BA areas. In the WEIS Market, SCED will make use of all available resources across the WEIS Market Footprint to help balance load and generation on a continuous five-minute basis…Ultimately, the WEIS Market offers a more reliable and cost effective energy imbalance management option than the traditional bilateral approach utilized by BAs." *Ibid*, at 5.

[8] WJDA defines the Joint Dispatch Transmission Service (JDTS) (to be) provided by the Joint Dispatch Transmission Service Provider(s), and administered by SPP subject to the terms and conditions of the (proposed) tariff. *See* Attachment D Joint Dispatch Transmission Service of the Rate Schedule Filing. JDTS is provided in real-time on an intra-hour, non-firm, as available basis having the lowest curtailment priority. The tariff rate for JDTS customers for receipt or delivery of energy dispatched will be $0.00/MWh of reserved capacity for on-peak and off-peak hours. *See Ibid.,* Schedule 2 for the tariff rate.

already been procured by JDTS customers.[9,10] As part of the WEIS Market design, under the WJDAs the transmission owners do not relinquish control of their assets to SPP, as is the case in the RTO/ISO model.[11]

Participation in the WEIS Market is voluntary. Entities within the footprint with load and/or generation who do not choose to participate in the market will be registered by their respective BAs as Partially Participating Resources (PPRs). These resources will not be available for economic dispatch by the WEIS Market.

Under the proposed market design, market participants are responsible for unit commitment to meet their real-time obligations, and the participating BAs will continue to be responsible for balancing load and generation within their respective areas.[12]

The following table summarizes the main design features of the WEIS Market:[13]

[9] Kelley testimony at 4, 9-10.

[10] JDTS is only allowed for receipt or delivery of energy dispatched within a balancing authority area on an intra-hour, non-firm basis to serve wholesale or retail native load and excludes (i) off-system sales of capacity or energy or (ii) direct or indirect provision of transmission service by the JDTS customer to any third party. *Ibid.,* at 9.

[11] "Equally as important as understanding what is included in the scope of the WEIS Market is understanding what is not included. In contrast to the Integrated Marketplace, the WEIS Market does not include consolidation of BA operations, nor markets for day-ahead unit commitment and energy deployment, operating reserves or transmission congestion rights. SPP, as the market administrator, does not provide consolidation or administration of transmission tariffs for the WJDA signatories. Participating utilities are not transferring functional control of their generation or transmission assets to SPP." Tariff Filing, at 8-9.

[12] "… the WEIS Market does not contain provisions for unit commitment decisions by SPP, as the market administrator, or the clearing of any operating reserve products (i.e. regulation up, regulation down, spinning reserve, and supplemental reserve). BAs participating in the WEIS Market will continue to be responsible for ensuring their compliance with applicable reliability standards for balancing load and generation within their BA boundaries. " *Ibid*, at 9.

[13] Table reproduced and expanded from Table 1 in Contract Proposal at 6.

Figure 2-1 Main features of the WEIS Market

PRODUCTS, PRICING AND DISPATCH	
Market product	Imbalance energy (five-minute)
Supply adequacy	Day-ahead and hour-ahead supply adequacy checks performed[14,15]
Pricing mechanism	Locational Marginal Pricing (LMP)
Dispatch	Real-time security constrained dispatch (SCED) by the market clearing engine
Unit commitment	Each entity is responsible for commitment of generation to meet its real-time obligation
SETTLEMENTS	
Settlement responsibilities	SPP provides market settlements
Settlement timeline/granularity	Daily settlements on a five–minute basis
TRANSMISSION	
Transmission service	Regional JDTS used as non-firm, "as available" service with lowest curtailment priority offered at zero cost
PARTICIPATION	
Participation	Voluntary participation open to entities with load/generation in or external pseudo-tied into a participating balancing authority[16,17,18]
Registration	Resource registration on a nodal basis at settlement locations

[14] "SPP will perform supply adequacy analysis to ensure that each BA participating in WEIS Market and the Market Participants within those Balancing Authority Areas have sufficient generation in their operating plan to meet the load and Ancillary Services obligations of both the Market Participant and BA. The supply adequacy analysis will occur on both day-ahead and hour-ahead time horizons." *Ibid*, at 26-27.

[15] "Under Section 1.3.3 of Attachment A, SPP is required to evaluate Ancillary Service Plans submitted by Market Participants to ensure that the Market Participant has either identified sufficient Resources or has entered into bilateral transactions to meet its Ancillary Service Plan obligations for the next Operating Day." *Ibid*, at 24.

[16] Entities within a participating balancing authority can participate in the WEIS Market in one of two ways: They can *directly* register their generation or load by executing the WJDA, which establishes the legal relationship between SPP and the WEIS Participant. Alternatively, the participating host balancing authority in which the generation or load resides can register that generation and load." A resource that is registered by the latter method is not available for economic dispatch and designated as a Partial Participation Resource. Kelley testimony at 5 and Tariff Filing, at 15.

[17] Entities physically located within, or pseudo-tied into, a participating balancing authority are allowed to participate in the WEIS market. Entities that are pseudo-tied out of a participating balancing authority are not allowed to participate. Kelley testimony at 5.

[18] Of the total of 24 entities with generation and/or load within the two participating BAs, initially seven of them executed the WJDA in order to directly participate in the WEIS Market. Tariff Filing, at 10. Deseret become a signatory to the WJDA subsequent to the Tariff Filing, becoming the eighth.

2.2 OVERALL MARKET VIEW

As of June 2020, eight market participants have announced their participation in the WEIS Market.[19] These announcements bring the WEIS Market's total installed generation capacity to 7,242 MW, including the PPRs, along with peak load of nearly 3,600 MW. When PPRs are excluded, total capacity is approximately 5,830 MW and the hourly peak load was 2,474 MW as of end of 2019.[20] These market participants exist within the two Western Area Power Administration (WAPA) Balancing Authority Areas (BAAs), Western Area Colorado Missouri BAA (WACM) and Upper Great Plains West BAA (WAUW) that are also participating in the WEIS Market, and will function as the two BAs.[21]

The WEIS Market's installed generation capacity is predominantly hydro based at 49 percent share, followed by coal-fired resources at 39 percent, wind resources at 5 percent, and natural gas resources at 5 percent. In terms of total annual generation output, coal accounts for approximately 59 percent of power produced, with hydro resources at 36 percent, wind at 5 percent, and natural gas accounting for less than half a percent.[22] Market footprint-wide load data for the past three years follows a consistent load duration and twin peaking pattern, with peaks occurring both in summer and winter seasons. During the period studied, while the summer coincident instantaneous peak demand occurred in July at approximately 2,500 MW, the winter peak occurred in January between 2,200 and 2,300 MW.[23]

The volume of imbalance energy[24] settled by WACM was 585 GWh in 2019.[25]

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[19] These utilities are Basin Electric Power Cooperative, Deseret Power Electric Cooperative, Municipal Energy Agency of Nebraska, Tri-State Generation and Transmission Association, Western Area Power Administration, and Wyoming Municipal Power Agency. Western Area Power Administration has three sub-regions as market participants namely Colorado River Storage Project, Rocky Mountain Region registered as "LAP", representing the Loveland Area Projects), and Upper Great Plains Region. *See* Section 3.2 for more on participant profiles.

[20] Based on the data submitted by participants in response to the MMU's request.

[21] Among others, BA operators have the responsibility for providing energy imbalance service in their BAAs to ensure that load and generation remain balanced in real-time. *Ibid*., at 4. *See* Rate Schedule Filing Definitions section for complete list of responsibilities of BAs.

[22] 2019 figures with PPRs excluded.

[23] The winter peak in 2017 was more pronounced in December occurring at 2,472 MW. *See* Section 3 for more detail.

[24] Including both supplied and demanded imbalance energy.

[25] The MMU was not able to attain the WAUW data.

Entity types of market participants and ownership of assets

In 2019, total annual generation by direct market participants was 23,963 GWh in the market footprint. Generation by electric cooperatives is a dominant feature of the WEIS Market, and in 2019, despite possessing nearly equal shares of installed capacity between federally and municipally-owned entities and electric cooperatives, the share of generation output produced by electric cooperatives neared 62 percent. This is consistent with output patterns observed in the two prior study years, 2017 and 2018.

In 2019, with PPRs excluded, 57 percent of imbalance energy was provided by cooperatives and 43 percent by federally and municipally-owned owned entities.[26] In conclusion, 100 percent of energy and 100 percent of imbalance energy is supplied by not-for-profit entities[27] in the WEIS footprint.

All eight direct market participants own transmission assets in the market footprint to some extent.

Pricing of imbalance energy

The proposed market-based locational marginal pricing improves upon the existing pricing of imbalance energy within the footprint. The MMU anticipates that this will increase efficiency, as the existing pricing is based on administratively-determined static rates or formulas implemented by each balancing authority, while the proposed design utilizes optimized dispatch of imbalance energy from the large portfolio of available resources in the footprint through cost-minimizing SCED.[28] The nodal pricing of imbalance energy through SCED algorithm targets dispatch of cost minimizing generation.[29] In 2019, the average settlement price was $21/MWh in WACM.

[26] Including WACM data only. When WAUW is added where market participant UGMP is located, the share by federally and municipally owned entities will be higher.
[27] Electric cooperatives define themselves as not-for-profit entities.
[28] See https://www.wapa.gov/regions/RM/rates/Documents/Rate%20Schedule%20L-AS4%20EI.pdf and https://www.oasis.oati.com/WAPA/WAPAdocs/WAPA-UGP-Rate-Schedules--Rate-Order-No-WAPA-188-DRAFT%28Clean%29.pdf for WACM and WAUW balancing area authorities' rate schedules, respectively for the energy imbalance service each entity provides.
[29] Tariff Filing at 4-5.

Market liquidity is an important indicator to assess degree of competitiveness. Although there are no commonly set thresholds for it, volume and number of transactions along with number of market participants are notable features of a market that shows liquidity. Compared to bilateral trading, centralized spot electricity markets are generally accepted to improve liquidity however, prices during times of low liquidity can swing rapidly and with great magnitude.

The proposed WEIS Market will most likely improve liquidity over the existing bilateral construct at least by increasing number of transactions. The size of the WEIS Market with its 7,242 MW of installed capacity and nearly 3,600 MW of peak load (with PPRs included), and 24 TWh of annual generation output in 2019 allows for a liquid market.[30] As the size of market grows with the addition of new participants, market liquidity is expected to grow in step.

2.3 SCOPE OF MARKET MONITORING

Under the WEIS Market tariff filed with the Commission,[31] the SPP MMU is tasked with performing monitoring activities for the WEIS Market. The scope of monitoring activities is similar to that in SPP's Integrated Marketplace, and includes the following:

Market power mitigation plan

The Market Power Mitigation Plan[32] constitutes a set of market mitigation measures intended to mitigate the exercise of horizontal and vertical market power by market participants in specific circumstances.[33] The Market Power Mitigation plan specifies processes and conditions under which the mitigation measures would be applicable, including determining local market power, pivotal supplier test, establishing frequently constrained areas, mitigation of economic withholding, the rules for the calculation and submission of mitigated energy offer curves by

[30] Comparing the levels of liquidity in other (larger) markets does not weaken the argument here.
[31] *See* Rate Schedule Filing.
[32] *Ibid*., Attachment B.
[33] *See Ibid*., Section 1. Similar to the SPP Integrated Marketplace, SPP will implement these mitigation measures for the WEIS Market.

market participants—subject to *ex-post* verification by the market monitor[34]—and mitigation measures for physical resource offer parameters.[35]

Market monitoring plan

The Market Monitoring Plan[36] establishes the independence of SPP's Market Monitoring Unit in monitoring the WEIS Market. The plan also establishes the mission, objectives and responsibilities of the MMU. The mission of the MMU is to monitor and report on possible abuses of horizontal and vertical market power and gaming in the WEIS Market by any market participant, identify market design flaws, recommend any improving design changes for the benefit of consumers and market participants, and monitor market participants' compliance with market rules.[37] The objective of the MMU includes that "[T]he Market Monitor will work to ensure that its functions and activities are implemented fairly and consistently, and that it protects and fosters competition while minimizing interference with open and competitive markets. Making recommendations to improve the operation of markets and preventing the exercise of market power in advance rather than punishing offenders afterward shall be the preferred approach."[38]

Further, the Market Monitoring Plan provides for the MMU's responsibilities for plan implementation, including continuous monitoring of the market, recommending compliance and corrective actions, collecting and retaining the data and information necessary for the performance of the monitoring plan, recommending updates to the monitoring plan, and periodically reporting on the WEIS Market.[39] Finally, the plan tasks the MMU with monitoring for potential abuse associated with economic withholding, uneconomic production, and physical withholding as the categories of prohibited market participant behavior.[40]

[34] Note that Partially Participating Resources will not be available for economic dispatch, and hence are not obligated to submit mitigated Energy Offer Curves.
[35] Tariff Filing, at 43-44 and Attachment B of the Rate Schedule Filing.
[36] Rate Schedule Filing, Attachment C.
[37] *Ibid*., Section 1.3.1.
[38] *Ibid*., Section 1.3.2.
[39] Tariff Filing, at 44-46 and Rate Schedule Filing, Section 1.2 of Attachment C.
[40] Tariff Filing, at 45 and Rate Schedule Filing, Section 4.6 of Attachment C.

2.4 WHY ASSESS STRUCTURAL MARKET POWER?

Within the scope of its monitoring activities, the MMU is specifically tasked with monitoring structural and behavioral aspects of market power in the WEIS Market. Structural aspects are conditions that point to market power *without* regard to the actual *exercise* of market power. Behavioral aspects, on the other hand, relate to the *exercise* of market power, which is observed through the actual offer or bid behavior of market participants, and evaluated by the impact of that behavior on market prices. Conceptually, structural market power can be assessed both at the system and at local levels. Therefore, while structural aspects are assessed both at the footprint level and at the locational (transmission-constraint) level, the behavioral trends are commonly analyzed at the locational level. This approach to behavioral issues is appropriate, as the auction-based wholesale markets are nodally-cleared.

Going forward, the MMU will perform periodic reviews for structural market power to ensure that structural issues are sufficiently reported and addressed, and this study represents the first of such reviews. The assessment of structural market power is important to ensure that, if such conditions exist, appropriate remedial measures will be in place both at the system and local market level to prevent the actual exercise of market power. Sustaining a competitive structural base is also essential to maintaining a robust and effective mitigation practice for the exercise of market power. Hence, the results from this study will inform the WEIS marketplace, and provide a basis for additional measures for system-wide and local market power mitigation, should they be warranted.

2.5 STUDY APPROACH

In conducting this study, the MMU primarily relied upon Federal Energy Regulatory Commission ("Commission") precedent in assessing structural market power for the approval of market-

based rate authority (MBRA) applications.[41,42,43] The MMU analysis defined the relevant market by defining its relevant product market(s) and relevant geographic market(s) components, and then assessed structural market power with the help of market concentration, market share, and pivotal supplier analyses within those defined product and geographic markets.[44,45] While the

[41] The MMU followed the Commission precedent in general terms, and to the extent applicable or feasible. This approach is also consistent with other market power studies undertaken. For instance, *see* "Assessment of Market Power in SPP's Proposed Ancillary Services Markets, Potomac Economics, Ltd., December 2011" in Submission of Tariff Revisions to Implement SPP Integrated Marketplace of Southwest Power Pool, Inc., Docket No. ER12-1179-000 (February 29, 2012), Exhibit No. SPP-6.

[42] The Commission acts under section 205 of the Federal Power Act in granting MBRA to sellers that can demonstrate that they and their affiliates lack or have adequately mitigated horizontal and vertical market power. The final rule in Order No. 697 issued in 2007—and Orders through 697-D—codifies the Commission's currently effective policies applicable to MBRA (*See* Market-Based Rates for Wholesale Sales of Electric Energy, Capacity, and Ancillary Services by Public Utilities, 121 FERC ¶ 61,260, a-d, or "FERC Order No. 697"). Subsequent rulings in Order Nos. 816 and 816-A issued in 2015 clarify and streamline certain requirements for MBRA (*See* Refinements to Policies and Procedures for Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities, 153 FERC ¶ 61,065, or "FERC Order No. 816").

[43] In MBRA application to the Commission, a seller must submit a market power analysis that address whether the applicant (seller) has horizontal and vertical market power. In evaluating applications, the Commission applies a rebuttable presumption that the seller lacks *horizontal market power* with respect to sales of energy, capacity, energy imbalance service, generation imbalance service, and primary frequency response service if it passes two indicative market power screens: an *uncommitted* pivotal supplier analysis based on annual peak demand of the relevant market, and an *uncommitted* (wholesale) market share analysis conducted for the relevant market—with a 20 percent threshold—applied on a seasonal basis. Applicants that fail either screen are rebuttably presumed to have market power. By presenting evidence through the submission of a Delivered Price Test analysis, applicants can demonstrate that, despite a screen failure, they do not have market power. In that, the Commission weighs both available economic capacity and economic capacity when analyzing market shares and Herfindahl-Hirschman Indices). In order to demonstrate a lack of *vertical market power*, a seller (or its affiliates) that own(s), operate(s) or control(s) transmission facilities, must satisfy certain requirements including having a Commission approved Open Access Transmission Tariff (OATT) on file or receiving Commission waiver of the OATT requirement (*See* https://www.ferc.gov/industries-data/electric/power-sales-and-markets/electric-market-based-rates), and FERC Order No. 697 at 8.

[44] See Section 4 for this analysis.

[45] In FERC Order 697, the Commission defines (three) major aspects of its market-based rate regulatory regime one of which refers to sellers that operate in RTO/ISO markets, and the relevance of their individual OATTs in satisfying MBRA requirements. Specifically, the Commission states "…for wholesale sellers that have market-based rate authority and sell into day ahead or real-time organized markets administered by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs), they do so subject to specific RTO/ISO market rules approved by the Commission and applicable to all market participants. These rules are designed to help ensure that market power cannot be exercised in those organized markets and include additional protections (e.g., mitigation measures) where appropriate to ensure that prices in those markets are just and reasonable. Thus, a seller in such markets not only must have an authorization based on an analysis of that individual seller's market power, but it must also

first two indicators are exclusively market-wide measurements that ignore demand conditions, the pivotal supplier analysis considers demand conditions. Pivotal supplier analysis can be conducted both at the system and the local levels while the latter will use local transmission constraints in the analysis.

Because of the nature of wholesale electricity markets—where demand and transmission constraints continuously and dynamically alter operating parameters of the market—static metrics such as supplier concentration and market share may not sufficiently capture actual market conditions. Accordingly, the MMU ran pivotal supplier analyses where demand and transmission constraints as well as supply conditions were taken into account in making market power assessments both at the system and at the local market levels. In addition, the MMU conducted analysis for system level structural market power by employing a residual supply index so that overall market power could be assessed. Based on the results, appropriate remedial measures are recommended for system-wide market power concerns. Finally, barriers to entry in the WEIS Market were assessed.

Importantly for this study, the MMU considered *energy imbalance* as a byproduct of the provision of *energy*, and therefore analyzed market power for both the imbalance energy as well as the energy product. It is reasonable to expect that the level of structural competitiveness in the energy segment of the WEIS Market will affect the energy imbalance segment, and any (un)competitive conditions in the former will inevitably be transmitted into the latter, particularly given the settlements mechanisms proposed for the WEIS Market.

Analyses in this study are based on three years of historical data, encompassing the period from 2017 to 2019 for the proposed WEIS Market footprint. Energy, load, and resource capability data was submitted by prospective market participants, while imbalance data was obtained from the WACM Balancing Authority. The data was validated for internal consistency and compared with publicly-available information from the Energy Information Administration, Bureau of

abide by additional rules contained in the RTO/ISO tariffs." (*See* FERC Order No. 697 at 3). The MMU notes that the WEIS Market design does not propose a RTO/ISO construct nor the MBRAs obtained, or OATTs on file by individual participants will have the standard meaning or effect in assessing structural market power for the WEIS Market. In other words, having MBRAs and OATT on file by individual participants would alleviate many of the MMU's structural market power concerns had the WEIS Market be a Commission approved RTO/ISO market.

Reclamation, and prospective participant websites and filings. It was further compared against private datasets on power system entities and relationships. Although behavior under the future WEIS Market construct will be different than behavior today in the (bilateral market) footprint, historical data still represents the best available information.

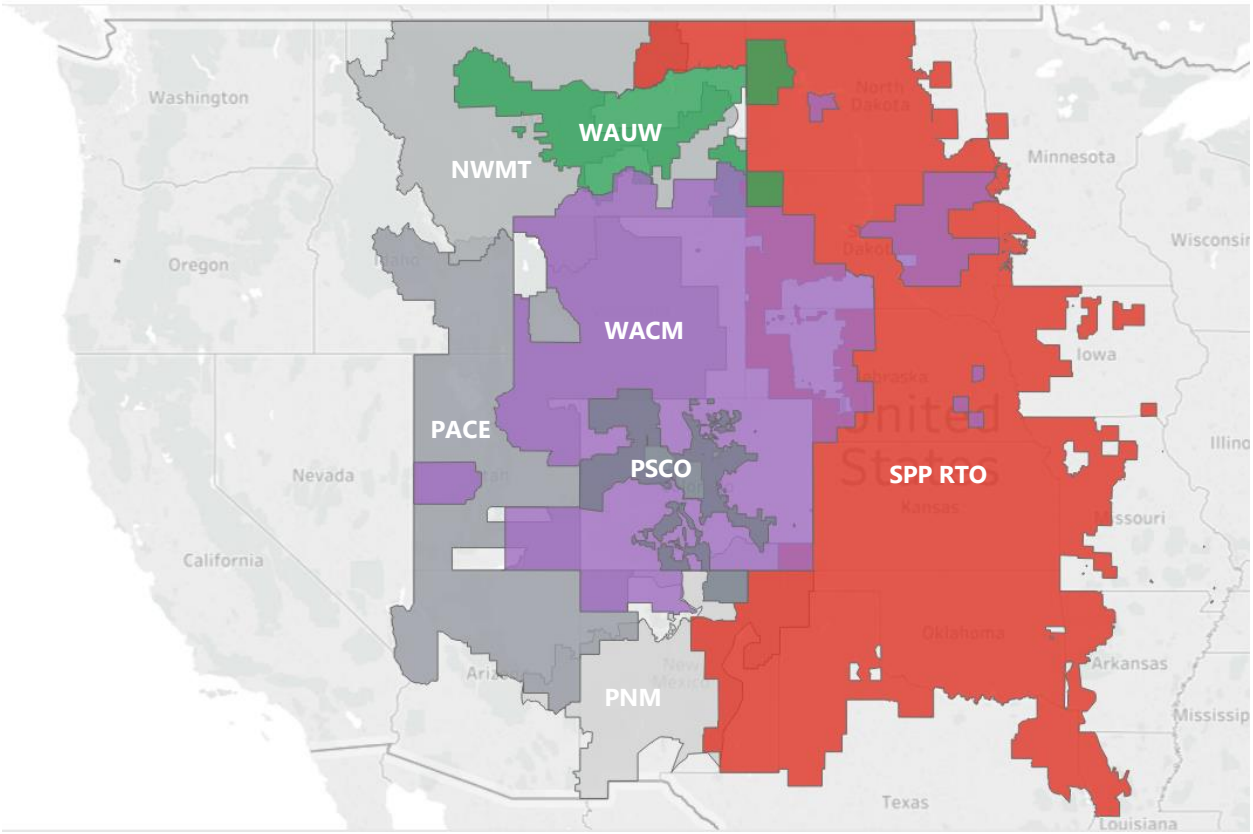
The study is organized as follows: In Section 2, SPP's contract services and main features of the WEIS Market are briefly described. Next, the scope of market monitoring responsibilities are outlined based on the proposed WEIS tariff filed with the Commission. Section 2 also provides a rationale for conducting a market power assessment prior to market launch. Section 3 provides an overview of the WEIS Market by its market participant profiles, including its two Balancing Authority Areas, and market components with respect to generation, load, and (internal and external) transmission capabilities. Generation and load are analyzed both from energy and imbalance energy perspectives emphasizing the latter as the relevant WEIS Market product. It should be noted throughout the analysis that the MMU considers energy imbalance as a byproduct of energy, and the imbalance energy amounts are observed subsequent to (real-time) actual energy flows, and during the settlements process. Consequently, energy will still have a determinative role in conclusions drawn for the imbalance energy product in the analyses throughout this report. Section 4 contains a market power assessment first by defining relevant product and geographic markets and then, measuring structural market power using market share, supplier concentration, and pivotal supplier metrics. In Section 5, barriers to entry in the WEIS Market as potential impediments to competitive market implementation are discussed. Findings and proposed mitigation measures are described in Section 6. Finally, Section 7 concludes the study by reemphasizing the study's findings and recommendations to ensure and maintain competitive outcomes in the upcoming WEIS market.

3 OVERVIEW OF THE WEIS MARKET

3.1 WEIS MARKET AREA

The WEIS Market footprint is comprised of entities within the Western Area Power Administration – Western Area Colorado Missouri (WACM) BAA and the Western Area Power Administration – Upper Great Plains West BAA (WAUW). Geographically, it is located in the easternmost portion of the Western Interconnection, bordering the SPP RTO which lies in the Eastern Interconnection to the east, and surrounded to the west by several entities, including the PacifiCorp East, Northwestern Energy, Public Service Company of Colorado, and Public Service Company of New Mexico Balancing Authority Areas. Figure 3-1 shows the proposed WEIS Market footprint and surrounding entities.[46]

Figure 3-1 WEIS market footprint and adjacent areas



[46] Geographic bounds were collected from Homeland Infrastructure Foundation-Level Data found here: https://hifld-geoplatform.opendata.arcgis.com/datasets/02602aecc68d4e0a90bf65e818155f60_0. The map and boundaries are depicted solely for illustrative purposes, and may differ from other depictions.

3.2 MARKET PARTICIPANT PROFILES

As of July 2020, eight market participants have announced their participation in the WEIS Market. The Western Area Power Administration (WAPA), has three sub-regions as market participants: the Colorado River Storage Project (CRSP), Rocky Mountain Region (registered as "LAP", representing the Loveland Area Projects), and Upper Great Plains Region (UGPM). All market participants of the WEIS Market are already within the two WAPA BAAs: Western Area Colorado Missouri BAA (WACM) and the Western Area Power Administration, Upper Great Plains West BAA (WAUW). These two BAAs are also participating in the WEIS Market, and as balancing authorities they are responsible for ensuring that load and generation remain balanced in real-time in their respective balancing areas.[47] Market participants, their entity type, and their BAs are as follows:[48]

[47] *Balancing Authority* is defined as "[T]he responsible entity within the WEIS Market that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports Interconnection frequency in real time in order to: (1) Match, at all times, the power output of the generators within the electric power system(s) and capacity and energy purchased from entities outside the electric power system(s), with the load within the electric power system(s); (2) Maintain scheduled interchange with other Balancing Authority Areas, within the limits of Good Utility Practice; (3) Maintain the frequency of the electric power system(s) within reasonable limits in accordance with Good Utility Practice; and (4) Provide for sufficient generating capacity to maintain operating reserves in accordance with Good Utility Practice." *Balancing Authority Area* is defined as "[T]he collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance within this area. *See* Rate Schedule Filing, Definitions at 7.

[48] Short names or acronyms in parenthesis will be used to identify market participants for the remainder of the report.

Figure 3-2 WEIS Market direct participant entity types

WEIS MARKET DIRECT PARTICIPANTS			
Participant	Entity type	Assets[49]	BA
Basin Electric Power Cooperative (BEPM)	Electric cooperative	Generation-Transmission-Load	WACM
Municipal Energy Agency of Nebraska (MEAN)	Municipally owned	Generation-Transmission-Load	WACM
Deseret Power Electric Cooperative (DSRT)	Electric cooperative	Transmission-Load	WACM
Tri-State Generation and Transmission Association (TRIS)	Electric cooperative	Generation-Transmission-Load	WACM
Wyoming Municipal Power Agency (WMPA)	Municipally owned	Generation-Transmission-Load	WACM
Western Area Power Administration (WAPA) – Upper Great Plains (UGPM)	Federally owned	Generation-Transmission-Load	WAUW
WAPA – Colorado River Storage Project (CRSP)	Federally owned	Generation-Transmission-Load	WACM
WAPA – Rocky Mountain Region (LAPM)	Federally owned	Generation-Transmission-Load	WACM

Figure 3-2 shows that all of the direct participants in the WEIS Market are not-for-profit entities. In 2019, nearly 62 percent of *energy* was provided by cooperatives and the remaining by federally-or municipally owned entities. As such, 100 percent of *energy* and 100 percent of *imbalance energy* will be supplied by not-for-profit entities in the proposed WEIS Market.

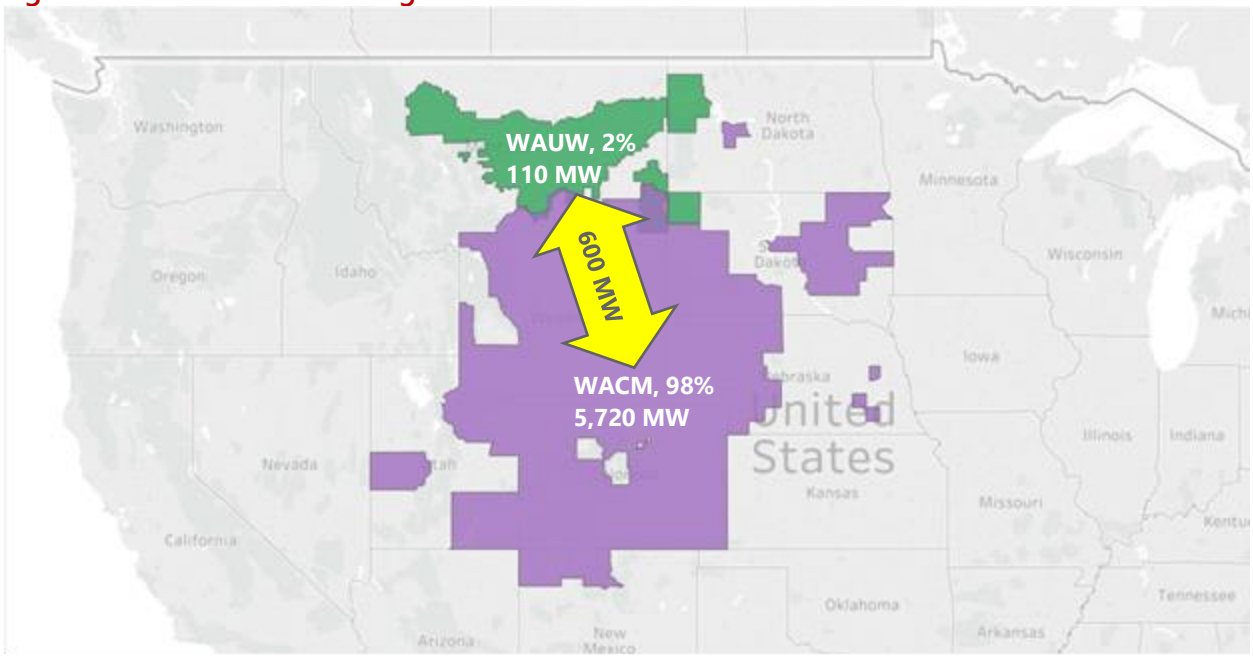
3.3 TWO WAPA BALANCING AUTHORITY AREAS

At the end of 2019, the total installed generation capacity in both BAAs was approximately 7,242 MW. Out of 24 generation and/or load entities that operate within the two participating BAs,

[49] In the WEIS Market footprint.

eight of them executed the WJDA, and will be directly participating in the WEIS Market.[50] These entities represent approximately 5,830 MW of generation (nameplate) capacity or approximately 80.5 percent of the total capacity. The remaining entities, the PPRs, will be registered by the market participant representing the host balancing authority, and represent approximately 1,412 MW of nameplate capacity.

Figure 3-3 WAPA Balancing Authorities



The Western Area Colorado Missouri BAA (WACM) is by far the larger balancing entity in the footprint in relation to the Upper Great Plains West BAA (WAUW). The figure above compares the two BAs with respect to installed capacity, and shows the estimated transfer limit—of 600 MW—between the two BAAs.[51] In the WACM BAA, the two WAPA entities, CRSP and LAPM control 2,735 MW, or 47 percent of the total WEIS Market capacity of nearly 5,830 MW with PPRs excluded. On the other hand, nearly 34 percent of the total output is generated by these

[50] Note that Deseret Power Electric Cooperative is a load serving entity only participant, and has no installed capacity.
[51] The MMU estimated the transfer limit by calculating changes in historical flows on paths when replacing generation with imports. This approach is similar to available transfer capability estimation methods by moving generation between areas except the flow change was applied to historical flows rather than forecasted values.

two WAPA entities with PPRs excluded. Meanwhile, the WAPA entities have significant off-system sales outside the WEIS Market footprint.

In this study, the MMU will present calculated market indicators by considering WAPA entities as individual participants. While the MMU recognizes a general interest in treating these entities as a single participant, we have considered them separately to get a sense of the level of concentration at the disaggregated level. Any further aggregation of the WAPA entities would result in higher levels of market concentration and structural market power.[52]

3.4 GENERATION RESOURCES AND LOAD

In this section, the MMU first reviews generation resources and load assets with respect to *energy*, and subsequently discusses *imbalance energy* as the (relevant) WEIS Market product. Notwithstanding, the MMU considers energy imbalance as a byproduct of energy, and the imbalance energy amounts are observed subsequent to (real-time) actual energy flows, and during the settlements process. Therefore, energy still has a determinative role in analyzing the imbalance energy product.

Throughout the study, the MMU analyzed the most recent three-year's data from 2017 through 2019 to explore if a pattern or characteristic can be seen in the footprint prior to the implementation of the WEIS Market. These features may relate to behavior or performance of generation or load that reflects pre-market conditions. For this, the MMU considered the specific generation and load assets within the market footprint that registered to directly participate in the market. The data includes capacity or output of the same resources and the obligation of the same load serving entities that existed in the currently defined WEIS Market footprint prior to 2019.

[52] There are cases in the calculation of imbalance energy metrics where aggregated market participants may actually offset one another, lowering perceived market concentration. Given this possibility, the MMU performed a subset of aggregated calculations, which confirmed our assumption that aggregation leads to higher levels of measured concentration. Although 25 percent of imbalance energy intervals saw a decrease in concentration, the remaining increase more than offset those intervals, significantly raising the average HHI when WAPA entities were treated as one.

3.4.1 Energy

Total installed generation capacity was approximately 7,242 MW at the end of 2019. When PPRs were excluded, total capacity was approximately 5,830 MW. Hydro resources[53] have the largest share with over 49 percent followed by coal-fired capacity at 39 percent, together nearing 90 percent of the total generating capacity. The remaining capacity portfolio has the following composition: wind resources with 5 percent, natural gas with 5 percent,[54] and fuel oil with 2 percent.[55] Figure 3-4 depicts the WEIS footprint installed capacity by technology type owned by direct market participants.

Figure 3-4 Generation nameplate capacity (MW) by technology type and share, 2019

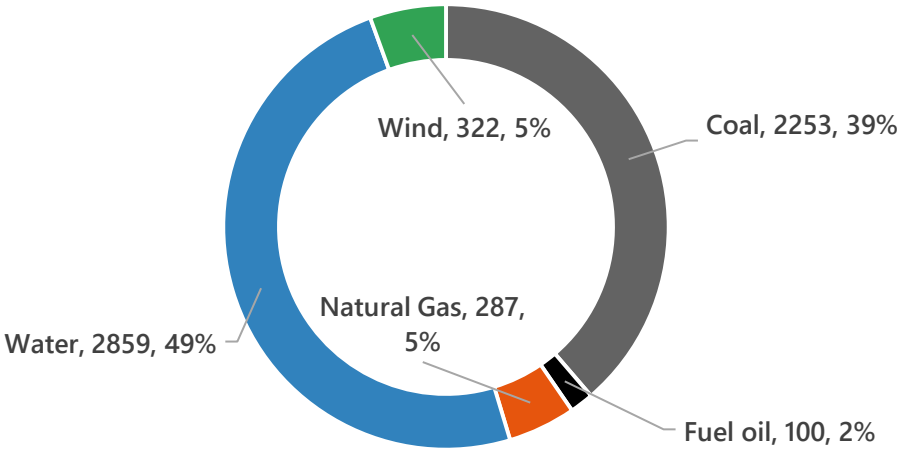
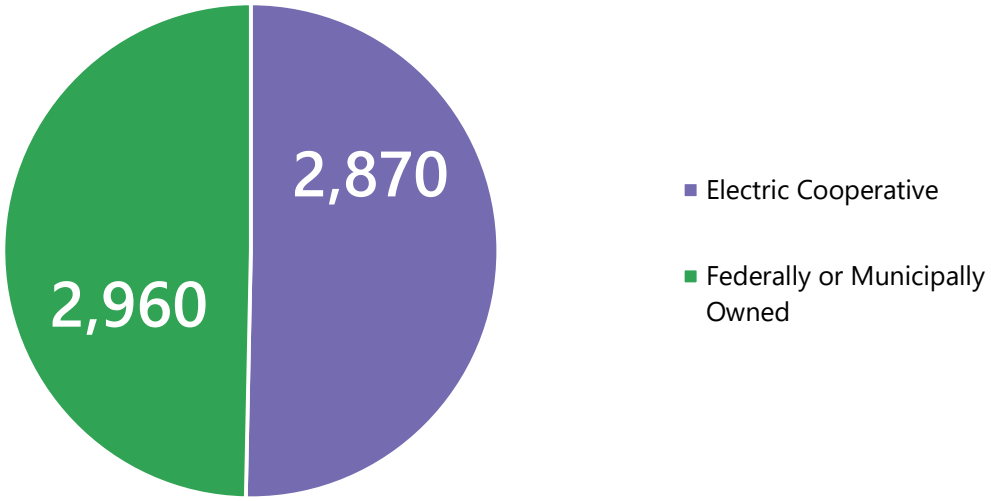


Figure 3-5 depicts generation nameplate capacity owned by the type of direct market participant in 2019.

[53] Among hydro resources, reservoir generation is the dominant technology, representing over 85% of nameplate hydro capacity.
[54] Three of the four participating natural gas resources serve as peaking units.
[55] No direct participants in the proposed WEIS Market possess registered solar capacity. To the extent that utility-scale solar capacity exists within the WACM and WAUW BAAs, it is entirely owned by partially participating entities.

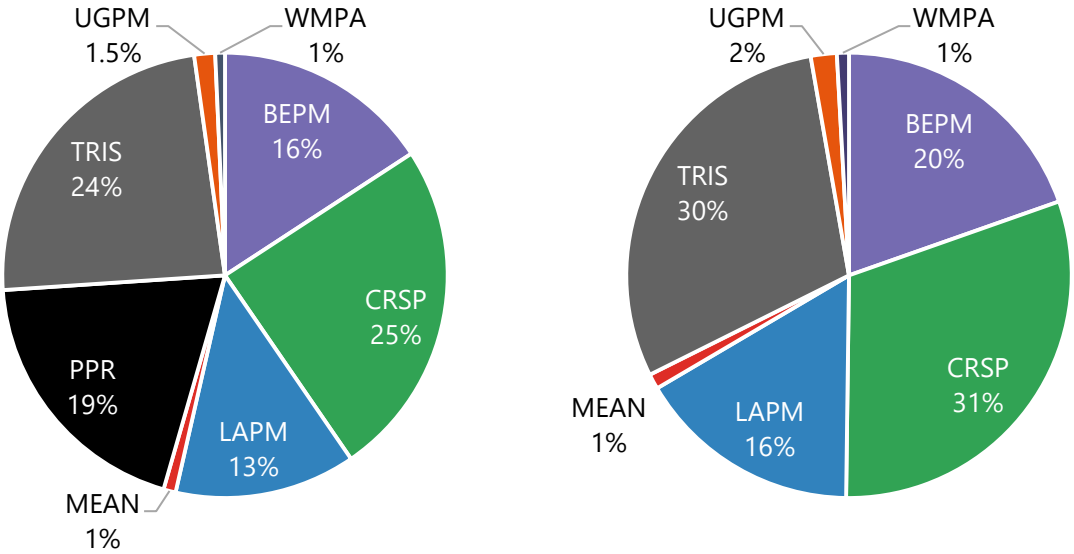
Figure 3-5 Nameplate capacity (MW) by participant type, 2019



In 2019, electric cooperatives and federally and municipally owned utilities nearly have (50 percent) equal shares in the WEIS market when PPRs are removed. When PPRs are included, federally and municipally owned utilities, cooperatives, and PPRs have approximately 41 percent, 40 percent, and 19 percent shares, respectively.

Figure 3-6 shows installed capacity by all market participants with and without PPRs, and their shares in 2019.

Figure 3-6 Nameplate capacity and participant shares, 2019



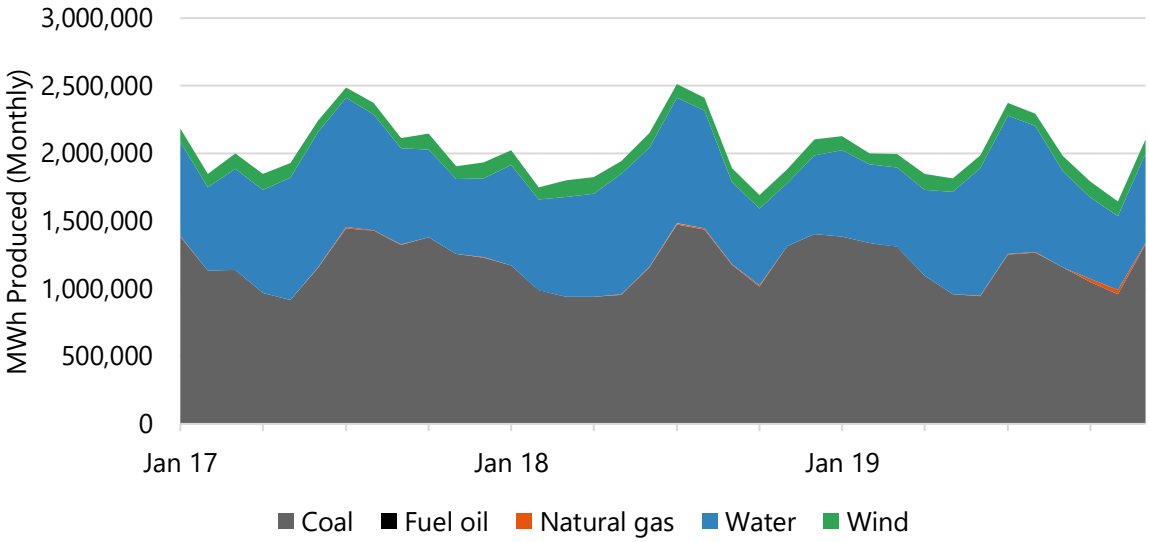
Market participant	Capacity	Percentage	Capacity	Percentage
	with PPR		without PPR	
CRSP	1,783	24.6%	1,783	30.6%
TRIS	1,726	23.8%	1,726	29.6%
PPR	1,412	19.4%	—	—
BEPM	1,144	15.8%	1,144	19.6%
LAPM	952	13.1%	952	16.3%
UGPM	110	1.5%	110	1.9%
WMPA	51	0.7%	51	0.9%
MEAN	64	0.9%	64	1.1%
Total	**7,242**		**5,830**	

Figure 3-6[56] shows that the largest participant in the WEIS Market is WAPA's Colorado River Storage Project with nearly 25 percent when nameplate capacity owned by PPRs is included, and 31 percent when PPRs are removed. The next largest participant is Tri-State with slightly under one quarter (24 percent) with PPRs included. Tri-State's share rises to nearly 30 percent if only direct participants are considered. Among direct participants, the largest three market participants—namely CRSP, Tri-State, and BEPM—owned 80 percent of the total nameplate capacity in 2019.

Figure 3-7 shows annual generation by direct participants by technology during 2017, 2018, and 2019.

[56] Total percentages may not sum to100 percent due to rounding.

Figure 3-7 Generation by technology type (GWh), 2017-2019

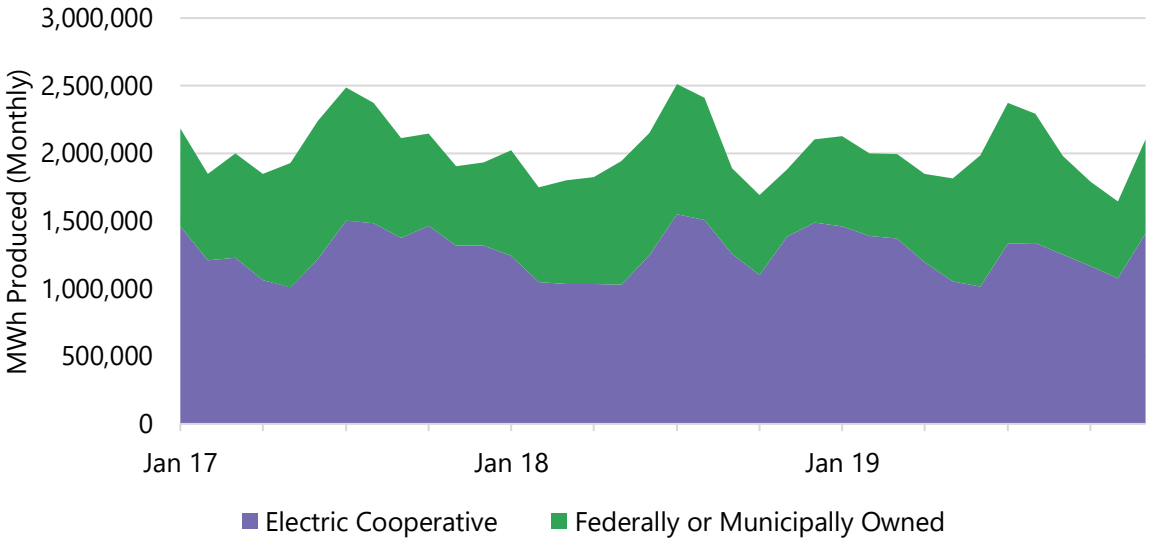


Fuel type	2017 (GWh)	2018 (GWh)	2019 (GWh)	Percent as of year-end 2019
Coal	14,743	13,964	14,035	58.6%
Hydro	9,029	8,703	8,612	35.9%
Wind	1,181	1,267	1,231	5.1%
Natural gas	43	43	80	0.3%
Oil	2	4	3	<0.1%
Total	**24,998**	**23,981**	**23,963**	**100%**

By generating technology, coal and hydro resources together generate nearly 95 percent of the total energy in the footprint with coal at 59 percent and hydro generation at 36 percent. In 2019, the WEIS Market footprint total annual generation was 23.9 TWh.

Figure 3-8 below shows the WEIS footprint output for 2017 to 2019 by electric cooperatives and federally and municipally owned entities.

Figure 3-8 Generation by market participant type (MWh), 2017-2019



Similar to nameplate capacity, generation output by participant type provides valuable context for potential market behavior. On an annual basis, generation output by market participant type shows almost identical patterns over the last three years with approximately 62 percent produced by cooperatives and 38 percent by federally- and municipally owned entities.

Generation output by individual participants reveals their relative positions in the market. Figure 3-9 shows generation output by direct market participant since 2017, and Figure 3-10 compares participants' nameplate capacity to their generation output in 2019.

Figure 3-9 Generation by market participant (MWh), 2017-2019

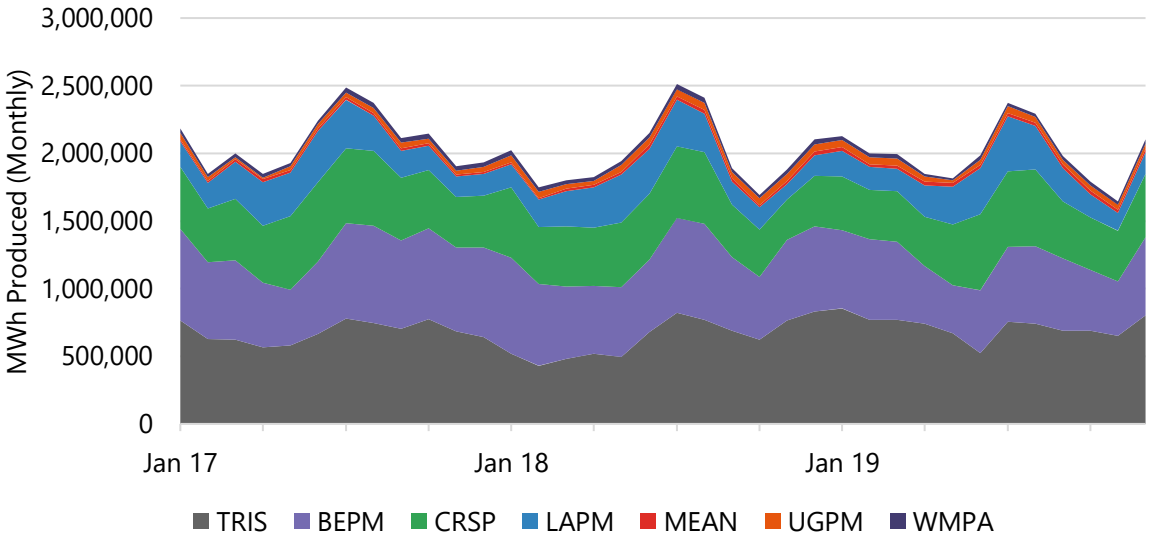


Figure 3-10 Capacity and generation shares by market participant, 2019

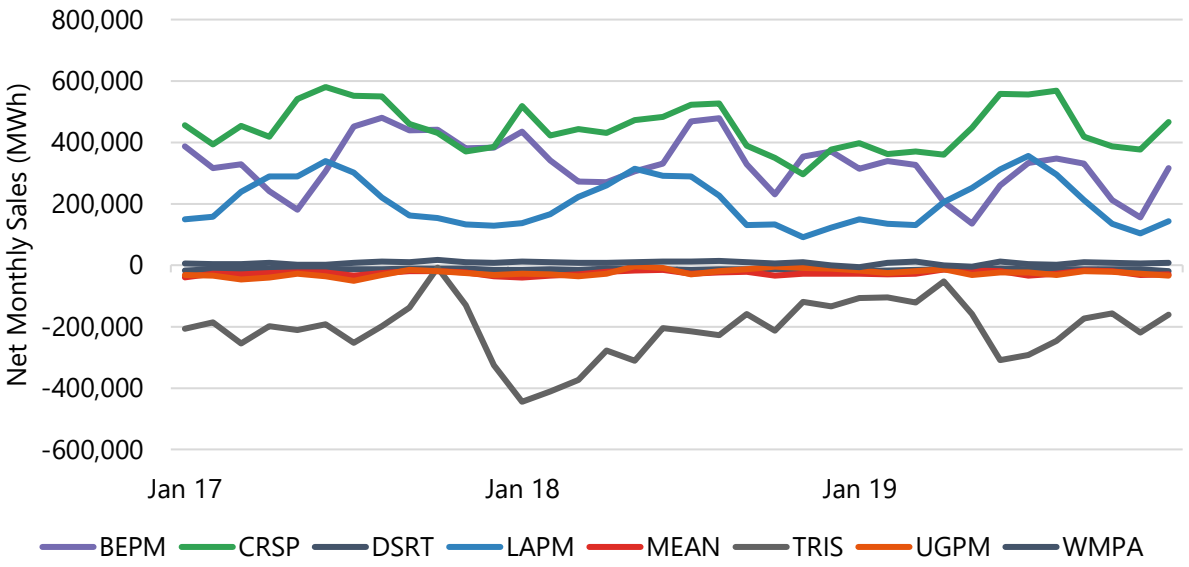
Market participant	Capacity share with PPRs	Capacity share without PPRs	Output share without PPRs
CRSP	24.6%	22.2%	22.1%
TRIS	23.8%	36.4%	36.1%
PPR	19.5%	N/A	—
BEPM	15.8%	25.6%	25.4%
LAPM	13.1%	11.8%	11.7%
UGPM	1.5%	2.0%	2.0%
WMPA	0.7%	1.4%	1.4%
MEAN	0.9%	0.7%	1.3%
Total	**100%**	**100%**	**100%**

Figure 3-10[57] shows that in 2019, and among direct participants, nearly 84 percent of the total generation was realized by the largest three market participants (TRIS, CRSP, and BEPM), who combined own almost equal (84) percent of the total nameplate capacity. While most participants of the WEIS Market own generation assets and have load obligations at the same time, one participant (Deseret) functions as a load-serving entity only within the market.

[57] Total percentages may not sum to100 percent due to rounding.

Market participants' injection and withdrawal amounts in the footprint determine whether they are net suppliers or buyers of energy. Figure 3-11 below shows market participants by their net seller/buyer position considering each participant's cumulative monthly generation output and load obligation during 2017 to 2019.

Figure 3-11 Net monthly sales

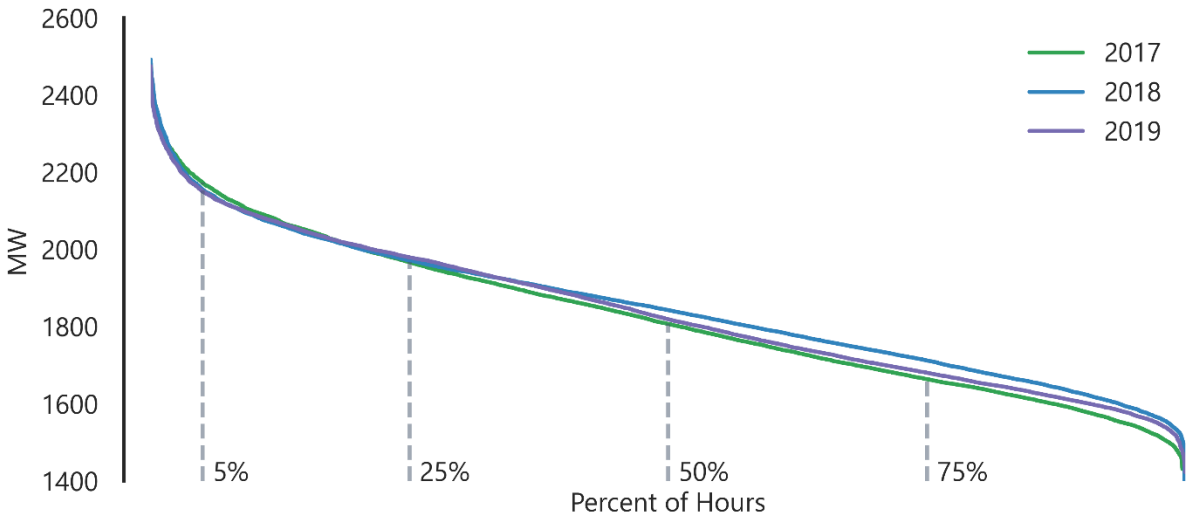


During the past three years CRSP, BEPM, and LAPM have been net sellers of energy in the footprint with CRSP being the largest. Tri-State, on the other hand, has been a net buyer for most of the period studied while the remaining three participants—namely UGPM, WMPA, and MEAN—are nearly self-sufficient. Supply of imbalance energy in excess of demand is exported from the WEIS Market.[58] In general, market participants' relative positions of net seller/buyer in the energy segment is likely to carry over into the energy imbalance segment in the market. Section 4 provides a competitive assessment of the market for both energy and imbalance energy.

The load duration curves in Figure 3-12 below display WEIS footprint hourly loads from the highest to the lowest hour for each year from 2017 to 2019.[59]

[58] See Section 3.5 for observed BA interchange.
[59] This includes load by direct participants only. Comparable historic load information was not available for PPRs.

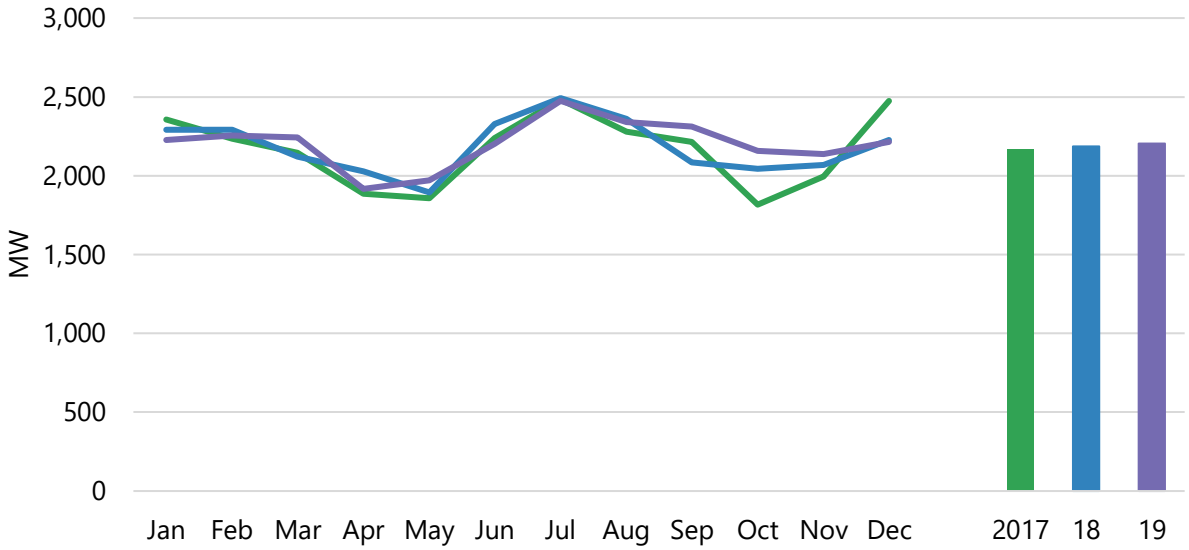
Figure 3-12 Load duration curves, 2017-2019



The most recent three-year data exhibits a consistent and stable load duration pattern in the footprint. The data also indicates that total load exceeds 1,978 MW at less than 5 percent of the hours in 2019. In 2019, the maximum and minimum hourly loads were 2,474 MW, and 1,423 MW respectively.

System load can also be evaluated by analyzing timing of its peak as well as its magnitude. The system peak demand can be affected by factors such as weather patterns—and associated cooling and heating needs—and economic activity on a daily, monthly or seasonal basis. Figure 3-13 shows coincident peak demands for the WEIS footprint based on a month-by-month comparison of peak-hour demand for the last three years.

Figure 3-13 Monthly peak system demand

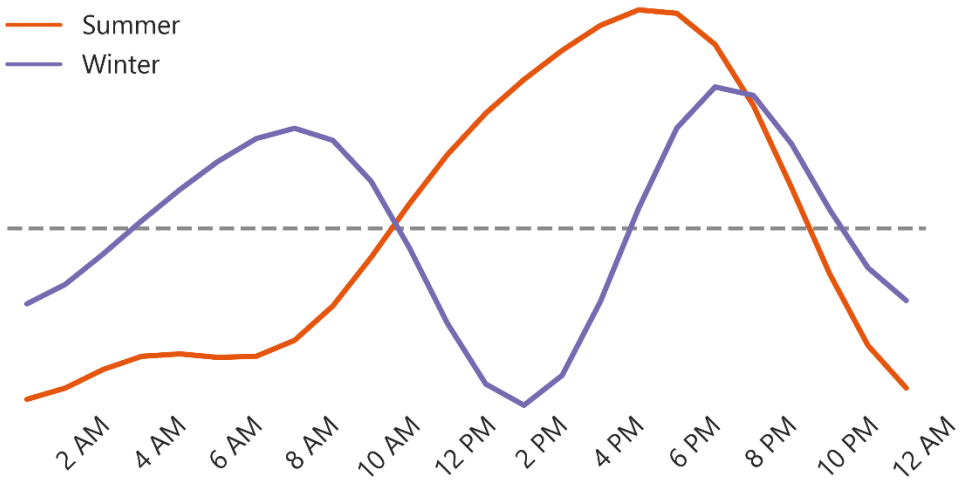


The footprint data for the last three years reveals a twin peaking pattern with summer and winter peaks. During the period covered, while the summer coincident instantaneous peak demand occurred in July approximately at 2,500 MW, the winter peak was in January approximately at 2,200 to 2,300 MW levels.[60]

The following figure provides a more detailed load data focusing on the daily pattern of the load.

[60] The winter peak in 2017 was more pronounced in December occurring at 2,472 MW.

Figure 3-14 Daily load profile, seasonal



Summer daily loads follow a clear single-peaking pattern, with the peak aligning with the hottest hours of the day. Winter loads follow a double-peaking pattern, with the highest loads seen around 7 A.M. and 7 P.M., respectively.

So far delineating supply side features of the WEIS Market, both nameplate capacity and generation output, have been discussed. On the demand side, net seller/buyer position considering each participant's cumulative monthly generation output and load obligation followed by system-wide load profile and system peak demand were shown. Additionally, the total system energy usage in the footprint reveals valuable demand side information. Figure 3-15 lists system energy use by participant.

Figure 3-15 System energy usage (GWh)

	2017		2018		2019	
		System %		System %		System %
BEPM	2,945	18.5%	2,862	17.7%	2,813	17.5%
CRSP	22	0.1%	26	0.2%	23	0.1%
DSRT	154	0.1%	167	1%	174	1.1%
LAPM	429	2.7%	457	2.8%	375	2.3%
MEAN	848	5.3%	858	5.3%	843	5.2%
TRIS	10,461	65.6%	10,718	66.1%	10,763	66.9%
UGPM	826	5.2%	844	5.2%	824	5.1%
WMPA	271	1.7%	282	1.7%	276	1.7%
Total	**15,954**	**100.0%**	**16,214**	**100.0%**	**16,091**	**100.0%**

The figure above[61] shows that Tri-State and BEPM were the two largest load-serving entities in 2019, using 84 percent of energy. A similar trend can be found in 2017 and 2018 data. The last three year's data indicate that two of the largest suppliers in the market also use the majority of the energy produced.

Supply margin in the WEIS market

One of the prerequisites of a competitive market is sufficient supply margin to satisfy (peak) demand. Under tight supply conditions, a market could be subject to frequent and sustained anti-completive behavior. When the nameplate capacity of 5,830 MW (excluding PPRs) is used, a peak demand of 2,474 MW in 2019 translates into a 136 percent supply (or reserve) margin in the WEIS Market. However, considering the hydro resources' 49 percent share in total nameplate capacity, supply margin calculations need to include derating of hydro resources to account for their availability.[62] Further, there are, on average, about 1,000 MW of exports out of the WACM BA. Considering this reduces the margin to about 95 percent. Even considering these prior obligations, the market still enjoys a relatively high supply margin, which contributes to system reliability and can diminish the potential to exercise market power.

3.4.2 Imbalance energy

Figure 3-16 below depicts the cumulative monthly quantity of settled imbalance energy. As can be seen, the federally- and municipally-owned utilities' imbalance quantities generally net out on a monthly basis to near zero MWh levels, while large swings in energy imbalance transaction volumes are driven by electric cooperative behavior. These results may be consistent with a resource mix that sees electric cooperatives providing relatively more variable energy (which generally drive a need for much higher energy imbalance quantities), and also federal utilities self-balancing or acting in close coordination with the BA(s).

[61] Total percentages may not sum to100 percent due to rounding.
[62] Wind resources should be approached the same way however, wind constitutes 5 percent of the total WEIS Market capacity therefore, the study focused on hydro resources only.

Figure 3-16 Cumulative monthly imbalance energy by market participant type, 2017-2019

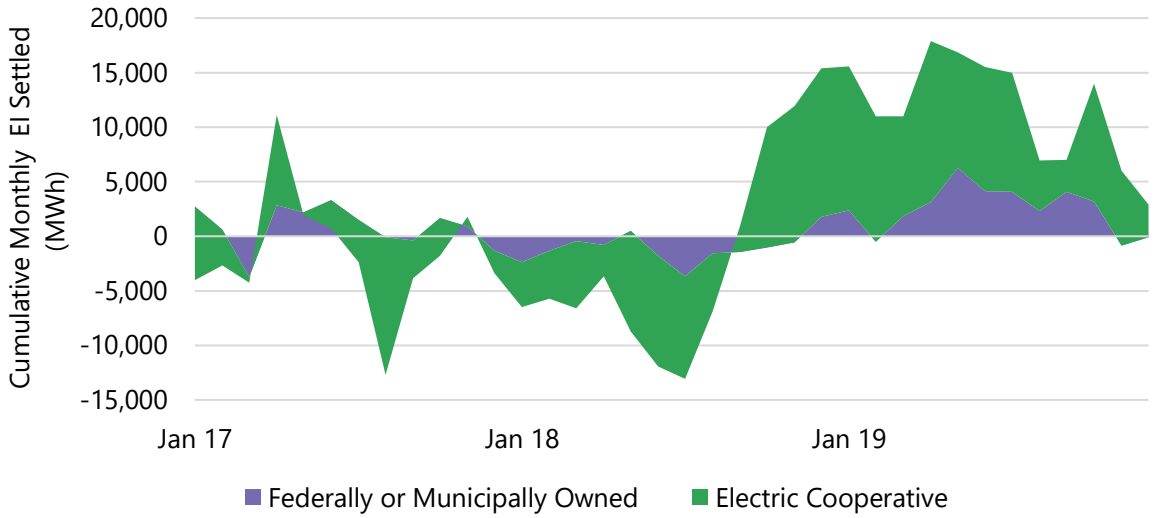


Figure 3-17 depicts monthly cumulative energy imbalance quantities by participant, and largely mirrors the results of Figure 3-11. Of note is the strong negative correlation between LAP and CRSP imbalance quantities. Based on conversations with market participants, this is believed to be a function of operational coordination within WAPA, as well as an artifact of the process used to "disaggregate" LAP and CRSP imbalance energy quantities, which had previously been recorded as a single account under the WACM BA. Also of note is the large swing in volume of energy imbalance transaction from Tri-State, which explains the majority of the positive cumulative imbalance energy settlements that persisted throughout 2019.

Figure 3-17 Imbalance energy by market participant, 2017-2019

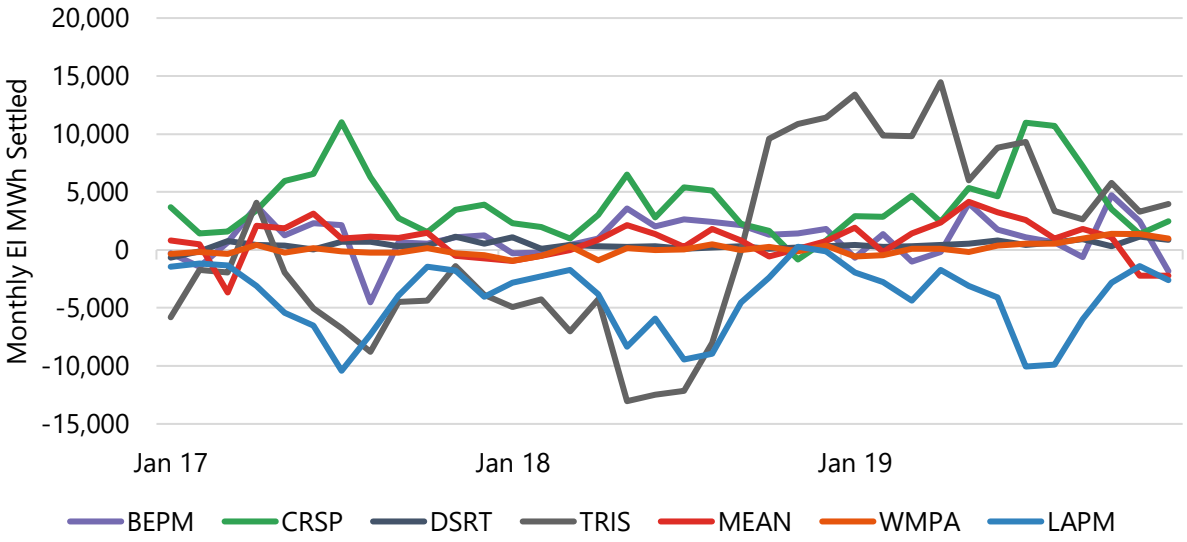


Figure 3-18 below tabulates absolute value of imbalance energy transacted by direct participants in 2019.

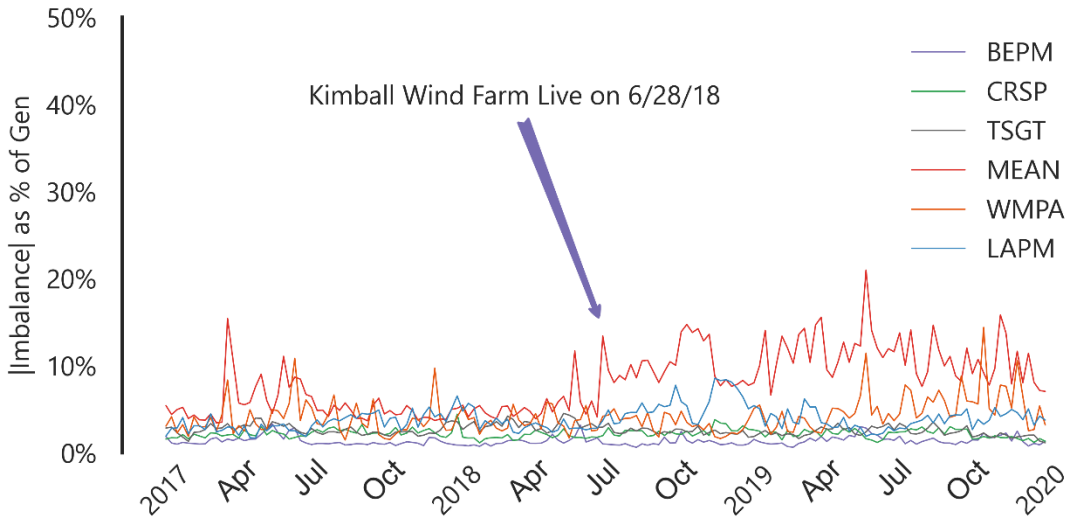
Figure 3-18 Absolute value of imbalance energy by market participant, 2019

Market participant	Total imbalance energy (absolute) MWh	Percent of total
TRIS	202,638	34.7%
CRSP	109,805	18.8%
LAPM	96,894	16.6%
BEPM	82,233	14.1%
MEAN	60,469	10.3%
DSRT	17,272	3.0%
WMPA	15,471	2.7%
Total	**584,782**	**100.0%**

The absolute value of energy imbalance quantities closely tracks the capacity and output metrics for each participant, with the possible exception of MEAN. Although MEAN possesses less than two percent of market capacity, and accounts for slightly over five percent of system load, it represents 10 percent of the imbalance energy transacted in 2019. Again, this may point to MEAN's buildout of a large wind facility, the only variable energy resource to come online during the study period.

As can be seen in Figure 3-19, MEAN's (red line) imbalance energy requirements as a fraction of its generation increased sharply with the installation of the Kimball Wind Farm.[63]

Figure 3-19 Absolute value of imbalance energy vs generation by market participant, 2019



3.5 AVAILABLE INTERNAL AND EXTERNAL TRANSFER CAPABILITY

In the transmission segment of the WEIS Market, all eight direct participants own transmission assets in the market footprint.

Internal and external transmission interface capabilities can play a significant role as a check on market power by generators. Figure 3-20 and Figure 3-21 below depict observed BA interchange values using real-time operational observations of the Western interconnect obtained from the SPP Reliability Coordinator. Both figures point to average flows of approximately 1,000 MW out of WACM, and an average net interchange much closer to zero MWh for WAUW.

[63] The Kimball Wind Farm is contracted to MEAN under a power purchase agreement. Given the scope of rights granted under the agreement, imbalance energy attributed to the wind farm was assigned to MEAN.

Figure 3-20 Observed BA interchange, October 2019 - June 2020

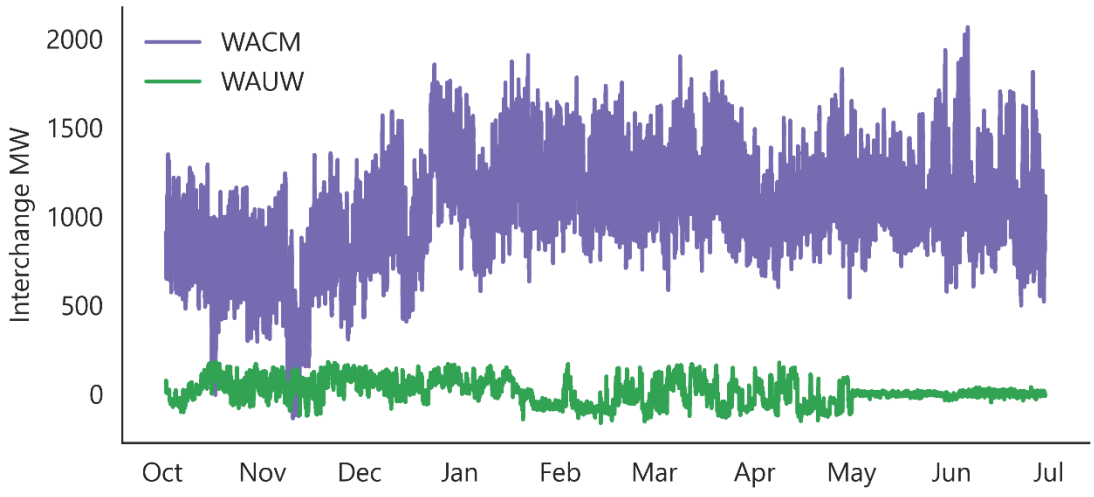
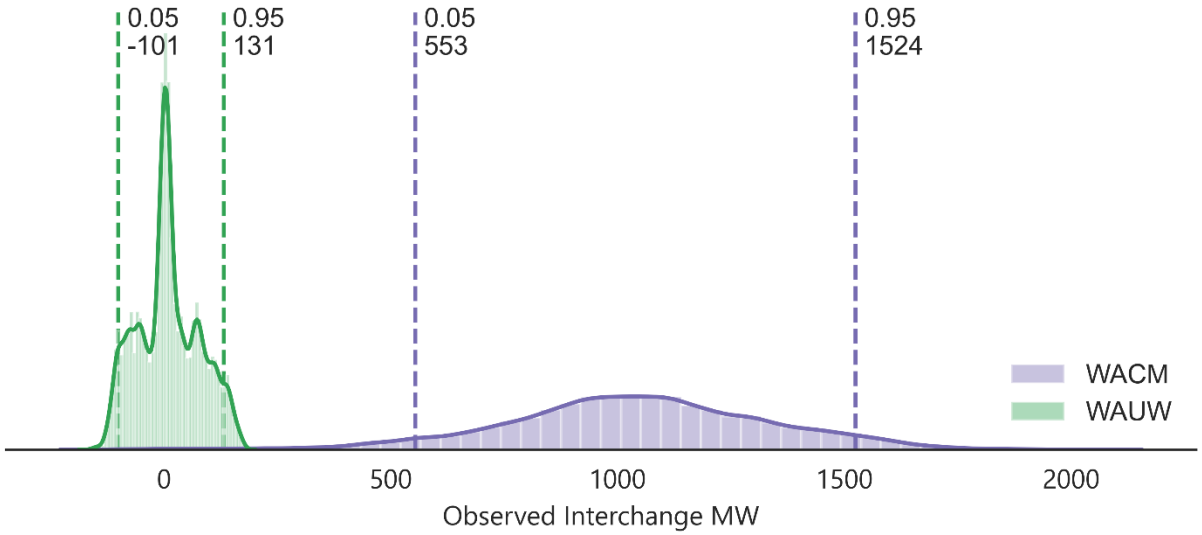


Figure 3-21 Observed BA interchange, October 2019 - June 2020



Given the nameplate capacity of 5,720 MW in WACM and 110 MW in WAUW along with an estimated transfer limit of at least 600 MW between the two BAAs, the existing *internal* interface capability does not pose concerns for potential structural market power. As such, the MMU does not see any further need to consider any potential inter-BAA market power concerns.[64]

[64] A market power assessment conducted by CAISO's Department of Market Monitoring (DMM) for the CAISO Energy Imbalance Market concluded that "…based on currently available information it [DMM] cannot conclude that the two PacifiCorp BAAs will be structurally competitive and therefore recommends that market power mitigation procedures be applied when scheduling constraints into either of these

Examination of data from the SPP Reliability Coordinator did not reveal significant intra-market congestion, and local congestion effects are further discussed in Section 4.5.

Congestion management in the proposed WEIS[65] will differ from SPP RTO operations in the Eastern interconnect in several significant ways. The proposed WEIS Market footprint contains several phase-shifting transformers, and the Western interconnect has a significantly higher amount of remedial action schemes (RASs) for post-contingency recovery processes relative to the SPP RTO.

Importantly, the market will not rely on economic redispatch as the primary approach to congestion management. Redispatch under the current congestion management methodology will not consider costs, and is one of the last steps before declaring emergency conditions.[66] Instead, the congestion management methodology calls for the adjustment of flows by the operation of the phase-shifting transformers and other transmission element reconfigurations, in order to honor the Western Interconnection Unscheduled Flow Mitigation Plan (WIUFMP). The inclusion of a marginal congestion component (MCC) in prices, in the absence of an economically-informed congestion relief process, and given a high degree of reliance on manual congestion relief, may result in unforeseen pricing and congestion effects.

Finally, the Western interconnection is characterized by large flows of power from resource-rich, sparsely populated areas to dense population centers. Much of this power is transmitted from large facilities in the Pacific Northwest to serve load to large cities along the Western coast. However, much of this power also loops through the easterly BAs within the Western

BAAs becomes binding." See California Independent System Operator Corporation ISO Tariff Amendments to the Energy Imbalance Market Docket No. ER14-2484-000, (July 23, 2014), Attachment C – Assessment of Potential Market Power in Energy Imbalance Market at 12, http://www.caiso.com/Documents/Jul23_2014_TariffAmendment_EnergyImbalanceMarketEnhancements_ER14-2484.pdf. Given the relatively large estimated transfer capacity, the MMU does not share the same concerns for the WACM-WAUW combined area.

[65] *See* Congestion Management Methodology at https://www.spp.org/documents/60289/spp%20west%20congestion%20management%20methodology%20v1.0.pdf

[66] There is currently a proposal before relevant organizational groups to modify the last-step dispatch process to allow the Reliability Coordinator to designate constraints for "market-optimized" relief through SCED. This proposal has not been approved, but is anticipated to receive approval prior to the projected market go-live date. While this represents an incremental improvement to this particular step of the methodology, the step itself remains nearly last-priority within the methodology.

interconnect on its way to those same population centers. This "donut effect," combined with intra-market needs to transport power to southern areas of the market footprint, results in predominately north-to-south, east-to-west flows coming into and leaving the market footprint. Operation of the proposed WEIS Market is not anticipated to change this dynamic, especially given the relatively small quantities of imbalance energy transacted relative to overall flows. If anything, external flows may determine market outcomes more than market outcomes may determine external flows. The WIUFMP, for example, along with SPP's Congestion Management Methodology, will dictate topological reconfigurations of the network in ways that will alter computed LMPs.

4 COMPETITIVE ASSESSMENT

4.1 DEFINITION OF RELEVANT MARKET: RELEVANT GEOGRAPHIC AND PRODUCT MARKETS

Antitrust and competition economics use the concept of the *relevant market* in identifying products or services, or the geographic market in the context of a merger, or, most generally, wherever competition occurs. The relevant market has two components: a relevant *product market*, and a relevant *geographic market*. In principle, both are determined based on the concept of degree of substitutability. The degree of substitutability among group of products determines the relevant product market designation by confirming if the products can serve the same purpose from the consumer's perspective. Similarly, the relevant geographic market is determined based on the locational substitutability, or whether suppliers in one location can reach and substitute for suppliers in another location to meet consumer demand for the relevant product.

As stated earlier, the MMU primarily followed Commission precedent in assessing structural market power for applications of MBRA for sales of various services including wholesale sales of electric energy, capacity and ancillary services by public utilities.[67] In assessing *horizontal market power* through indicative market share and pivotal supplier screens, the Commission uses the "default relevant geographic market" concept. For that purpose, a seller's BAA or the RTO/ISO market, as applicable, would be the default relevant geographic market.[68]

In non-RTO/ISO markets, the default relevant geographic market is first, the BAA where the seller is physically located, and second, the markets directly interconnected to the seller's BAA (first-tier balancing authority area markets).[69] In that regard, if a transmission-owning Federal power marketing agency is the home or first-tier market to the seller, then that Federal power

[67] *See* Section 2.5.
[68] In cases where the Commission makes a specific finding that there is a submarket within an RTO/ISO, that submarket is taken as the default relevant geographic market for sellers located within the submarket. *See* FERC Order 697 at 127-128.
[69] "Where a generator is interconnecting to a non-affiliate owned or controlled transmission system, there is only one relevant market (i.e., the balancing authority area in which the generator is located.)." *Ibid*., at 128.

marketing agency's BAA would be the relevant geographic market. For indicative screens, the Commission considers only those supplies that are located in the market being considered (relevant market) and those in first-tier markets to the relevant market. For non-RTO sellers, the Commission makes a rebuttable presumption that the seller's BAA and each of its neighboring first-tier BAAs are each relevant geographic markets.[70]

Accordingly, the MMU took the WEIS footprint as one default relevant geographic market covering two BAAs—WACM and WAUW—for security constrained economic dispatch of energy imbalance since there are no limiting interface transmission constraints between the two to create two separate markets. This will be used in calculating market share, supplier concentration, and system-wide pivotal supplier analysis using RSI. Submarkets within the WEIS Market were postulated where supply is limited due to transmission constraints. These would be used for the pivotal supplier analysis. Given the sparsity of intra-market congestion observed from real-time operational data, however, the MMU did not designate any sub-markets within the larger footprint for PSA analysis, instead electing to treat the dual-BA footprint as a single constrained area.

In case of the relevant product market,[71] the main criterion is whether a group of power supply products can be substituted or interchanged for the same use. Because of the inherent nature of energy and imbalance energy products, distinguishing the two is not readily apparent: while the energy product is interchangeable for the purpose of imbalance energy, the other way around is not possible. In other words, they are not fully substitutable to be considered in the

[70] *Ibid*., at 128-129

[71] The Commission defines relevant product in the context of transactions under section 203 of the Federal Power Act (FPA) under the delivered price test, as "[t]he horizontal Competitive Analysis Screen must be completed using the following steps: (1) *Define relevant products*. Identify and define all wholesale electricity products sold by the merging entities during the two years prior to the date of the application, including, but not limited to, non-firm energy, short-term capacity (or firm energy), long-term capacity (a contractual commitment of more than one year), and ancillary services (specifically spinning reserves, non-spinning reserves, and imbalance energy, identified and defined separately). See CFR 33.3.c(1). The Commission notes that "…the delivered price tests analyses filed with the Commission often focus on only the short-term energy market, with far less detail and attention given to the other relevant products." *See* Modifications to Commission Requirements for Review of Transactions under Section 203 of the Federal Power Act and Market-Based Rate Applications under Section 205 of the Federal Power Act, 156 FERC ¶ 61,214, at 5 (September 22, 2016).

same category of power supply products. Therefore, energy imbalance can be considered as a separate product from energy.

From the practical point of view, however, and in the context of calculations performed for this study, the MMU used the energy data for both the RSI and PSA.[72] Theoretically, even though imbalance energy is the relevant product for the proposed WEIS Market, energy has a determinative role in energy imbalance outcome. Moreover, market participants do not make offer decisions with energy imbalance market in mind; rather imbalance energy occurs as a residual. For this reason, the MMU considered energy imbalance as a byproduct of energy, as the imbalance energy amounts are observed subsequent to (real-time) actual energy flows, only during the settlements process.

Consequently, the MMU analyzed market power considering both energy and imbalance energy products in calculating market share and supplier concentration metrics, but used only energy in conducting the RSI and PSA.

4.2 STRUCTURAL ASPECTS

As explained in Section 2.5, this study examines the structural aspects of market power concerns in the proposed WEIS Market through market share analysis, supplier concentration index, and pivotal supplier analysis.[73, 74] The structural aspects—both at the aggregate and at local market

[72] *See* Sections 4.5.1 and 4.5.2.

[73] As discussed earlier, in evaluating MBRA applications for horizontal market power, the Commission, applies two indicative market power screens: pivotal supplier and (wholesale) market share analyses of which both based on *uncommitted*, not total capacity. Uncommitted capacity is calculated as total capacity minus the capacity dedicated to long-term sales contracts, operating reserves, planned outages, and native load as measured by the appropriate native load* proxy. (*See* FERC Order 697 at 51). The MMU was not able to obtain such data particularly for participant capacity dedicated to long-term contracts. Therefore, to the extent such contracts exists, the estimated market share results may overstate the actual market shares by not counting such capacity. On the same token, the MMU's pivotal supplier analysis represent conservative outcomes. (*Native load commitments are commitments to serve wholesale and retail power customers on whose behalf the potential supplier, by statute, franchise, regulatory requirement, or contract, has undertaken an obligation to construct and operate its system to meet their reliable electricity needs." *Ibid*., at 82).

[74] In Order 697, the Commission declines to substitute the HHI for the market share indicative screen or to supplement the indicative screens with the HHI "…because the indicative screens are sufficiently conservative to identify those sellers that have a rebuttable presumption of market power, without having to add an additional layer of review at the initial stage." *See* FERC Order No. 697 at 42-43. However,

levels—are conditions that create *potential* for market power without regard to the actual *exercise* of market power. It is necessary to assess these conditions in order to ensure that when the market goes live, appropriate mitigation measures are in place. A structurally competitive market will limit the potential for the exercise of market power through market participant offer and bid behavior.[75]

In this section, market share and supplier concentration indicators are used to assess structural competitiveness. Next, the residual supply index and the pivotal supplier analysis are used to assess structural competitiveness utilizing transmission constraints and changing demand conditions.[76]

4.3 THE MARKET SHARE ANALYSIS

4.3.1 Energy

Market share is a static indicator for potential market power and measures suppliers' relative position in total market supply. It provides important—nonetheless limited—information for market power, as it does not account for the role of demand. For this analysis, the MMU calculated the maximum market share (in energy output) held by any supplier within an hour in the WEIS Market footprint by hour from 2017 through 2019. This calculation includes output of

when sellers fail two indicative screens, the Commission provides "…full opportunity to present evidence (through the submission of a Delivered Price Test (DPT) analysis) demonstrating that, despite a screen failure, they do not have market power, and the Commission will continue to weigh both available economic capacity and economic capacity when analyzing market shares and Hirschman-Herfindahl [*sic*] Indices (HHIs)." *Ibid*., at 8. The MMU uses the supplier concentration index (HHI) to illuminate the potential for coordinated behavior among suppliers.

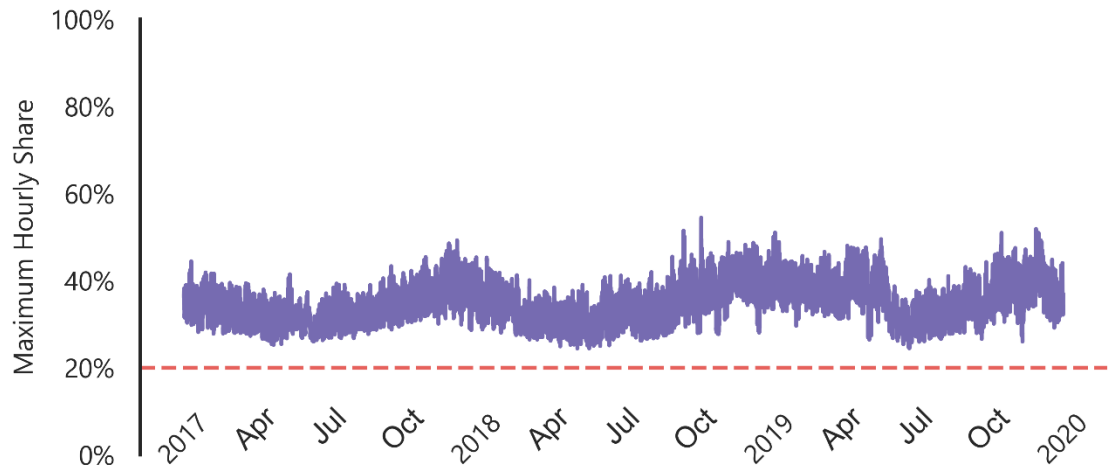
[75] Mitigation measures addressing the actual exercise of local market power is provided in Tariff Filing, Attachment B Market Power Mitigation Plan. Behavioral indicators used to detect actual exercise of local market power include offer price markup (or price cost markup), economic withholding analysis, uneconomic production, and physical withholding.

[76] While the WEIS Market's (only) product will be *imbalance energy* to be dispatched in 5-minute intervals, and priced nodally by the locational marginal pricing (LMP) method, the market power analysis used historical data sets for the footprint submitted by market participants to the MMU, which are for hourly dispatched *energy*, and *imbalance energy*, pricing of which used administrative methods. Balancing Authorities have been using the Commission approved rates or formulas for the pricing of the imbalance energy within their respective footprints.

the same resources that have decided to participate directly in the WEIS Market in 2019[77] and indicates pre-market conditions of the actual WEIS Market.

Figure 4-1 displays the largest supplier's *energy* output by hour for 2017-2019.

Figure 4-1 Market share of largest supplier



The results show that the market share of the largest supplier of energy varied from 24 percent to 54 percent, exceeding the 20 percent threshold[78] in all (8,760) hours annually throughout the 2017 to 2019 period.[79] The largest supplier of energy has an average market share of 35 percent

[77] Excluding PPRs.

[78] The 20 percent threshold is a benchmark used for identifying system-wide structural market power for various industries, and generally used in pre-mergers analysis conducted by governmental agencies including the Department of Justice. The Commission uses this benchmark as well particularly in concluding market-based pricing applications. "The market share analysis adopts an initial threshold of 20 percent. …a seller who has less than a 20 percent market share in the relevant market for all seasons will be considered to satisfy the market share analysis. A seller with a market share of 20 percent or more in the relevant market for any season will have a rebuttable presumption of market power but can present historical evidence to show that the seller satisfies our generation market power concerns." FERC Order 697 at 23, It is however, not considered a sufficient or conclusive indicator for local market power assessment in wholesale spot power markets primarily because such markets clear on a nodal basis, and thus requires consideration of load pockets formed by transmission congestion. In the presence of such constraints, even smaller than 20 percent market shares may lead to local market power. The same issue is valid for the market wide supplier concentration values measured by the HHI index.

[79] Market participants self-reported their output of jointly-owned units (JOUs), and the MMU verified the data against public and private information on the ownership and operation of various JOUs throughout the market footprint.

in the same period. Most recently in 2019, the market shares varied from 26 percent to 57 percent, averaging 37 percent for the largest supplier. The largest supplier's market share is significantly higher than the 20 percent benchmark throughout the period studied. The seasonal data for 2019 show that while shoulder months typically reveal relatively lower levels of market share, higher rates are prevalent throughout the rest of the year.

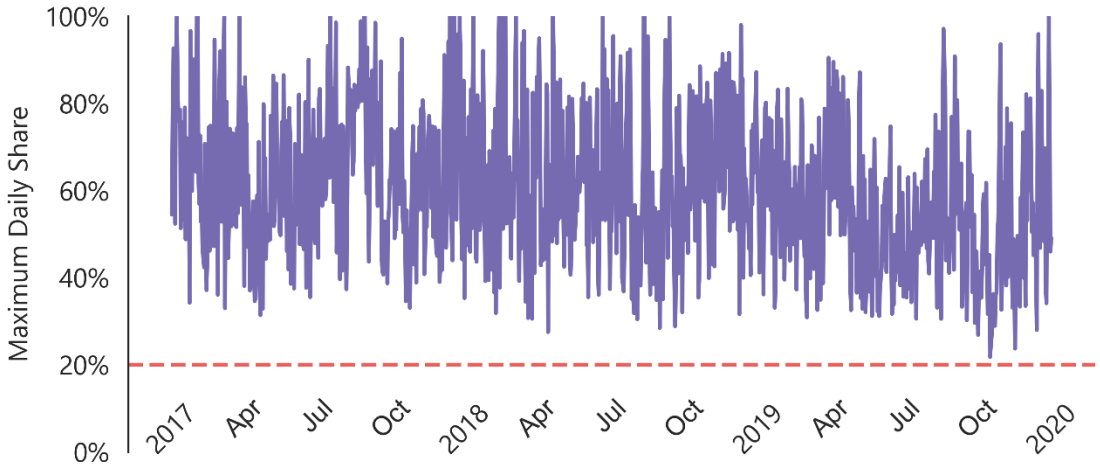
The high market shares reflect a general pattern that raises concerns for market implementation. It is not solely determinative, though, and other indicators such as supplier concentration and particularly the pivotal supplier analysis will aid in understanding market composition and market power.

4.3.2 Imbalance energy

Data on imbalance energy was provided for the same period (2017-2019) but was only available for the WACM BA. While more complete information would be preferred, the WACM BA constitutes the overwhelming majority of market capacity, generation, and withdrawal, and can be viewed as a reasonable proxy for whole-market concentration.

Figure 4-2 below shows the largest supplier's *imbalance energy* output by day for 2017-2019.

Figure 4-2 Market share of largest supplier, daily



The figure above shows that, in terms of hourly imbalance energy supplied, the market share of the largest supplier—which can vary from hour to hour—was between 22 percent and 100 percent, exceeding the 20 percent threshold in all hours observed.

4.4 THE HERFINDAHL-HIRSCHMAN INDEX (HHI) FOR SUPPLIER CONCENTRATION

The Herfindahl-Hirschman Index (HHI) is another commonly used metric to measure structural market power, analyzing overall supplier concentration in the market. High levels of supplier concentration can indicate the possibility of coordinated actions among suppliers. It is a static metric in the sense that it takes a snapshot of the market data without considering dynamic supply and demand conditions in a relevant market. It is calculated as the sum of the squares of the market shares of all suppliers in a market as follows:

$$HHI = \sum_i \left(\frac{MW_i}{\sum_i MW_i} * 100 \right)^2$$

According to FERC's "Merger Policy Statement,"[80] which is similar to the Department of Justice's merger guidelines, an HHI below 1,000 is an indication of an "unconcentrated" market, an HHI of 1,000 to 1,800 indicates a "moderately concentrated" market, and an HHI above 1,800 indicates a "highly concentrated" market.

[80] Inquiry Concerning the Commission's Merger Policy Under the Federal Power Act: Policy Statement, Order No. 592, Issued December 18, 1996 (Docket No. RM96-6-000).

4.4.1 Energy

The SPP MMU conducted the HHI analysis at the market participant level. Figure 4-3 and Figure 4-4 show the number of hours for each concentration category in terms of actual energy output[81,82] over the 2017 to 2019 period, respectively.[83]

The HHI in 2019 for installed capacity in the proposed WEIS market is 2,470.

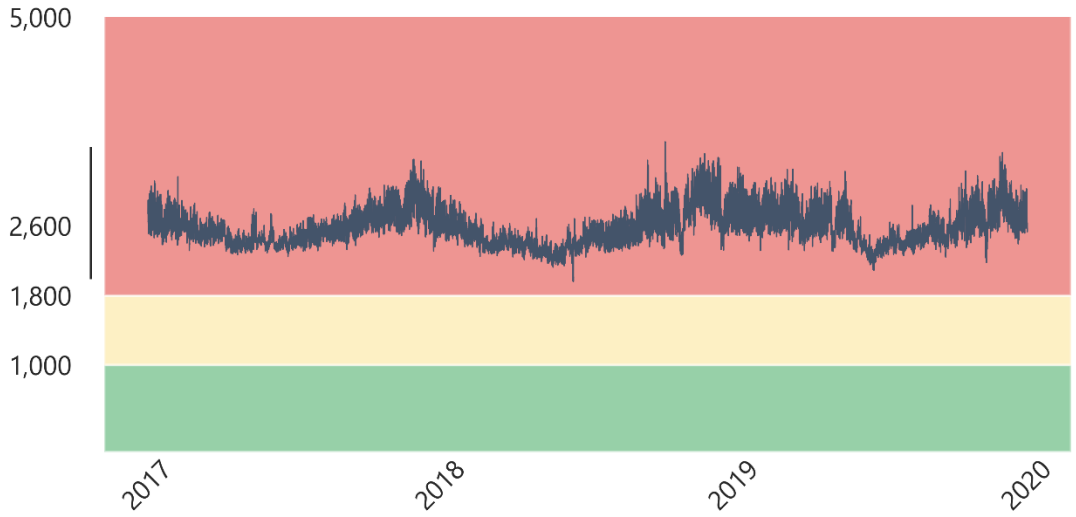
Figure 4-3 Market concentration by energy output, 2017-2019

Concentration	HHI Level	2017		2018		2019	
		Hours	Percent of hours	Hours	Percent of hours	Hours	Percent of hours
Unconcentrated	Below 1,000	0	0%	0	0%	0	0%
Moderately concentrated	1,000 to 1,800	0	0%	0	0%	0	0%
Highly concentrated	Above 1,800	8,734	100%	8,751	100%	8,758	100%

Figure 4-4 shows a graphical breakdown of the HHI for all hours in 2017, 2018, and 2019.

[81] The FERC merger guidelines uses capacity owned. However, considering the nature of the electric power industry, and the purpose of this study—not being a merger analysis—the MMU analyzed supplier concentration primarily in actual energy output terms. The MMU also calculated HHI in nameplate capacity for 2019.
[82] The SPP MMU calculated HHI by hourly generation. Some years may reflect hour counts that, when totaled, do not constitute a full 8,760 hours. 37 hourly intervals (less than 0.15 percent) were excluded from a total of 26,280 hours in the study period.
[83] In this calculation, the MMU assumed that the participants and the resources they owned were the same ones since 2017 when a decision was made to participate and form the WEIS Market in 2019. The only exception, as noted earlier, is the assignment of the output of the Kimball Wind Farm to MEAN.

Figure 4-4 Market concentration by energy output, 2017-2019

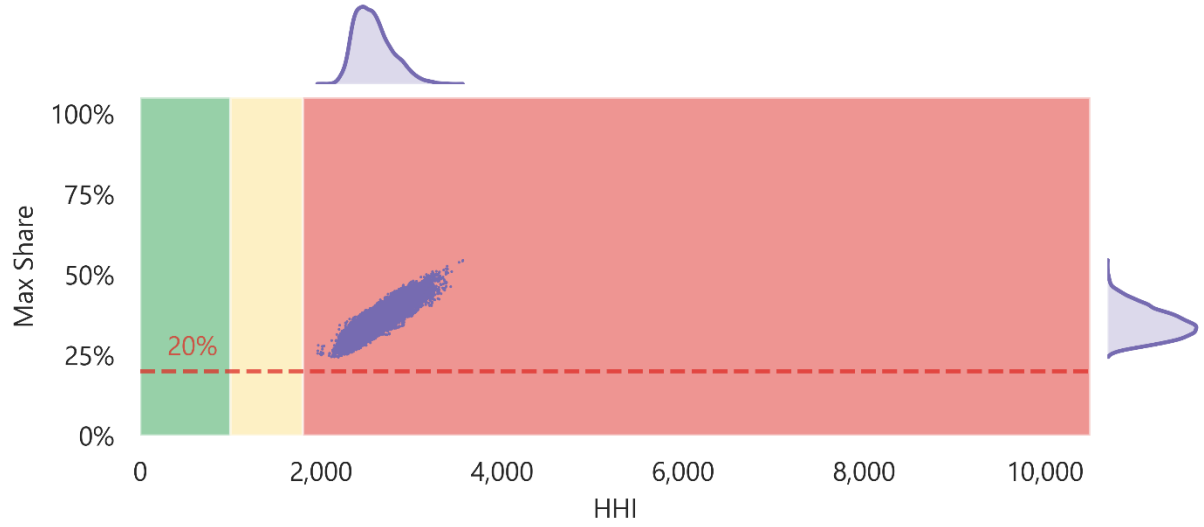


As the chart indicates, the market footprint was "highly concentrated" in all hours for the entire three-year period. Hourly minimum and maximum HHI values for the three-year period were 1,960 and 3,566, respectively with an average level of 2,580 and a standard deviation of 200. The most recent year 2019 figures show similar pattern indicating minimum and maximum values as 2,089 and 3,442, respectively.

High concentration results, when weighed in conjunction with elevated market shares, raise substantial structural market power concerns prior to market implementation. These results highlight the importance of the pivotal supplier analysis.

Figure 4-5 below depicts the distribution of hourly maximum share and HHI values for the provision of in-market energy.

Figure 4-5 Hourly maximum share and HHI distribution, energy, 2017-2019



No intervals could be considered "unconcentrated" or "moderately concentrated," although the distribution of values is adjacent to the 20 percent and 1,800 thresholds for maximum share and HHI, respectively. Additionally, the maximum share values and HHI values are tightly concentrated in ranges slightly outside of the threshold, but do not meaningfully extend more than halfway to the extreme in either axis. The shape and slope of the distribution provide confidence that the underlying calculations are performing as expected.

4.4.2 Imbalance energy

The following figures depict the same metrics as above, but are calculated for imbalance energy.

Figure 4-6 Daily market concentration, imbalance energy, 2017-2019

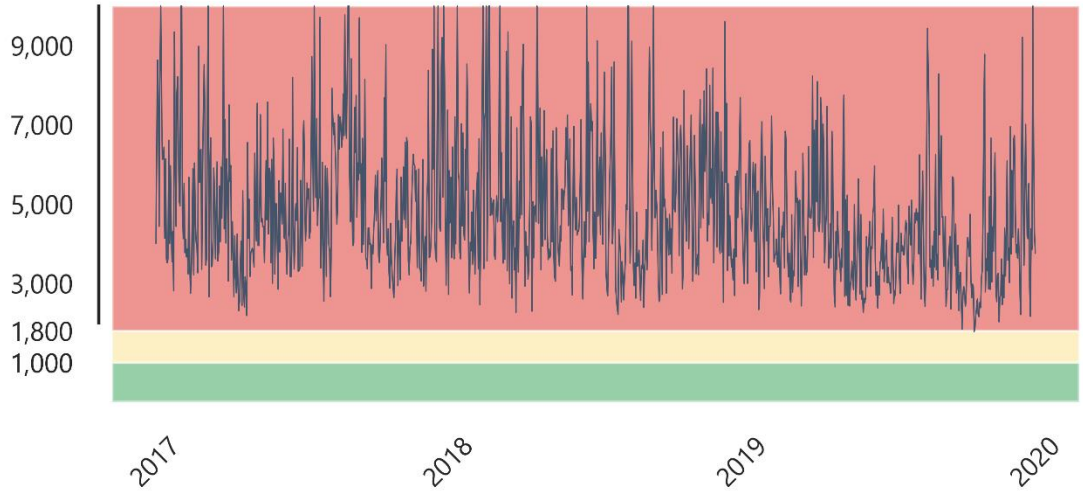


Figure 4-6 depicts daily HHI values for the provision of imbalance energy. As can be seen, very few—if any—intervals can be considered not "highly concentrated."

HHI values in output varied between 1,742 and 10,000 from 2017 to 2019, with all but two hours considered highly concentrated in the three-year period. In 2019, the average HHI value for energy imbalance supply was approximately 4,854 with a standard deviation of approximately 1,753.

It is important to note that the set of possible "suppliers" is exceptionally limited in this analysis, as it is first restricted to in-market entities, and then to those entities that are net suppliers within an interval. Because the MMU cannot retroactively infer the latent supply of imbalance energy, this *ex-post* analysis will necessarily demonstrate higher levels of concentration than would be seen in an *ex-ante* analysis of market offers in a competitive environment. Nonetheless, the results demonstrate high levels of market concentration.

Figure 4-7 Market concentration by imbalance output, 2017-2019

Concentration	HHI Level	2017		2018		2019	
		Hours	Percent of hours	Hours	Percent of hours	Hours	Percent of hours
Unconcentrated	Below 1,000	0	0%	0	0%	0	0%
Moderately concentrated	1,000 to 1,800	0	0%	1	0.01%	1	0.01%
Highly concentrated	Above 1,800	8,710	100%	8,716	100%	8,753	100%

Figure 4-8 Hourly maximum share and HHI distribution, imbalance, 2017-2019

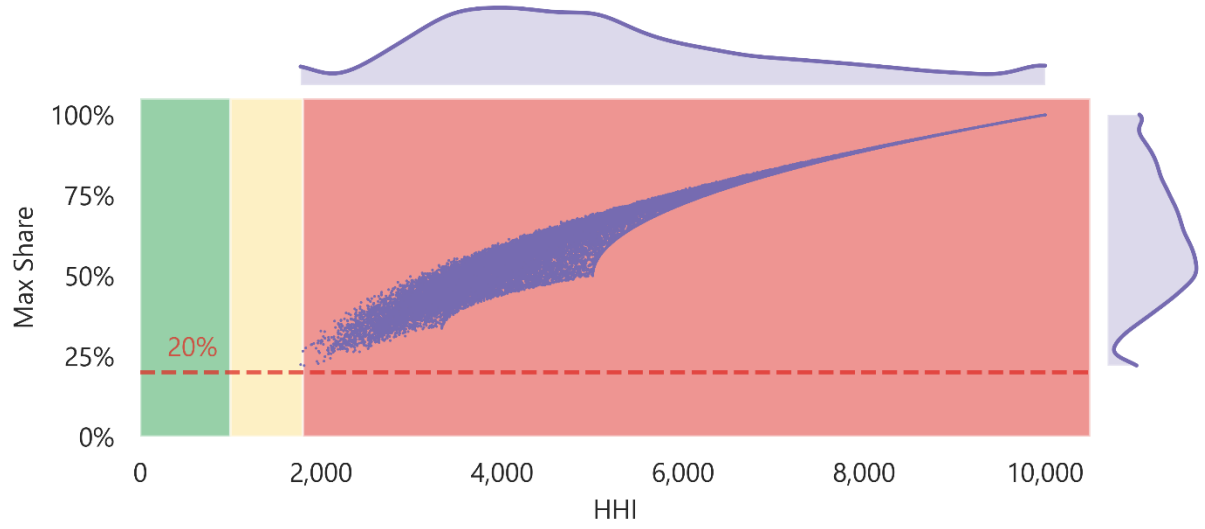


Figure 4-8, like Figure 4-5, plots pairs of HHI and maximum share values for each hour in the three-year study period and depicts a structurally concentrated market.

While the figure does point to high levels of market concentration, it most likely overstates the level of concentration for the reasons provided in the analysis of Figure 4-6—namely that the set of suppliers is limited within an interval, and that the data represents *ex-post* analysis of output data, as opposed to *ex-ante* analysis of offered supply, which would provide a more accurate sense of the quantity of latent and offerable imbalance energy. Given that the imbalance energy quantities are not known until they are settled, the energy concentration metrics may more closely resemble the levels of *actionable* market power.

4.5 PIVOTAL SUPPLIER ANALYSIS

PSA and RSI are two closely related metrics that measure structural competiveness in power markets. PSA, or pivotal supplier analysis, removes the capacity of a supplier from the total available supply to assess if demand can be met without that supply. If not, this supplier is considered pivotal. Thus, PSA is a binary metric. PSA can also be run for two or three suppliers. The RSI, on the other hand, is the ratio of residual supply (or total supply minus supply of i^{th} supplier) to demand, hence it measures pivotal status in a continuous scale.[84] RSI can also be calculated by removing two or three suppliers, and the RSI value less than 1.0 indicates an uncompetitive structure.[85]

We will present our PSA results in the form of pivotal supplier frequency charts, and RSI results in the form of duration curves. PSA results display frequency with which at least one supplier was pivotal in the relevant geographic market in a timeframe. The frequency with which a supplier is pivotal indicates a potential to raise prices above competitive levels. Higher demand levels have a greater potential to exercise market power by suppliers that are frequently pivotal. Hence, the MMU analyzed pivotal supply frequency at different levels of demand in the market. The RSI results sorts hourly RSI values from the highest to the lowest to show hours of duration for uncompetitive conditions within a year.

4.5.1 Residual supply index

For the reasons discussed in Section 4.1, the MMU used the energy data for RSI and PSA analyses. Even though imbalance energy is theoretically the relevant product for the proposed WEIS Market, energy has a determinative role in energy imbalance outcome, as the imbalance

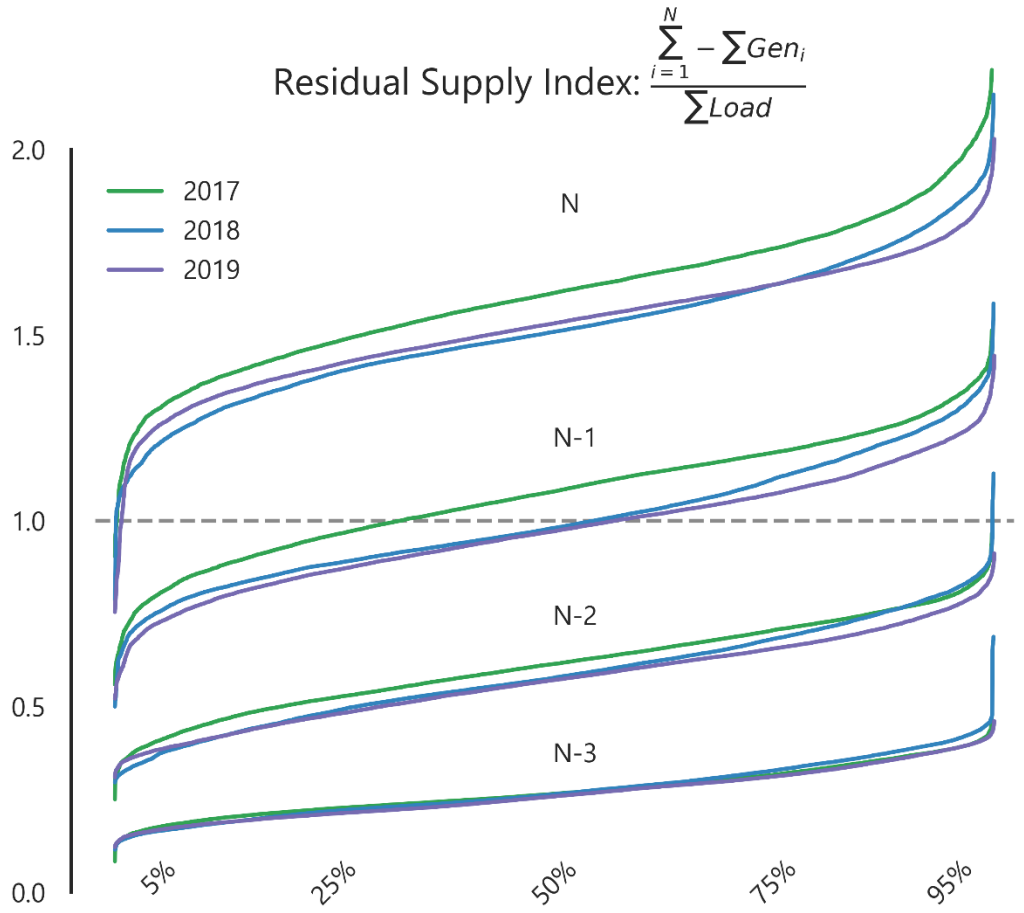
[84] A supplier may exercise market power when it is nearly, but not actually pivotal based on the pivotal supplier test. RSI, being a continuous measure, addresses that criticism. S*ee* Newbery, David., Richard Green, Karsten Neuhoff, and Paul Twomey. November 2004. *A Review of the Monitoring of Market Power The Possible Roles of TSOs in Monitoring for Market Power Issues in Congested Transmission Systems*, report prepared at the request of European Electricity Transmission System Operators, at 27.

[85] In principle, RSI_i **=** (Total supply – Supply by $resource_i$) / Total demand, where total supply is total available supply in the market including net imports and supply by resource *i* is resource capacity minus contract obligations. In calculations, supply by $resource_i$ was taken as total observed output by participant *i*. Adjustments for net imports or contract obligations were not made.

energy amounts are observed subsequent to (real-time) actual energy flows, and during the settlements process.

RSI duration curves are calculated to analyze system-level market power. Figure 4-9 depicts RSI duration curves for each year in the study period under four scenarios: one with the base data, and three further sets of curves with the first (N-1), second (N-2), and third (N-3) largest supplier within each interval removed.

Figure 4-9 Residual Supply Index, 2017-2019



As is shown, when the largest supplier is removed (N-1), the remaining generation may be unable to meet demand in nearly 50 percent of intervals. When the second (N-2) and third (N-

3) suppliers are removed, generation falls short of demand in all but a handful of hours over the three-year period. This further confirms significant system-level market power. However, unlike the market share or HHI analysis, the RSI analysis shows that with the largest supplier removed, the remaining generation can still meet demand about 50 percent of the time. This can provide a basis for successful mitigation of system-level market power.

4.5.2 Pivotal supplier analysis

In addition to evaluating the RSI based on prospective participants' submitted historical data, the MMU conducted a more granular examination of structural market power in the proposed market in the form of a PSA. The purpose of the PSA is to introduce a topological dimension to the assessment of market power. The results of the PSA determine the frequency with which the largest supplier could become "pivotal" to the market (i.e., without a supplier's generation within a certain, constrained area, the market would not be able to meet demand with the remaining competitive dispatchable supply).

As with the RSI calculations, the MMU used information on the provision and demand for energy for the reasons outlined in Section 4.1 of this report. Unlike the RSI metrics, however, the PSA used real-time data collected and provided by the SPP Western Reliability Coordinator (RC-West).[86,87] As noted above, the RC-West data is more granular and topologically-informed, which is necessary in evaluating congestion characteristics and constrained areas for pivotality.

Examination of the data generally supports the interpretation that the network is presently operated in a manner that produces relatively little congestion, compared with both prior MMU experiences analyzing the SPP RTO network and the thresholds and metrics conventionally employed by the MMU to characterize transmission congestion. Conversations with SPP reliability and operations personnel indicate that this is in fact a prevailing characteristic of the

[86] The data provided by RC-West was referenced against the market participant-submitted data, and examination of overlapping intervals reveals consistent accuracy with what prospective participants self-reported as their historic injections and withdrawals.

[87] RC-West did not commence reliability coordinator functions until early October of 2019. As such, the data collected spans a continuous period of approximately 270 days—nearly 6,500 hours—from early October 2019 to late June 2020. While the data collected does not cover the full summer peak, it does capture the other "twin peak" of winter demand, and inferences may be extended to the summer peak based on the pivotal frequencies observed in high-demand intervals in the available data.

BAs under consideration, at least as they exist in a pre-market, pre-centralized-dispatch state. Accordingly, some interpretive caution is warranted, as the transmission network will operate differently under central dispatch.

Due to the relative sparsity of observed congestion, both within and between BAs, the MMU considered both BAs—WACM and WAUW—as a single constrained area encompassing the entire market footprint for the purpose of the PSA. As a result, the study is essentially a test of system-wide pivotality. Again, it is important to note that pre-market behavior and congestion patterns will change with market implementation, and the MMU is committed and obligated to continual re-assessment of the market footprint in order to identify substantial changes in congestion patterns. Absent further market entry or an increase in the resource portfolios of smaller market participants, however, it is anticipated that any sub-regions identified within the market will demonstrate similar or higher rates of pivotality.

This analysis was not intended to establish the Frequently Constrained Areas (FCAs) that the MMU has a distinct obligation to identify under the proposed WEIS tariff. The MMU will perform separate and ongoing FCA analyses prior to and continuing after market implementation, and increased understanding of the region—coupled with changing dispatch patterns—may warrant a revision of the MMU's outlook on network congestion.

Methodology

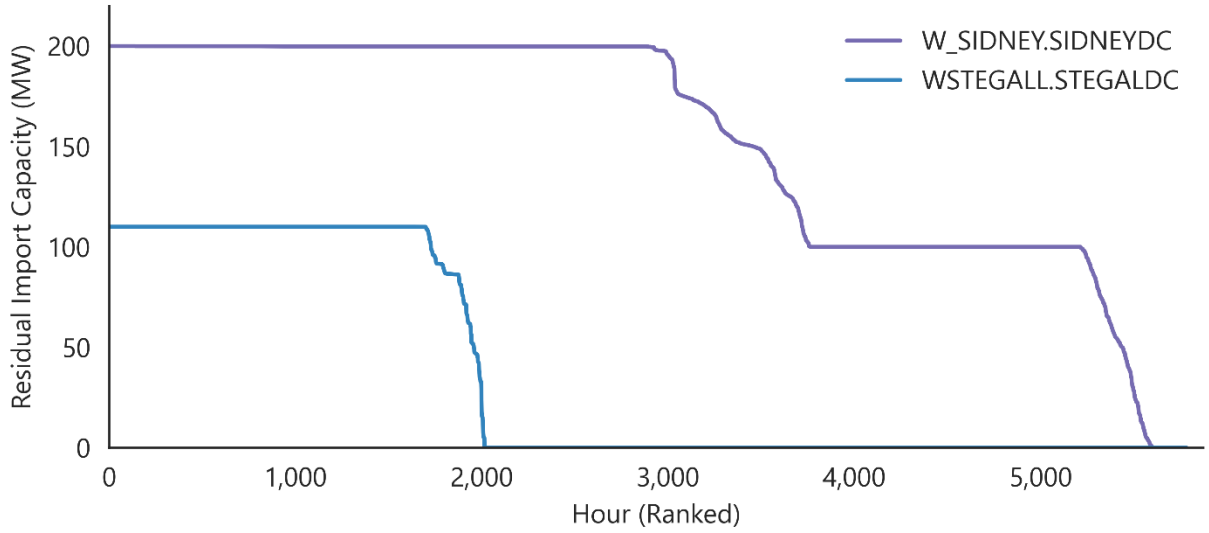
In conducting the PSA, the MMU pursued three major methodologies: a "generation only" method, a "DC ties" method, and a "schedule cut" method. Within each major methodology, the analysis was conducted with two subsets of assumptions concerning the ability of hydroelectric resources, due to the high penetration of hydroelectric generation in the market. Three major methodologies, each with two different assumptions, provides for a total of six scenarios.

In the "generation only" method, only online, dispatchable capacity possessed by prospective market participants[88] was considered in attempting to balance the loss of the largest

[88] PPRs, wind resources, and resources generating zero MW or otherwise offline were not considered as online dispatchable capacity. PPRs are not subject to economic dispatch, as they are not members of the proposed WEIS. Wind resources, even if dispatchable, are assumed to be operating at full output within each interval, and as such do not provide any additional upwards capacity to meet the loss of the largest

participant's supply. In the "DC ties" method, observed latent import capacity at the two DC ties located in Sidney and Stegall Nebraska was added to the pool of remaining competitive supply. Figure 4-10 below depicts the amount of import capacity available at each tie during the observed period.[89]

Figure 4-10 Available import capacity



Finally, the "schedule cut" method employed an aggressive set of assumptions that the market could both curtail the export of power to adjacent areas, and begin importing at or near the historically observed maximum hourly import value.

As noted above, across all three methods, after removing the supply and capacity of the largest participant, the MMU employed two different assumptions about the capability of hydroelectric resources to meet market demand.

supplier. Finally, resources outputting zero MW, or resources with open breakers during an interval, were considered offline.

[89] While the PSA observation period covered nearly 6,500 hours, approximately 11 percent of sub-hourly intervals were excluded from the DC Tie analysis when RC-West data indicated that the tie was not operational or the individual measurement may be suspect. Analysis of outage data indicates that the Stegall tie was out of service frequently throughout the period. Those intervals were included in the analysis, but at zero MW of assumed import capacity. Notably, market participants Basin and Tri-State have publicly committed to refurbish the Stegall tie, with an anticipated completion in 2022. *See* https://www.basinelectric.com/news-center/news-briefs/basin-electric-board-votes-refurbish-stegall-dc-tie

The first assumption modelled hydroelectric generating resources as capable of providing up to the maximum of their presently observed value, or the maximum output of the resource observed within an interval in the two weeks preceding the interval of interest. This method was developed to reflect the unique dynamics of hydroelectric generation, the output of which can be seasonally bounded over time, but still capable of providing large amounts of power if necessary within a single interval. While these resources obviously cannot run at maximum output indefinitely, the study is explicitly designed to observe single-interval capacity. A total and prolonged withdrawal of the largest supplier, with demand levels remaining constant, is an equally unlikely assumption[90] as a hydroelectric generator running at full nameplate capacity for the entire year.

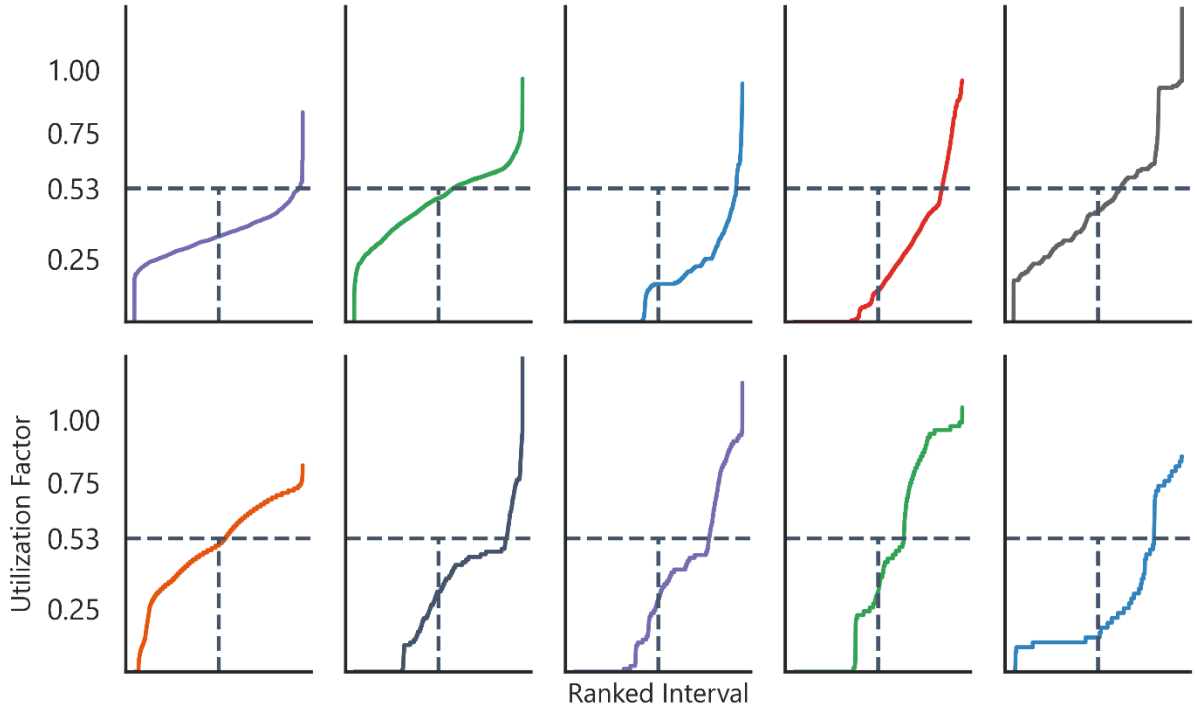
The second assumption is based on literature concerning the Effective Load Carrying Capacity (ELCC) of different resource technologies in the Pacific Northwest.[91] ELCC is an accreditation mechanism for variable energy resources (VERs) that attempts to account for the non-coincident profiles of electrical demand and VER output, as well as the decreasing marginal returns to system capacity as more VERs are added at network locations with non-coincident generation profiles. The literature provided an ELCC accreditation factor of 0.53 for hydroelectric resources. Latent hydroelectric generation capacity was thus determined as the greater of either the presently observed output or the nameplate capacity, de-rated by the ELCC accreditation factor.[92] Figure 4-11 below depicts the ten largest hydroelectric resources' output divided by nameplate capacity (utilization factor) within each interval, with a horizontal line drawn at the 0.53 accreditation factor, and a vertical line drawn at the median observed interval.

[90] In many intervals the largest supplier of energy was also a net purchaser, which removes the incentive to manipulate prices higher. Additionally, 100 percent of market participants are not-for-profit entities, and remain subject to the supply adequacy obligations outlined in the tariff, and the load obligations of their customers.

[91] *See* Resource Adequacy in the Pacific Northwest, Energy Environmental Economics, March 2019 at https://www.ethree.com/wp-content/uploads/2019/03/E3_Resource_Adequacy_in_the_Pacific-Northwest_March_2019.pdf

[92] This effectively establishes a "floor" of 0.53 of nameplate capacity while still allowing observations greater than 0.53 * Nameplate. As such, the imputed data under this assumption results in a higher capacity factor than 0.53, but as discussed above, this analysis is focused on the ability of the market to meet short-term withdrawals of generation and capacity.

Figure 4-11 Hydroelectric utilization factors

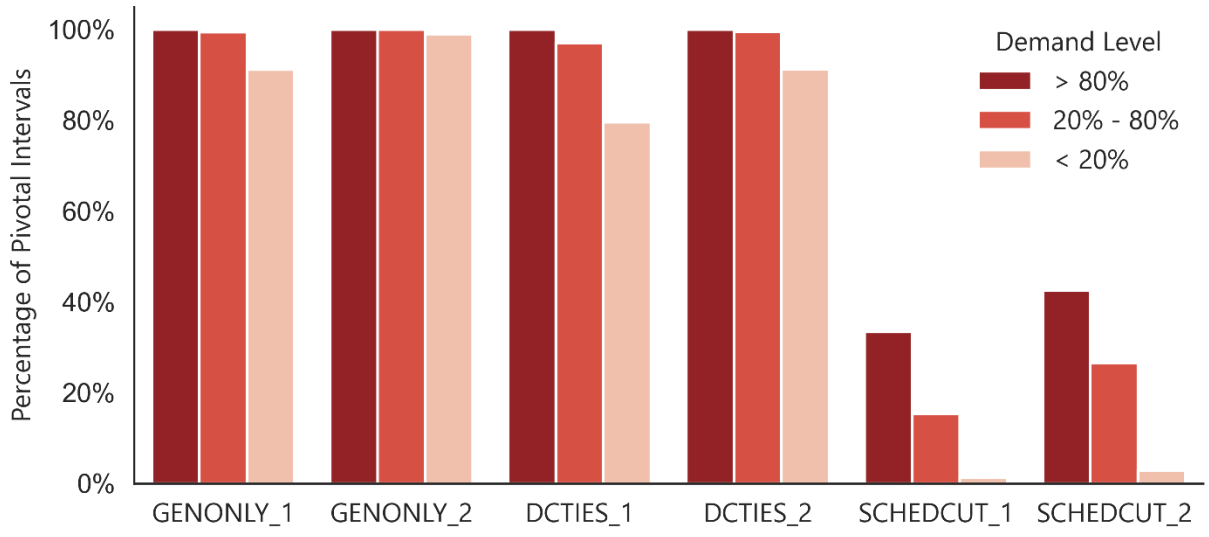


Results

With the exception of the last two scenarios ("schedule cut" method scenarios), all scenarios demonstrated that a pivotal supplier was present in almost every interval. Figure 4-12 below depicts the frequency with which at least one supplier was pivotal in each scenario's intervals, by demand level. High-demand intervals provide generators a greater ability to exercise market power.

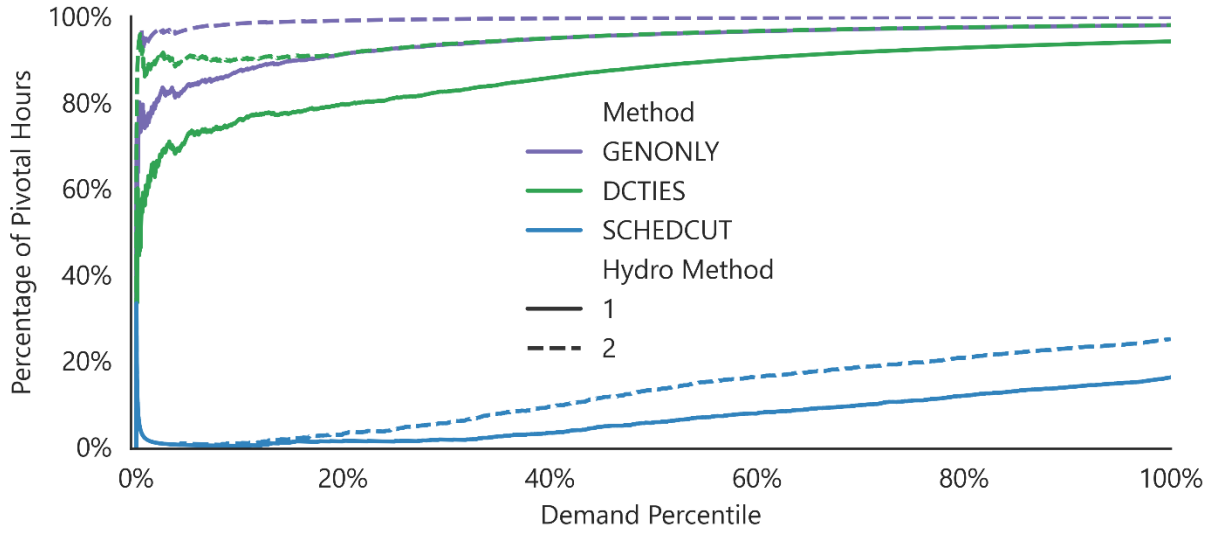
The last two scenarios—the "schedule cut" scenarios—employed the most aggressive assumptions (assumptions that may not hold in operational reality), but still saw approximately 40 percent of peak demand intervals possess a pivotal supplier.

Figure 4-12 Pivotal intervals by demand level and scenario



Plotted against a continuous demand axis in Figure 4-13 below, it is clear that most of the scenarios rapidly approach 100 percent pivotality, even at relatively low levels of demand.

Figure 4-13 Percentage of pivotal hours at each demand percentile



While the first assumption regarding hydroelectric resources (maximum of last fourteen days) consistently demonstrated less pivotal intervals, the difference is minor relative to the high levels of pivotality in the first four scenarios, and minor relative to the difference between the first four scenarios and the last two (the "schedule cut" method scenarios).

The results are consistent with high levels of structural market power—even in the absence of transmission congestion—in a concentrated market, and are consistent with the results of other inquiries (market share, HHI, and RSI), each of which similarly point to a concentrated market.

5 BARRIERS TO ENTRY AND EXIT

Consistent with the MBRA approval process, and in addition to evaluating *horizontal market power*,[93] the Commission also evaluates whether a seller has *vertical market power*.[94] In the context of vertical market power, and particularly transmission market power, the Commission deems having Open Access Transmission Tariff (OATT) on file sufficient to mitigate a seller's transmission market power.[95] With respect to other barriers to entry, the Commission considers a seller's ability to erect other barriers to entry, including inputs to electric power production,[96] as part of the vertical market power analysis.[97]

From the vertical market power perspective, structural competitiveness can be impacted by erecting barriers to entry through control over the transmission system, control of fuel supplies,

[93] Through market share and pivotal supplier screens.
[94] In Order No. 697, the Commission consolidated the transmission market power analysis and other barriers to entry analysis into one vertical market power analysis. *See* FERC Order No. 697 at 228.
[95] *See* Order No. 697 at 11 and 233. This refers to the minimum terms and conditions in *pro forma* OATT adopted by the Commission in Order No. 888—later revised in Order 890 in addressing and remedying issues for undue discrimination under the pro forma OATT adopted in Order No. 888. Alternatively, sellers may satisfy the requirements by receiving Commission waiver of the OATT requirement, or satisfying the requirements for a blanket waiver (*See* https://www.ferc.gov/industries-data/electric/power-sales-and-markets/electric-market-based-rates).
[96] The Commission defined two categories of input to electric power production: "…one consisting of natural gas supply, interstate natural gas transportation (which includes interstate natural gas storage), oil supply, and oil transportation, and another consisting of intrastate natural gas transportation, intrastate natural gas storage or distribution facilities; sites for generation capacity development; and sources of coal supplies and the transportation of coal supplies such as barges and rail cars." FERC Order No. 697 at 252.
[97] *Ibid.,* at 11. For the *first category* input to electric power production stated above, "…the Commission will not require a description or affirmative statement with regard to ownership or control of, or affiliation with an entity that owns or controls, natural gas and oil supply, including *interstate* [emphasis added] natural gas transportation and oil transportation. *Ibid.,* at 252. For the *second category* however, the Commission's rebuttable presumption provides that "…ownership or control of, or affiliation with an entity that owns or controls, *intrastate* [emphasis added] natural gas transportation, intrastate natural gas storage or distribution facilities; sites for generation capacity development; and sources of coal supplies and the transportation of coal supplies such as barges and rail cars do not allow a seller to raise entry barriers, but intervenors are allowed to demonstrate otherwise." *Ibid*., 254-255. In addition, the Commission requires a seller to provide a description of its ownership or control of, or affiliation with an entity that owns or controls such assets; sellers to make an affirmative statement that they have not erected barriers to entry into the relevant market and will not erect barriers to entry into the relevant market. *Ibid*., at 255. Finally, the Commission rules that this obligation applies both to the seller and its affiliates, but is limited to the geographic market(s) in which the seller is located. *Ibid.*

essential facilities, or inputs. In an RTO/ISO market, the transmission owners agree to relinquish control of their transmission assets to the RTO/ISO to ensure generation entities' open access to transmission assets via an RTO/ISO OATT. In an MBRA process, the Commission approved OATT satisfies the vertical market power concerns associated with control of transmission.

For the WEIS Market, all of the eight direct market participants signed the Western Joint Dispatch Agreement (WJDA) with SPP, and all entities own transmission assets in the footprint.[98] While the WJDA does not amount to a requisite OATT, it is not clear if the individual participant's OATTs on file with the Commission satisfy the minimum terms and conditions of FERC Orders Nos. 888 and 890 with regard to the vertical market power concerns. A resolution of this point is ultimately for the Commission to determine.

In terms of ownership or control of inputs to electric power production, areas such as *intrastate* natural gas transportation, storage or distribution facilities, sites for generation capacity development, coal supplies and the transportation of coal supplies were considered by the MMU. The region's relatively small amount of large-scale in-market gas generation[99] is not located on major gas pipelines controlled or affiliated with the gas plant owners, to the MMU's knowledge. Therefore, the MMU does not anticipate that intrastate natural gas infrastructure facilities will be used to restrict entry.

Much of the market's coal supply, however, is provided by the Western Fuels Association (WFA), a cooperative which counts the coal-fired market participants as members.[100] WFA holds itself out as a not-for-profit fuel supply cooperative, and it owns and operates the Dry Fork Mine, which itself feeds the Dry Fork Generating Station via a one-mile conveyor belt,[101] as well as supplying the large Laramie River Station.[102] The MMU does not anticipate that market participants could collectively exercise their role as WFA members to the detriment of the rest of

[98] WJDA defines the Joint Dispatch Transmission Service (JDTS) (to be) provided by transmission service providers in real-time on an intra-hour, non-firm, as available basis. *See* Section 2.1 for more on this.
[99] In 2019, natural gas resources had 5 percent and less than half a percent share in nameplate capacity and generation output, respectively.
[100] Basin, Tri-state, and the Wyoming Municipal Power Agency represent three out of the 20 members. *See* https://www.westernfuels.org/who-we-are/current-members for more information.
[101] *See* https://www.basinelectric.com/Facilities/Dry-Fork
[102] *See* https://www.westernfuels.org/member-services/mining-operations

the region. Specifically, this would be challenging given the composition of the WFA as well as rail access to alternative sources of coal, particularly in this region. Annually, less than two percent of coal mined in the Powder River Basin is mined by the WFA.

Regarding hydroelectric generation, there is a non-insignificant number of privately owned and operated facilities within the market footprint, although few, if any, are registered under direct participants, and none match the scale of the federally-owned and operated dams that dominate the market portfolio. Given the multifunctional use of water storage and management projects in the West, and given the complexity, scale, cost, and overlapping jurisdictions governing large hydroelectric generation, with the exception of the unique challenges posed by construction of new large-scale hydroelectric generation, it is not anticipated that the control of hydro resources will restrict entry.

Additionally, although it is not explicitly stated by the Commission, the balancing function can also be interpreted as one essential input in the production of relevant product(s) in this market. Because balancing of energy will continue to be done by the two WAPA BA entities,[103] WAPA market participants, also functioning as BAs, could create a potential for preferential treatment. This aspect of vertical market power may be taken in the context of OATT issue discussed above. The MMU intends to monitor for this type of behavior and report any suspected abuses to the Commission.

One point of discussion could be the exit fee proposed by the WEIS Market tariff that requires reimbursement of startup and administrative fees by exiting participants should they decide to leave the market. While this may seem as a deterrent serving as an entry barrier, CAISO EIM requires such payments upfront in the beginning of participation. Therefore, such payments regardless of their forms—either upfront or in case of exit—should essentially amount to equal effect in terms of constituting a barrier to exit, and thus interpretation. The MMU does not consider the exit fee in the proposed WEIS Market design as a significant barrier to exit.

[103] The SPP Regional Coordinator only intervenes if congestion issues arise.

6 FINDINGS AND PROPOSED MITIGATION MEASURES

The MMU analyzed structural competitiveness for both energy and imbalance energy products in the WEIS Market. Based on the calculated metrics using the most recent three years' market footprint data from 2017 to 2019, the MMU concludes that the WEIS Market represents significant system-level structural market power issues for both products prior to actual market implementation. The market share, the supplier concentration, residual supply index and pivotal supplier analysis metrics all indicate high potential structural market power in the WEIS Market such that:

Market share

- For *energy*, from 2017 to 2019 the market share of the largest supplier—in terms of hourly energy output—varied from nearly 24 percent to 54 percent, exceeding the generally accepted 20 percent threshold in all of the (8,760) hours. Most recently in 2019, this trend was similar varying from 24 percent to 52 percent. The seasonal data for 2019 show that while shoulder months relatively lower—but still high—levels of market share, much higher rates are prevalent throughout the rest of the year.

- For *imbalance energy*, in terms of hourly imbalance energy supplied, the market share of the largest supplier—that varies from hour to hour—was between 22 percent and 100 percent, exceeding the 20 percent threshold in all hours observed.

- The market share analysis shows the largest supplier's market share for both products is significantly higher than the 20 percent benchmark throughout the entire period studied. The high market shares reflect a general pattern that raises concerns prior to implementation of the WEIS Market where it can create opportunities for the exercise of market power.

Supplier concentration

- For *energy*, the HHI supplier concentration analysis—in terms of both nameplate capacity and hourly energy output—shows that the WEIS Market footprint was highly concentrated in all intervals from 2017 to 2019. The hourly minimum and maximum HHI values were 1,960 and 3,566, respectively, with an average level of 2,580, well above the 1,800 benchmark accepted for a highly concentrated market. The most recent year 2019 figures show similar pattern indicating minimum and maximum values as 2,089 and 3,442, respectively. The nameplate HHI in 2019 for installed capacity in the proposed WEIS market is 2,470.
- For *imbalance energy*, the HHI varied between 1,742 and 10,000 from 2017 to 2019, with all but two hours considered highly concentrated in the three-year period. In 2019, the average HHI for energy imbalance supply was approximately 4,854 with a standard deviation of approximately 1,753.
- For energy and imbalance energy products, the market share and the HHI metrics both point to high levels of structural market power. Accordingly, the assessment of structural market power by pivotal supplier analysis (PSA) gains increased importance.

Pivotal Supplier Analysis

- PSA and residual supply index (RSI) are closely related metrics that measure structural competitiveness either at the system or at the local market level.
- For the reasons explained in the study, the MMU used the energy data for RSI and PSA. The results of one, two and three firm RSI analyses at the system—WEIS Market—level point to high levels of pivotal status by large suppliers that raise significant concern for structural competitiveness. The RSI duration curves indicate that the absence of just one supplier may leave the system unable to meet demand in nearly 50 percent of intervals. When the second and third largest suppliers are removed, generation falls short of demand in all but a handful of hours over the three-year period. This further confirms significant system-level market power.
- In conducting the PSA, the MMU pursued three major methodologies: a "generation only" method, a "DC ties" method, and a "schedule cut" method. Within each major

methodology, the analysis was conducted with two subsets of assumptions concerning the ability of hydroelectric resources, due to the high penetration of hydroelectric generation in the market. Three major methodologies, each with two different assumptions, provides for a total of six scenarios.

  - With the exception of the last two scenarios ("schedule cut" method scenarios), all scenarios demonstrated that a pivotal supplier was present in almost every interval. The last two scenarios—the "schedule cut" scenarios—employed the most aggressive assumptions (assumptions that may not hold in operational reality), but still saw up to 40 percent of peak demand intervals possess a pivotal supplier
  - High-demand intervals provide generators a greater ability to exercise market power. Most of the scenarios rapidly approach 100 percent pivotality, even at relatively low levels of demand.

- The results are consistent with high levels of structural market power—even in the absence of transmission congestion—in a concentrated market, and are consistent with the results of other inquiries (market share, HHI, and RSI), each of which similarly point to a concentrated market.
- Given the unavailability of market-based data in the footprint prior to WEIS Market implementation, identification of Frequently Constrained Areas (FCAs) was not considered as part of the scope of this study. Therefore, the MMU has not evaluated if designating FCAs is warranted to supplement the automatic market power mitigation measures prescribed by the proposed WEIS tariff. However, going forward the MMU will perform separate and ongoing FCA analyses prior to and continuing after market implementation, as required under the proposed WEIS tariff, and increased understanding of the region—coupled with changing dispatch patterns—may warrant a revision of the MMU's outlook on network congestion.

Barriers to entry

- From the vertical market power perspective, structural competitiveness can be impacted by erecting barriers to entry through control over transmission system and control of fuel supplies, essential facilities or inputs. In an MBRA process, in addition to evaluating

horizontal market power, the Commission also evaluates whether a seller has *vertical market power*. In the context of vertical market power, and particularly transmission market power, the Commission deems having OATT on file sufficient to mitigate a seller's transmission market power.

- For the WEIS Market, all of the eight direct market participants signed the Western Joint Dispatch Agreement with SPP, and all of them own transmission assets in the footprint. While the WJDA does not amount to a requisite OATT, it is not clear if the individual participant's OATTs on file with the Commission satisfy the minimum terms and conditions of the FERC Orders Nos. 888 and 890 with regard to the vertical market power concerns. A resolution of this point is ultimately for the Commission to determine.

- In terms of ownership or control of inputs to electric power production, areas such as *intrastate* natural gas transportation, storage or distribution facilities, sites for generation capacity development, coal supplies and the transportation of coal supplies were considered by the MMU.

    - Because of the region's relatively small amount of large-scale in-market gas generation that is not located on major gas pipelines controlled or affiliated with the gas plant owners, the MMU does not anticipate that intrastate natural gas infrastructure facilities will be used to restrict entry.

    - Although, much of the region's coal supply is provided by a not-for-profit fuel supply cooperative, the Western Fuels Association (WFA), the MMU does not anticipate that market participants could collectively exercise their role as WFA members to the detriment of the rest of the region. Specifically, this would be challenging given the make-up of the WFA as well as access to alternative sources of coal, particularly in this region.

    - Regarding hydroelectric generation, given the multifunctional use of water storage and management projects in the West, and given the complexity, scale, cost, and overlapping jurisdictions governing large hydroelectric generation, with the exception of the unique challenges posed by construction of new large-scale

hydroelectric generation, it is not anticipated that the control of hydro resources will restrict entry.

- Although not explicitly stated by the Commission, the balancing function can also be interpreted as one essential input in the production of relevant product(s) in this market. Because balancing of energy will continue to be done by the two WAPA BA entities, WAPA market participants, also functioning as BAs, could create a potential for preferential treatment of scheduling. This aspect of vertical market power may be taken in the context of OATT issue as well. The MMU intends to monitor for this type of behavior and report any suspected abuses to the Commission.

- One point of discussion could be the exit fee proposed by the WEIS Market tariff that requires reimbursement of startup and administrative fees by exiting participants should they decide to leave the market. While this may seem as a deterrent serving as an entry barrier, CAISO EIM requires such payments upfront in the beginning of participation. Therefore, such payments regardless of their forms—either upfront or in case of exit—should essentially amount to equal effect in terms of constituting a barrier to exit, and thus interpretation. The MMU does not consider the exit fee in the proposed WEIS Market design as a significant barrier to exit.

MMU Recommendations

- Structural market power can be assessed both at the system and at local markets levels. Given the results summarized above, the MMU has substantial concerns with structural market power in the WEIS Market, particularly at the system level. Therefore, the MMU recommends that SPP and the WEIS Market participants consider the following:

    - **Develop a system-wide mitigation measure.** Unlike the market share or HHI analysis, the RSI analysis shows that even with the largest supplier removed, generation can still meet demand about 50 percent of the time. This result can provide a basis for implementing mitigation measures for system-wide market power, similar to those implemented in other markets, including, for example, the mechanism used by ISO-New England (ISO-NE). ISO-NE uses a system-wide

pivotal supplier test that identifies system market power.[104] This approach is likely to be instructive in developing a similar mechanism for the proposed WEIS Market and can act as a blue print for the WEIS Market.

- **Use cost based offers if a system market power mitigation measure cannot be implemented for go live.** In the event that structural mitigation measures cannot be implemented before market go live, the MMU recommends that WEIS Market participants offer in cost-based offers until such time that the structural market power approach can be implemented.

The MMU believes that the mitigation measures in the proposed tariff and in the response to the Commission's deficiency letter[105] will provide sufficient protections for participant conduct to exercise of market power with implementation of system wide mitigation measure(s) as recommended in this study.

[104] *See* related parts of Section III (known as Market Rule 1), Appendix A "Market Monitoring, Reporting and Market Power Mitigation" of *ISO New England Inc. Transmission, Markets, and Services Tariff*, including Sections III.A.5.2. Structural Tests and III.A.5.5. Mitigation Type (available at https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_append_a.pdf). Section III.A.5.2 explains that there are two structural tests with respective mitigation thresholds applicable to a supply offer. The first one determines if a supplier is pivotal according to a system wide pivotal supplier test, and mitigation thresholds for "General Threshold Energy Mitigation" and "General Threshold Commitment Mitigation" apply. (A Market Participant whose aggregate energy supply offers exceed the supply margin in the real-time energy market is deemed a pivotal supplier. The supply margin for an interval is the total energy supply offers from available resources minus total system load). The second one determines if a Resource is in a constrained area according to a constrained area test, and mitigation thresholds for "Constrained Area Energy Mitigation" and "Constrained Area Commitment Mitigation" apply.

[105] *See* Deficiency Letter issued on April 20, 2020, (Docket Nos. ER20-1059-000 ER20-1060-000).

7 CONCLUDING REMARKS

Currently, while the existing pricing of *energy* and *imbalance energy* is set administratively through regulatory or federal/municipal pricing methods in the WEIS footprint, under the WEIS Market design, pricing of *imbalance energy* will be (spot) market based. Hence, the proposed WEIS Market represents an improvement over the existing market structure via optimized dispatch of imbalance energy for production cost savings. Furthermore, more open and transparent price formation will send signals that promote reliability and long-term investment both in generation and transmission assets. Having said that, the MMU analysis concludes that the WEIS Market represents significant structural market power issues at the system level for both *energy* and *imbalance energy* prior to actual market implementation. The market share, the supplier concentration, residual supply index, and pivotal supplier analysis all indicate high potential for structural market power in the WEIS Market.

Two of the structural market power metrics—market share and concentration indices—initially used in the study point to market power concerns. The residual supply index and pivotal supplier analysis that were conducted subsequently reinforce and confirm these concerns. Therefore, high market concentration and market share levels combined with observed high pivotal supplier duration and high pivotal supplier frequency at the at the system level raise substantial competitive concerns. These competitive concerns must be addressed by instituting appropriate mitigation measures that address system-wide structural market power issues as implemented in other markets, including by ISO-New England.

The MMU believes that the mitigation measures in the proposed tariff and in the response to the Commission's deficiency letter will provide sufficient protections for participant conduct to exercise of market power with implementation of system wide mitigation measure(s) as recommended in this study.