BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Investigation regarding the Energy Choice Initiative	)	Docket No. 17-10001

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

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The California Independent System Operator Corporation (ISO) respectfully submits these comments in response to the October 11, 2017 notice of investigation and workshop (Notice) issued by the Public Utilities Commission of Nevada (Commission). The purpose of this docket is to "investigate issues of public importance regarding the pending Energy Choice Initiative and the possible restructuring of Nevada's electric industry."[1] The Notice outlines issues to be investigated during the course of this proceeding, including "[o]ptions reasonably available to Nevada in designing and establishing a wholesale market." The ISO currently operates a comprehensive wholesale market with significant transmission interconnections with Nevada's transmission system and therefore is uniquely situated to provide insight and assistance regarding Nevada's participation in a wholesale market.

These comments provide an overview of the ISO, the functions and services it provides, the existing synergies between the ISO and Nevada electric systems, and the potential benefits and issues to be considered in establishing a wholesale electricity market. The ISO also notes the interaction between the retail and wholesale markets and identifies specific issues that this Commission could consider if Nevada voters decide to require a competitive retail market. The ISO looks forward to working with this Commission and Governor's Committee on Energy Choice to frame the electric market options available to Nevada regardless of whether the retail choice initiative is approved.

The ISO continues to be a leader in providing wholesale market services that are designed to deliver concrete benefits to its customers and ratepayers. As the grid has rapidly transformed to include significant amounts of both large scale and distributed renewable generation, the ISO has adapted its services to integrate these resources in a cost-effective and transparent manner. The ISO will continue to evolve and develop services that are designed to

[1] Notice of Energy Choice Initiative Investigation and Workshop, p. 1.

meet the energy needs of its customers in the West, as exhibited in the creation of the western Energy Imbalance Market which is discussed later in this filing. Due to the unique relationship between the Nevada and ISO electric systems, there are likely significant benefits to increased integration at the wholesale market level. The ISO looks forward to exploring those benefits and how to best deliver them to Nevada customers.

I. The ISO Supports the Development of Organized Markets in the West.

The ISO is a nonprofit, public benefit corporation chartered under the laws of the State of California and regulated by the Federal Energy Regulatory Commission (FERC). The ISO ensures efficient use and reliable operation of the electric transmission grid under its operational control. The ISO operates day-ahead and real-time wholesale energy and ancillary services markets to reliably manage the high-voltage transmission system that serves approximately 80 percent of California's electric load as well as a portion of Nevada's electric load.[2] As a balancing authority area, the ISO monitors over 70,000 megawatts of electricity from more than 900 power plants that serve 30 million customers, representing about 35 percent of the electric load in the West.[3]

As the only independent grid operator in the Western Interconnection, the ISO grants equal access to 26,000 circuit miles of transmission lines and coordinates competing and diverse energy resources into the grid where it is distributed efficiently to consumers. It also operates a competitive wholesale power market designed to support a broad range of resources, power products and services at lower prices. The electricity industry is made up of sectors including utilities, private power plant owners, state and federal agencies, and other stakeholders, each playing a distinct role. As the impartial grid operator charged with ensuring the safe and reliable transportation of electricity on the power grid, the ISO has no financial interest in any individual sector ensuring fair and transparent access to the transmission network and market transactions.

The ISO makes it easier for all resources to compete and bring their power to consumers, and is a world leader in the integration of significant levels of solar, wind, and other renewable power technologies. Currently, the key to reliably integrating renewable generation is to maintain a diverse mix of generation and advanced technologies that can quickly respond to

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[2] Valley Electric Association joined the ISO as a full participant on January 3, 2013.

[3] The California ISO also serves as a Transmission Operator and Planning Coordinator under the North American Electric Reliability Corporation Functional Model.

fluctuations in wind and solar production to provide the necessary energy and reliability services.

Another central function of the ISO is to provide transparent information about the state of the system and the prices of essential electric products. These data help market participants assess the economics and manage the risks of wholesale power transactions and supply. Timely and accurate information about wholesale markets is the centerpiece of an effective and competitive marketplace. At the same time, economists within the ISO's Department of Market Monitoring keep a close eye on market activity, reviewing wholesale prices and watching for potential misconduct. These functions are described in more detail in Section III of these comments.

In recent years, the ISO has expanded its wholesale market offerings, most notably through the development of the western Energy Imbalance Market (EIM).[4] The EIM currently serves eight western states, including Nevada, and approximately half of the electric load in the Western Interconnection. Six additional entities are planning to join the EIM over the next three years, extending the EIM footprint to cover about two-thirds of the Western Interconnection's load. Since its inception in November 2014, the EIM has created significant benefits, both by allowing economic transfers of energy among participating entities and by enabling greater integration of renewable resources using a larger geographic footprint to balance variability and mitigate renewable curtailments when supply exceeds demand (known as "oversupply" conditions). The EIM has also resulted in greater situational awareness of grid reliability, transparency, and sharpened ability of participating entities to respond to major contingencies.

II. Nevada's Electric System Shares Unique Synergies with the ISO System.

The Nevada and ISO electric systems share unique synergies due to strong transmission interconnections, generation resource diversity, and differing load profiles. These factors are key to the success of the EIM, and they could provide additional benefits if Nevada elects to pursue further wholesale market services from the ISO. In this section, the ISO details the relationship between the Nevada and ISO electric systems, and discusses the potential benefits of additional coordination with the ISO. While the structure of Nevada's future energy system is still unknown, due to the ISO's current partnership with NV Energy through the EIM and NV

[4] More information about the EIM is available at the following website: https://www.westerneim.com/pages/default.aspx

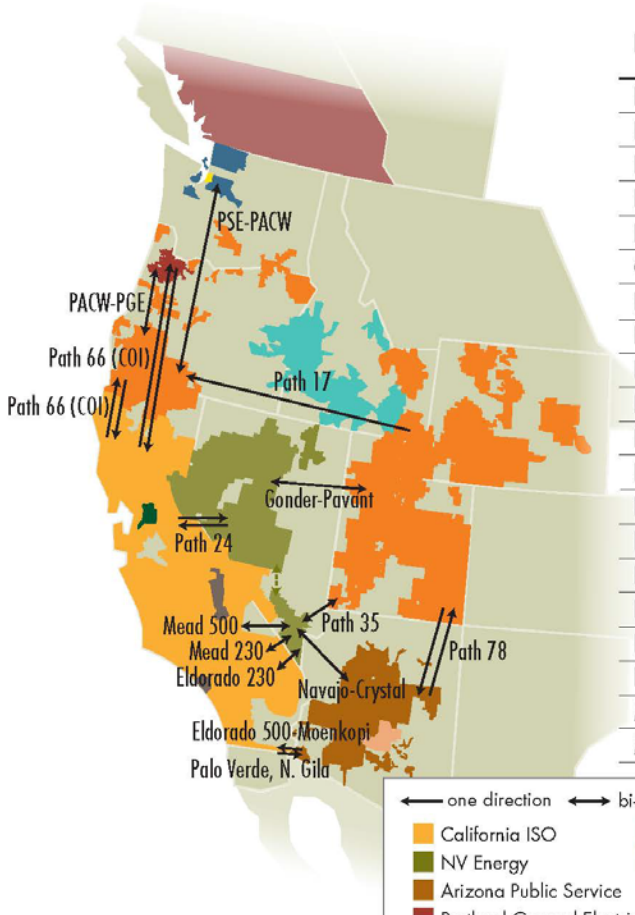
Energy's large market share in the state, the ISO references the utility throughout this document. The ISO recognizes that approximately 18% of Nevada's demand is served by electric cooperatives, municipal or state entities, or through direct access.[5]

A. Nevada's Transmission System Has Strong Interconnections with ISO and EIM Entities.

Nevada is fortunate to have strong transmission connections through interties to the ISO's markets and to other balancing authority areas that are major participants in the EIM. These interties are shown in Figure 1:

[5] State of Nevada 2016 Status of Energy Report, p. 4, (http://energy.nv.gov/uploadedFiles/energynvgov/content/About/GOE_2016_StatusOfEnergyReport.pdf).

Figure 1: Transmission Available for Optimal Use of Regional Resources



Path	Estimated Max Capacity (MW)*
Path 24 *(west to east)*	100
Path 24 *(east to west)*	35-90
Eldorado 230	797
Path 35 *(west to east)*	580
Path 35 *(east to west)*	538
Gonder-Pavant	130
PACW to PGE	320
Path 66 *(ISO to PGE)*	627
Path 66 *(PGE to ISO)*	296
Path 66 *(ISO to PACW)*	331
Path 66 *(PACW to ISO)*	432
Path 17	400
PSE to PACW	300
Eldorado 500-Moenkopi	732
Palo Verde, N. Gila	3,151
Path 78 *(PACE to APS)*	625
Path 78 *(APS to PACE)*	660
Navajo-Crystal	522
Mead 500	349
Mead 230	236

*Current as of December 2017

Key connections to the ISO are at the southern Nevada Eldorado substation (typically with about 1500 MW of capacity available for EIM transfers) and across Donner Summit in the north (Path 24). At the Eldorado substation, Nevada's transmission capacity with the ISO will soon be increased by the addition of a new Harry Allen – Eldorado 500 kV transmission line. This new 500 kV line will increase simultaneous transfer capacity between ISO and NV Energy by about 1,600 MW and non-simultaneous transfer capacity by about 3,000 MW. The line was approved by the ISO Board of Governors in 2014 and is expected to be operational in May 2020.

In addition to the connections to the ISO, NV Energy also has interties to the PacifiCorp East balancing authority area (via Path 35 and Gonder-Pavant), to the Arizona Public Service balancing authority area (via Mead 230 kV and Crystal 500 kV substations), and to the Idaho Power Company[6] balancing authority area (via Humboldt – Midpoint 345 kV line).

NV Energy's central location among the balancing authority areas in the western EIM has been instrumental in achieving the benefits that all participating balancing authorities have seen. NV Energy can now effectively exchange significant and cost competitive generation directly with its neighbors in real-time. If Nevada's interaction with ISO market participants increases through additional wholesale market services, the opportunities for Nevada to benefit from these exchanges will further expand.

B. Nevada and the ISO Have Diverse Generation Fleets.

Part of the benefit that Nevada has achieved through NV Energy's participation in the western EIM can be attributed to access to a wider portfolio of generation resources through the EIM's optimal regional dispatch. Nevada's generation fleet currently has more natural gas resources (on a proportional basis), with significant renewable contributions from solar and geothermal resources. In contrast, the ISO's generation is less reliant on natural gas with significant contributions from hydro, wind and solar resources. If the ISO and Nevada resources were pooled in a common portfolio, the increased diversity would result in a greater ability to react to changing grid conditions.

More extensive diversity is achieved through the western EIM's larger footprint, with some participating balancing authority areas having more than 90 percent hydro resources. In addition, diverse weather patterns between regions increases the stability of solar output, as changes in cloud cover vary over California, Nevada, and Arizona or further east into Utah. This diverse supply available in the market can help Nevada meet peak load requirements in a cost effective manner and provide an opportunity for NV Energy or other Nevada suppliers to sell any excess solar, wind, or other supply to other western EIM participants at opportune times. This geographic and fuel diversity has benefitted Nevada through the western EIM and could further benefit Nevada if its utilities expand their participation in the ISO wholesale markets.

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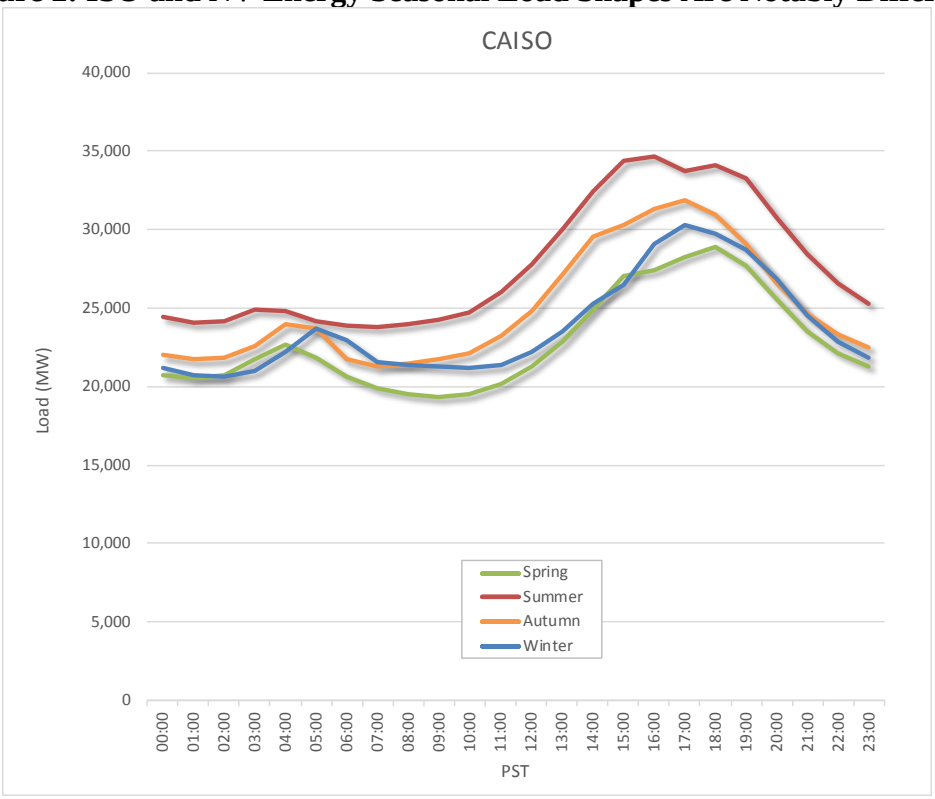
[6] Idaho Power Company will join the EIM in April 2018.

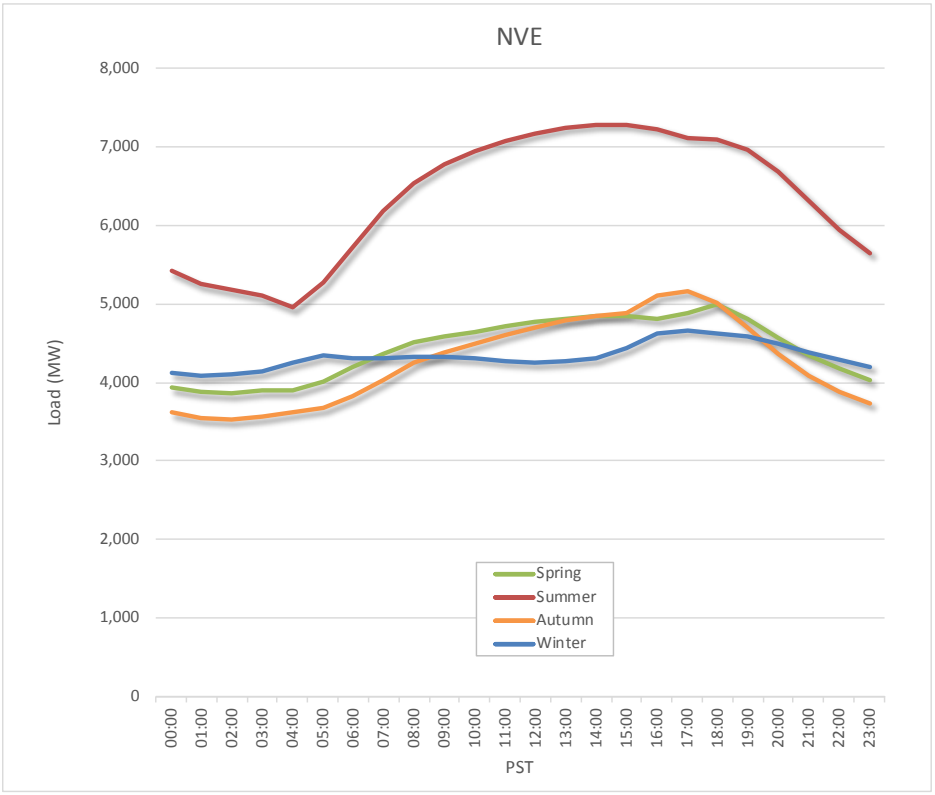
C. Nevada and the ISO Have Diverse Load Profiles.

Load diversity is important to recognize in addition to supply diversity when considering the combined operation of the ISO and Nevada service areas. Variations in load can be a challenge for electric system operators. Figure 2 shows the ISO and NV Energy's forecasted 2026 average daily load by season.[7] These graphs demonstrate that the ISO and NV Energy loads are notably different. For example, the ISO tends to have a sharper peak, especially during the summer season. NV Energy has significant amounts of variation between summer and the remaining seasons. These differences in load profiles provide opportunities to better optimize resource dispatch and reduce combined system capacity requirements.

[7] The forecasted daily load curves are summarized from the Western Electricity Coordinating Council (WECC) 2026 Common Case, Version 2.0 dated 8/31/2017.

Figure 2: ISO and NV Energy Seasonal Load Shapes Are Notably Different





With greater penetration of grid-connected renewables and behind-the-meter resources (i.e. roof top solar), the challenge becomes greater. However, larger systems have the benefit of seeing these variations significantly dampened. In limited geographic areas, such as Las Vegas or the Reno-Sparks area, where Nevada's load is concentrated, sudden changes in weather can cause demand to change by more than 10% within hours, which can cause challenges in optimizing resource dispatch. Combining the Nevada and ISO systems would "smooth" the impact of these weather-related variations, thereby minimizing the challenge to reliable and efficient operations. The operation of an integrated ISO and Nevada electric system could provide substantive benefits as both states increase their development and use of renewable energy resources.

The diversity of the load on the ISO and NV Energy systems also means that the combined system peak load is less than the sum of individual ISO and NV Energy peaks. The reduced combined peak would result in a reduction in total generation capacity necessary to meet demand. The ISO analyzed potential peak capacity savings based on historical (2006-2012) and forecasted data (2024 and 2026) and found that a potential combined ISO and NV Energy system would reduce annual peak capacity needs from 200 MW to 1500 MW, with an average annual reduction of about 900 MW.[8] This load diversity and the existing transmission infrastructure connecting the ISO and NV Energy systems could minimize or defer the need to build new generation in both Nevada and the ISO. The capacity benefits would be shared between the ISO and Nevada and the resulting cost savings would likely be significant.

III. Access to the Wholesale Markets Can Benefit Nevada Customers.

The Notice issued to commence this proceeding states that the Commission will investigate "[o]ptions reasonably available to Nevada in designing and establishing a wholesale market."[9] This section details the ISO's wholesale market offerings and the specific services associated with those offerings. Currently, the ISO offers wholesale market options through either the western EIM or participation in the ISO. However, the ISO is constantly developing enhancements to its market offerings that are specifically designed to cost-effectively meet the needs of its customers and the western electric grid. The ISO looks forward to working with

[8] In developing these capacity savings, a 15% planning reserve margin (PRM) was considered.

[9] Notice of Energy Choice Initiative Investigation and Workshop, p. 1.

Nevada policymakers and stakeholders to determine which specific wholesale market services will be most beneficial to Nevada customers and how those services can best be delivered, regardless of what changes are made to Nevada's energy policies.

A. The Western EIM

As outlined above, the ISO is constantly working to adopt new approaches and policies to add value to customers and enhance system reliability while accommodating the significant change in resource portfolios and load profiles associated with additional renewables and distributed energy resources. The western EIM is a product of this effort, implemented in November 2014 and designed to extend the ISO's automated tools and resource optimization to utilities outside the ISO's balancing authority area, including NV Energy, which began its participation in December 2015. The EIM uses the ISO's existing real-time market platform to offer these benefits while being cost-effective, flexible, and scalable.

The western EIM provides participants access to the real-time wholesale energy market. The western EIM's automated systems and tools operate on both a 15-minute and 5-minute basis to optimize dispatch with the lowest-cost energy resources. The western EIM allows participants to buy and sell power closer to the time electricity is consumed. It also gives system operators real-time visibility across neighboring grid systems. The result is improved balance between supply and demand at a lower cost. The western EIM software balances fluctuations in supply and demand by automatically finding lower-cost resources from across a larger region to meet immediate power needs. It effectively manages congestion on transmission lines to maintain grid reliability and supports integration of renewable resources. The real-time market also allows the ISO to export energy when California's renewable resources are generating more electricity than can be consumed by ISO customer demand. This oversupply of renewable energy can then be absorbed at low or no cost by western EIM participating balancing authority areas.

Participation in the western EIM shows that utilities can realize cost benefits and reduced carbon emissions. With millions in gross benefits to date, the savings are in line with analysis conducted by each EIM entity before they joined the western EIM. NV Energy has experienced approximately $34 million in gross benefits since it joined the western EIM in fourth quarter of

2015, with marked increases in benefits over time.[10] These savings are quantified based on three major categories of benefits: (1) more efficient real-time dispatch, both inter-and intraregional; (2) reduced renewable energy curtailment; and (3) reduced need for flexible ramping reserves in all participating balancing authority areas.

As discussed above, a major factor in the western EIM success is the robust transmission system in the West, which enables the ISO to connect diverse regional resources, including wind, solar, thermal, geothermal, hydro, and biomass, all of which have different production profiles. The western EIM also capitalizes the real-time optimization of load diversity in the West, which results from balancing authorities peaking at different times.

Importantly, when developing the EIM, the ISO recognized the need to enhance its governance structure to give these new participants and their state stakeholders a voice in the decision making on EIM related items. As a result, the western EIM is governed by a five-member Governing Body that serves as a primary decision-maker on policy initiatives that change market rules specific to participation in the western EIM. The ISO Board of Governors established the EIM Governing Body and assigned them this delegated authority after a comprehensive stakeholder process to design a governance framework and draft a formalized charter.[11] The EIM Governing Body members were then identified by a nominating committee of stakeholders throughout the West with assistance from a professional search firm. In addition to the EIM Governing Body, the adopted governance structure established the Regional Issues Forum and the Body of State Regulators to provide more opportunities for stakeholders outside California to express their opinions on issues affecting the EIM. The governance structure has been a major success and can be built upon in the event that Nevada elects to increase its participation in the ISO wholesale markets.

B. ISO Participation

The ISO provides a range of wholesale market services in its role as an independent system operator. In this section, the ISO details those services and the attendant benefits those services could provide to Nevada. Though this section details the full range of ISO services, the ISO looks forward to working with this Commission and Nevada stakeholders to determine the

[10] https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx.
[11] https://www.westerneim.com/Documents/CharterforEnergyImbalanceMarketGovernance.pdf.

services that will best serve Nevada's future energy needs. The ISO can provide additional computer based training for the Commission or stakeholders that would like further information regarding its wholesale market.

1. Real-Time and Day-Ahead Market Operations

The ISO wholesale energy market is comprised of distinct day-ahead and real-time processes. The energy products and services traded in the market allow the ISO to meet reliability needs and serve load.

The real-time market is a spot market in which utilities can buy power to meet the last few increments of demand not covered in their day ahead schedules, which is the primary service provided through the western EIM. The real-time market is also the market that secures incremental energy reserves, held ready and available for ISO use if needed, and the energy needed to regulate transmission line stability. The objective of a real-time market is to identify supplies to meet the demand forecast and export schedules. The ISO's real-time market also optimizes and dispatches ancillary services, a service that is not currently included in the western EIM.

The ISO's day-ahead market is designed to procure energy and capacity products in the day-ahead timeframe. Energy is the actual electricity needed to meet the demands of the consumers in the market footprint. To procure the necessary energy through the day-ahead market, the ISO creates a demand forecast to determine how much energy will be required to meet the need of the consumers for the trading day. In general, ISO load-serving entities procure much of their energy through bilateral contracts outside the ISO market in which suppliers purchase under contracts to meet demand. This energy needs to be scheduled into the market so that the ISO can confirm the adequacy of supply and use the information to monitor the physical energy flows on the grid. In most cases, energy acquired outside the ISO markets is submitted as a self-schedule. The day-ahead market enables suppliers to submit energy not under contract into the market and enables buyers to procure additional energy economically from the market.

Capacity, or the actual amount of generation available, is procured by the ISO through the day-ahead market in the form of ancillary services and residual unit commitment. Ancillary services are comprised of four different kinds of capacity products: regulation up, regulation down, spinning reserve, and non-spinning reserve. Ancillary services are primarily used to maintain grid reliability and may also be self-supplied through participants' self-schedules.

2. *Balancing Authority Services*

The ISO serves as the NERC-registered Balancing Authority in its area. NERC defines a "balancing authority" as "[t]he responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports Interconnection frequency in real time."[12] In its role as balancing authority, the ISO is responsible for operating its system in compliance with NERC and WECC reliability requirements, just as NV Energy is as it operates the Nevada transmission system today. Some of the primary responsibilities as the balancing authority include: (1) balancing load and resources in real-time; (2) ensuring electric flows are within equipment ratings; (3) maintaining system voltage; and (4) dispatching contingency reserves. The balancing authority requirements are the same for NV Energy as they are for the ISO, but the ISO includes and integrates its market service with its reliability functions.

3. Congestion Revenue Rights

Congestion revenue rights (CRRs) are financial instruments that entitle the owners of transmission, or entities paying for the cost of building and maintaining transmission, to congestion revenues associated with transmission capacity in the day-ahead market. In the ISO, most transmission is paid for by ratepayers of the state's investor-owned utilities and other load-serving entities through the transmission access charge. CRRs allow holders to manage variability in congestion costs based on locational marginal pricing. CRRs are acquired primarily, although not solely, for the purpose of offsetting congestion costs that occur in the day-ahead market. Load-serving entities have the opportunity to receive an allocation of CRRs to hedge their exposure to congestion costs that would otherwise accrue to their load. The ISO also facilitates annual and monthly CRR auctions.

4. Market Monitoring

The Department of Market Monitoring (DMM) of the California ISO maintains oversight on the ISO's wholesale energy markets. Although the DMM is internal to the ISO's corporate structure, it conducts its core market monitoring unit functions independent of the ISO, consistent with FERC regulations. The DMM monitors participant and ISO activity to ensure

[12] North American Electric Reliability Corporation (NERC) Glossary of Terms, http://www.nerc.com/files/glossary_of_terms.pdf.

that ISO market rules are followed, free from non-competitive behavior, and that market results produce effective and efficient outcomes. The DMM engages in ISO policy development from the perspective of market efficiency and market power mitigation. The DMM also reviews and provides feedback regarding the effectiveness of the ISO real-time market, which includes the western EIM.

DMM's core functions include (1) monitoring market performance to identify potential anti-competitive market behavior or market inefficiencies; (2) identifying ineffective market rules or ISO operational practices and recommending changes to improve wholesale competition and efficient market outcomes; (3) conducting market analysis with a particular focus on the structural competitiveness and efficiency of the wholesale markets and the effectiveness of bid mitigation rules to remedy the potential exercise of market power; (4) evaluating the effectiveness of the markets in signaling needed investment in generation, transmission, and demand response infrastructure and identifying any potential barriers that impede the market's ability to provide needed investments; (5) referring market violations to FERC; and (6) providing independent advice to the ISO CEO and ISO Board of Governors on market related matters. In conducting these core functions, DMM reports directly to the ISO's Board of Governors and can seek redress directly at FERC if warranted.

5. Stakeholder Processes

The ISO stakeholder process is a fundamental part of the ISO business model. The purpose of the stakeholder process is to gather stakeholder input during the policy and tariff development for planned initiatives.[13] All stakeholders have equal opportunity to comment.

Each year, the ISO publishes the Stakeholder Initiatives Catalog that details policy initiatives proposed by the ISO and stakeholders. The catalog and subsequent roadmap process update the status of current initiatives; identify new proposed initiatives and classify them as either discretionary or non-discretionary; and then prioritize discretionary initiatives for development during the coming year.

Once stakeholder initiatives have been prioritized, policy development begins. During that process, there are typically three iterations for each initiative: (1) issue paper; (2) straw

[13] Any interested party can engage in any ISO stakeholder process; no particular status is required to be considered a stakeholder in an ISO process.

proposal; and (3) draft final proposal. Stakeholders are encouraged to provide written comments on each paper/proposal. All comments are posted on the ISO's public website. After each paper/proposal is posted, the ISO conducts a meeting or a conference call to review the paper/proposal with stakeholders. To keep stakeholders informed, the ISO publishes market notices at each stage of the process. After the draft final proposal is vetted in the stakeholder process, it is presented to the EIM Governing Body, or ISO Board of Governors for decision, typically in a general session meeting that is open to the public. On issues under which the EIM Governing Body has primary authority or some level of advisory role, the proposal would first go to the Governing Body for review before it can be approved by the ISO Board of Governors.

Subsequent to Board approval, the tariff development process begins.[14] The ISO publishes draft tariff language, upon which stakeholders are encouraged to provide written comments. All comments are posted on the ISO's public website. The ISO hosts a conference call with stakeholders to review the language and submitted comments. As in the policy development phase, the ISO publishes market notices at each stage of the process. After the tariff language is vetted in a stakeholder process, the ISO publishes a final version and files it with FERC, which becomes effective with FERC approval.

This extensive stakeholder process is designed to provide an open and transparent process and to give stakeholders a voice in identifying and developing new market offerings and enhancements.

6. Transmission Planning

The ISO has an industry-leading transmission planning process that is designed to identify the need for new transmission facilities based primarily on three main categories: reliability, public policy and economics. Reliability projects are identified based on applicable transmission planning standards, including those developed by NERC and WECC. The ISO evaluates public policy projects based on the policy requirements and directives issued by state, municipal or county regulatory agencies. For example, California currently has legislation requiring utilities to meet 50% of their electric generation requirements with renewable resources by 2030. The ISO works with the California Public Utilities Commission to determine whether

[14] The tariff development process may begin prior to final Board approval in certain circumstances but would not be completed until after final Board approval.

new transmission projects will be needed to meet this requirement and, if so, where such projects should be located to best facilitate new renewable resource development. If Nevada joined the ISO, the transmission planning process would similarly take into account any Nevada-specific public policy goals in the transmission planning process. Lastly, economic transmission projects are identified based on their ability to reduce production costs, congestion costs, transmission losses, capacity needs or other electric supply costs.

The ISO also considers and places a great deal of emphasis on the development of non-transmission alternatives; both conventional generation and in particular, preferred resources such as energy efficiency, demand response, renewable generating resources and energy storage programs. Though the ISO cannot specifically approve non-transmission alternatives as projects or elements in the comprehensive plan, these can be identified as the preferred mitigation in the same manner that operational solutions are often selected in lieu of transmission upgrades.

7. Resource Interconnection

Most interconnections are managed through a cluster study approach. The cluster study approach can provide a number of advantages, especially if industry changes are driving an increase in the number of anticipated interconnection requests. The ISO's resource interconnection process is industry-leading in its ability to review and process large numbers of interconnection requests in a timely manner.

8. Benefits of ISO Participation

The ISO services outlined above have the potential to provide a host of benefits to Nevada electricity customers, whether or not the Energy Choice Initiative is approved by voters. In 2016, the ISO conducted detailed studies regarding the benefits of a western regional energy market. Those studies identified significant potential benefits in terms of cost savings to ratepayers, new job creation, greenhouse gas emissions reductions, increased grid reliability and integration of renewable resources, and benefits to disadvantaged communities. The studies estimated annual savings of $1.5 billion for to California ratepayers alone, with greenhouse gas reductions up to 11 million metric tons in the western region. Though these studies focused primarily on impacts in California, similar analysis focused on benefits to Nevada may be beneficial.

In the sections below, the ISO provides additional detail regarding some of the benefits of participation in the ISO.

a) Enhanced Reliability

Regional markets promote efficiency through resource sharing because they span large geographic areas. These organized markets are designed so that an area with surplus electricity can benefit by sharing megawatts with another region via the open market. By maximizing megawatts as the demand for electricity increases, the ISO helps keep electricity flowing during peak periods. In addition, the ISO has comprehensively restructured its markets since the 2001 energy crisis to avoid the issues that were experienced at that time. More details on this comprehensive restructuring can be found in Appendix A.

b) Efficient Grid Dispatch

Through the use of advanced technologies and market-driven incentives, the performance of power plants within regional markets tends to be better than in areas under monopoly control. Evidence indicates there are lower power plant outage rates within competitive market regions because generation owners are motivated to keep plants on line, especially during peak periods, to maximize their revenues.

c) Price Transparency

The ISO is well-equipped to identify transmission bottlenecks, analyze reliability and evaluate the economic benefits of investing in additional transmission in an unbiased manner. Without a transparent wholesale market, consumers and investors cannot easily obtain information about prices and locational value of transmission, which can inhibit investment in the power grid.

d) Ease of Entry and Private Investment

The ISO has developed standardized non-discriminatory rules for grid interconnection and provide important price signals for new investment. These rules help identify the best economic solutions to transmission issues across a large footprint and provide greater access to the infrastructure investment necessary to keep up with growing demand.

e) Efficient Integration of Renewable Power

The ISO has advanced technology that allows for seamless integration of variable energy resources. ISO studies have indicated that a regional market could improve integration of renewables by reducing curtailments relative to current practices based on bilateral trading.[15]

f) Market Monitoring Benefits

The ISO's DMM plays an important role in enhancing the performance of competitive wholesale electric markets. Competitive markets benefit customers by assuring that prices properly reflect supply and demand conditions. DMM identifies ineffective market rules and tariff provisions, identifies potential anticompetitive behavior by market participants and provide the comprehensive market analysis critical for informed policy decision making.

g) Market Flexibility

Organized markets offer diverse power products and services that can be used to hedge against price risks. Because average real-time energy prices correlate to short-term forward bilateral prices, ISO markets foster stable prices. Increased and improved price transparency results in better contract pricing.

h) Liquidity in the Marketplace

ISO markets have more buyers and sellers than non-competitive markets. For instance, hundreds of companies are now vying for customers in the ISO's wholesale market. Prior to restructuring, only a handful of companies were competing to bring the lowest cost power to consumers.

i) Distributed Energy Resource Development

The ISO can provide more information to distributed energy resource developments. ISO grid and market data are available publicly and, as a result, more companies are encouraged to participate in energy markets. Distributed energy resource bids can be important during peak periods of electricity use because reducing demand is just as effective as increasing supply – and it is cleaner and more economical.

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15 https://www.caiso.com/Documents/SB350Study_AggregatedReport.pdf.

C. Continued Development of ISO Services

The ISO is currently in the early stages of developing an effort that would enhance its day-ahead market processes. These changes could dramatically increase the efficiency of the day-ahead market by accounting for fluctuations in variable energy resources. In concert with this initiative, the ISO is scoping an effort to explore making day-ahead market functionality available to western EIM participants. This effort will present an opportunity for participants in the western EIM to explore expansion into the day-ahead timeframe, which would increase coordination and cost savings significantly while maintaining control of their transmission system. The ISO expects that the administration of these enhancements will be at a reduced cost, in comparison to the cost of full participation in the ISO.

IV. Nevada's Potential Retail Choice Paradigm Should be Coordinated with the Wholesale Market.

Issue No. 4 in the Commission's Notice requests information regarding "options reasonably available to Nevada in designing and establishing a competitive retail electric service market, including…the best practices and structure for Nevada."[16] As described above, the ISO offers many services that can be beneficial to Nevada consumers, but identifying the wholesale market elements that are most critical to Nevada depends on the ultimate design of the retail market. To that end, the ISO does not have a position on the relative merit of a competitive retail electric market, but it has identified specific issues that the Commission should consider if such a market is implemented. The Commission's prevailing concern should be to ensure that all essential reliability services currently provided by NV Energy continue to be provided in the retail choice construct. The issues identified by the ISO are centered on ensuring coordination between the retail market, the wholesale market, capacity procurement and essential reliability services, most or all of which are currently provided by NV Energy.

A. Maintaining Essential Reliability Services

First and foremost, in the event the state moves to a retail choice paradigm, Nevada will need to ensure that essential reliability services continue to be provided to all customers. In the sections below, the ISO highlights particular issues regarding the need to maintain sufficient

[16] Nevada Revised Statutes (NRS) 704.741.

capacity and energy in the system. While capacity and energy may be the most obvious aspects of reliable electric service, they are not the only essential reliability services currently provided by NV Energy in its role as a vertically integrated utility. Currently, these essential reliability services are provided by NV Energy, as a vertically integrated utility. If retail choice is implemented, the state will need to determine whether NV Energy will continue to provide these services, and, if not, what entity will do so. These essentially reliability services include the following:

1. *Regulation Service*

Regulation services are provided by resources that are immediately responsive to grid operator or automatic instructions to continually balance resources to meet deviations between actual and expected demand. The balancing authority is required to maintain sufficient regulation resources to meet NERC and WECC reliably standards.

2. *Voltage Support*

Voltage support is necessary to maintain voltage levels and reactive margins within NERC and WECC requirements. A balancing authority must determine the quantity and location of voltage support necessary to ensure compliance with NERC and WECC requirements.

3. *Frequency Response*

Frequency response reflects the system's ability to arrest and stabilize a frequency deviation after an event such as the loss of a large generator. NERC Reliability Standard BAL-003-1 requires each balancing authority to achieve an annual frequency response measure that equals or exceeds its frequency response obligation.

4. *Black Start Capability*

Black start is a procedure by which a resource self-starts without an external source of electricity. The output from the resource can then help restore power following a system or local area outage.

B. Ensuring Sufficient Capacity

Currently, the vast majority of the Nevada's electric resource planning activities are conducted through triennial resource plans submitted by NV Energy's respective utilities. Importantly, this process mandates that the utilities show the capacity of existing and planned resources designed to reliably operate the system.[17] By necessity, if retail choice is approved, this process will need to be amended and Nevada will need to address whether and what economic signals or regulatory requirements should be put in place to ensure short-term and long-term electric reliability. In the sections below, the ISO identifies specific aspects of resource planning and resource adequacy that the Commission should consider to ensure that the system has sufficient capacity to reliably operate the grid.[18]

1. Load forecasting

Currently, utilities are required to provide a load forecast in connection with their triennial resource plan.[19] The load forecast provides the fundamental building block in the state's resource planning process by establishing both long and short-term system needs. If retail choice is implemented, Nevada must consider who will prepare its load forecast and how it will be used in any resource planning processes. As an example, in California, a governmental agency[20] prepares the load forecast for the state for the next ten years. The California Public Utilities Commission uses this load forecast for resource planning and procurement purposes and the ISO also uses the forecast for its transmission planning.

2. Allocation and Resource Counting

Once decision makers have considered whether and how to develop an appropriate load forecast, Nevada should consider whether to allocate specific capacity requirements to load-serving entities. In California, the California Public Utilities Commission allocates local capacity requirements to load-serving entities based on power flow modeling conducted by the ISO. Allocating capacity requirements to load-serving entities will ensure that sufficient capacity exists to meet Nevada's needs. In conjunction with allocating capacity requirements,

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17 Nevada Administrative Code (NAC) 704.945

18 The ISO notes that that the state will retain control over procurement policies in a wholesale market framework.

19 NAC 704.9156.

20 The California Energy Commission.

the Commission will need to consider how particular resources are counted toward meeting those requirements. Especially with large influxes of variable energy resources, the state must consider how resources meet capacity needs. For example, NV Energy currently establishes capacity values for wind and solar projects in its integrated resource plan, which is subject to Commission approval.[21] In the future, the state may want to consider a standardized process for establishing resource capacity values to meet peak demands.

3. Procurement Processes

The state should also consider whether to establish a capacity procurement process. The method by which load-serving entities procure capacity could have an impact on both cost and the state's role in directing procurement. In California, load-serving entities rely on bilateral contracts with generators to meet resource adequacy requirements. Other states rely on capacity markets for all, or a portion of resource needs. Yet other states have created state run procurement agencies.[22] Nevada must consider which capacity procurement methods meet its specific needs.

4. Resource assessment

Lastly, Nevada should consider how to determine whether the resources actually procured by load-serving entities are sufficient to meet expected demand. In California, the ISO works with the California Public Utilities Commission to ensure that resources procured meet three categories: system, local and flexible capacity needs for the subsequent year. The ISO uses power flow modeling to check that procured resources meet applicable reliability criteria, including applicable NERC and WECC standards. In addition, if there are insufficient resources, the ISO notifies deficient load-serving entities and their respective regulatory authorities to allow an opportunity to cure the deficiencies. If deficiencies persist, the ISO has backstop authority to procure resources and ensure system reliability.

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[21] *See*, for example, Docket No. 16-07001, Sierra Pacific Power Company's (Sierra) 2016 IRP, Volume 4 of 16, p. 15. Sierra's loads and resources table indicates that Sierra's 22.08 MW portion of the Nevada Solar One plant counts as 16 MW of capacity.

[22] See, for example, the Illinois Power Agency presentation to the Nevada Committee on Energy Choice, http://energy.nv.gov/uploadedFiles/energynvgov/content/Programs/TaskForces/2017/TWG%2010-10-2017_AgendaItem6_IPA.pdf.

C. Efficient Use of Energy Contracts

While sufficient capacity is necessary to ensure system reliability, Nevada should also consider the appropriate use of energy contracts to hedge against spot market volatility. As mentioned in Section III.B, above, ISO load-serving entities procure much of their energy through bilateral contracts outside the ISO market in which suppliers purchase under contracts to meet demand. This serves to limit the load-serving entities' exposure to volatile energy prices, thereby resulting in greater rate stability. Nevada should review how to best utilize existing energy contracts in a retail choice framework.

D. Integrating Distributed Energy Resources

Integration of increased levels of distributed energy resources is an emerging issue whether or not retail choice is implemented, but the issue may be more complex under a retail choice paradigm. Distributed energy resources have the potential to provide capacity, energy and ancillary services at the wholesale level. However, to do so effectively, such resources must be properly interconnected at the distribution level and there must be sufficient capacity on the distribution system to accommodate the resources. To facilitate the integration of distributed energy resources, Nevada should consider whether to adopt advanced inverter functionality requirements, how it will identify available capacity on the distribution system and the locational benefits of particular distributed resources. These types of policies can allow distributed energy resources to be cost competitive and participate in wholesale markets to meet the state's energy needs. In California, the ISO has worked with policy makers to recognize future trends and provide opportunities for the growth of distributed energy resources. The ISO is a leader in developing markets that allow distributed energy resources to aggregate and add value by providing critical energy services at the wholesale level.

E. Metering Services

Currently, NV Energy provides metering services to its customers. If retail choice is implemented, these services will need to continue to be provided, whether by NV Energy or by another entity. In California, investor-owned utilities typically provide metering services, even when customers choose to receive electric service from community choice aggregators or through direct access providers. In other states, the metering services are provided by the system operator or through competitive metering service providers. Nevada will need to consider the

appropriate mechanism for delivering metering services in a retail choice construct.

V. Conclusion

The Nevada and the ISO electric systems benefit from close transmission interconnections and commercial relationships. NV Energy has been a valuable partner in, and its customers have been the beneficiary of, the western EIM's optimization of energy resources in the real-time market. The strength of the interconnections, the interest in integrating more renewable energy onto the grid and the existing diversity of load and resources provide a foundation for continued coordination between Nevada and the ISO. This Commission and the Governor's Committee on Energy Choice are correctly exploring potential wholesale market options as part of this docket. The ISO believes that there is potential for real economic and reliability benefits to Nevada in further cooperation with the ISO, no matter what its ultimate retail energy market structure, and looks forward to working with Nevada policymakers and stakeholders on the development of wholesale market solutions that will continue to increase the benefits to Nevada customers.

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Respectfully submitted,

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Appendix A

Post-Energy Crisis Reforms

The Governor's Committee on Energy Choice expressed interest in understanding the reforms made to the ISO market following the energy crisis of 2001-2002. This appendix includes an overview of the market issues experienced during the energy crisis and the ISO's post-energy crisis market reforms.

Background

On April 1, 2009 the ISO launched operations of a comprehensive restructuring of its market. The central objective of the market redesign was to eliminate the problems inherent in the zonal Congestion Management design that the ISO and the California Power Exchange markets were originally based on. In the initial phases of the redesign the ISO recognized that properly reforming Congestion Management would require establishing rules and procedures for allocating and pricing transmission and for clearing and pricing energy that are consistent across market time frames – an attribute that was crucially absent in the original design of the ISO. There are four relevant market time frames to the ISO and these can most logically be thought about by starting with the Real-Time balancing market, where the practical impacts of the laws of physics cannot be avoided, and working backward to the Hour-Ahead Scheduling Process ("HASP"), the Day-Ahead Market and, beyond that, to the process for awarding transmission rights. The rules and procedures for transmission allocation and pricing should be consistent across these markets. The main problem with the ISO's original zonal Congestion Management design was that it deliberately did not require consistency between the forward markets (Day-Ahead and Hour-Ahead) and the Real-Time market. A primary objective of the new design was to remedy this deficiency.

The ISO market design contains several structural elements that now promote a robust and efficient market, and that can be described as follows:

(1) "Full Network Model" ("FNM") to be used in all ISO markets – the Real-Time, Day-Ahead, and transmission rights markets – reflects the topology of the ISO grid and the associated transmission constraints accurately. The FNM, in conjunction with Security Constrained Unit Commitment ("SCUC") and Security Constrained Economic Dispatch ("SCED") algorithms, comprise the functional core of the market design. The consistent enforcement of the FNM across all ISO market time-frames is key to ensuring that market outcomes reflect and support

the efficient and reliable Real-Time operation of the transmission grid;

(2) "Integrated Forward Market" ("IFM") optimization, which utilizes the SCUC to commit resources, manage Congestion, balance Energy Supply and Demand, and procure ancillary services ("AS") in the most efficient, integrated manner based on economic Bids submitted by Market Participants. Although the term "IFM" applies specifically to the Day-Ahead Market, essentially the same optimization algorithm will be used in the Real-Time balancing market and the Real-Time pre-Dispatch process referred to as the "Hour-Ahead Scheduling Process" or "HASP." The IFM design also incorporates specific provisions to allow entities to engage in long-term bilateral contracting and avoid exposure to the short-term markets by "self-scheduling" their bilateral transactions in the Day-Ahead Market and in the HASP;

(3) "Residual Unit Commitment" ("RUC") process that enables the ISO to identify and commit on a Day-Ahead basis additional capacity that will be needed in Real-Time to meet the ISO's Demand Forecast, but may not have been committed or scheduled in the financial Day-Ahead IFM;

(4) "Locational Marginal Pricing" ("LMP") approach for managing congestion and determining marginal energy prices for each settlement period that accurately reflect the least cost, based on Market Participants' submitted Bids, of serving the next MWh of demand at thousands of locations on the ISO grid, including the cost of congestion and transmission losses;

(5) "Congestion Revenue Rights" ("CRRs") provide financial instruments for hedging the variability in congestion costs in power markets with location-based pricing that reflects grid congestion, i.e. LMP. They are released on both an annual and a monthly basis through an allocation process to load-serving entities ("LSEs") and through an auction open to all creditworthy parties;

(6) Market Power Mitigation ("MPM") procedures designed for compatibility with the LMP market design, which recognize that the transmission system in California was built on a vertically-integrated utility model and not with competitive wholesale markets in mind;

(7) Resource adequacy requirements that apply to LSEs and have explicit linkages to the ISO markets. These linkages are captured in rules and procedures whereby supply capacity that is procured by LSEs under state and local regulatory requirements is required to participate in the ISO markets starting with the Day-Ahead timeframe, to ensure that the "adequacy" achieved via forward procurement translates into day-to-day adequacy for operating the transmission system.

Beyond the system capacity requirements that were initially recognized for resource adequacy, operating experience has led to the inclusion of local capacity requirements and products that ensure that the ISO will have adequate flexible ramping capacity available for real-time dispatch.

A Summary of the ISO market design can be described as follows:

To summarize, the ISO market design utilizes three complementary elements to provide for efficient and consistent market outcomes: the FNM, the SCUC, and LMP. The FNM is the element that ensures consistency between transactions in the ISO markets and the physical operating needs of the grid, and thus eliminates the problem of "infeasible schedules" inherent in the previous zonal design. The FNM is used in the allocation and auction of CRRs as well as in the ISO's spot markets, so that these congestion hedging instruments reflect as closely as possible the grid constraints that will actually be enforced in the spot markets. The SCUC is the market optimization engine, which performs Congestion Management and clears Energy Supply and Demand in an integrated fashion, performs Unit Commitment, local market power mitigation and reliability Dispatch, and optimizes the provision of AS. The SCUC is used in conjunction with the FNM in the Day-Ahead IFM, the RUC process, the HASP and the Real-Time Market. Finally, LMP is the methodology for pricing Energy and charging for Congestion on the grid, based on locational or "nodal" marginal energy prices at each node of the FNM as calculated by the SCUC optimization. The nodal LMPs paid to Supply resources provide the correct signals to these resources to operate in a manner consistent with reliable grid operation and economic efficiency. Taken together these three elements address the primary objectives of the ISO Market redesign and achieve the replacement of the zonal market design with a system that ensures consistency between the market outcomes and the operational needs of the grid, as well as consistency in pricing and transmission allocation across the ISO Market time frames.

CERTIFICATE OF SERVICE

I hereby certify that I have on this 8th day of December 2017, caused to be served by electronic mail a true and correct copy of ***Comments of the California Independent System Operator Corporation*** on each of the following in Public Utilities Commission of Nevada Proceeding No. 17-10001:

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