State-Led Market Study Stakeholder Meeting – Q1 2021

Exploring Western Organized Market Configurations: A Western States' Study of Coordinated Market Options to Advance State Energy Policies (or the "State-Led Market Study")

Webinar
March 3, 2021
2:00 pm – 4:00 pm Mountain Standard Time

Agenda

1. **Introduction – *Utah Office of Energy Development***
2. **Project Overview and Progress to Date – *Energy Strategies***
   - ❖ Project Timeline & Status Update
3. **Market and Regulatory Review Scorecards/Analysis – *Energy Strategies***
4. **Update on Technical Modeling Efforts, 2030 Studies & Ongoing Cost Estimates – *Energy Strategies***
5. **Next Steps – *Energy Strategies***
   - ❖Comment Opportunity

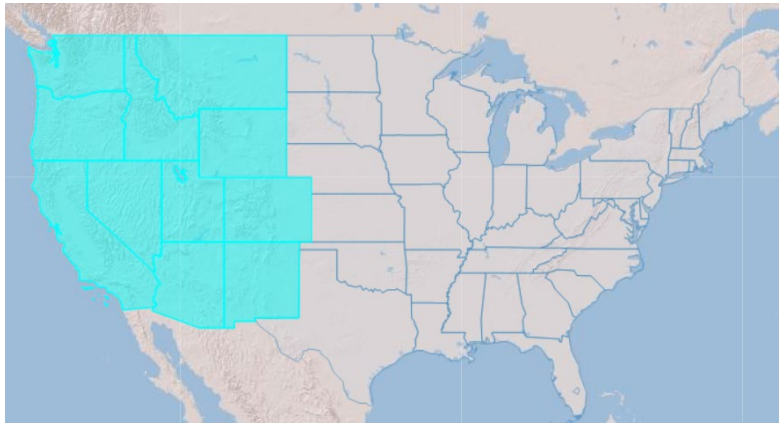
Introduction

Utah Office of Energy Development

State-Led Market Study made possible through DOE grant

- **The last several years have featured numerous discussions and initiatives related to the formation of coordinated wholesale trading markets in the West**
- **The Utah Governor's Office of Energy Development, in partnership with State Energy Offices of Idaho, Colorado, and Montana, applied for and received a grant from the US DOE to facilitate a 2-year state-led assessment of organized market options**
- **The project is called *Exploring Western Organized Market Configurations: A Western States' Study of Coordinated Market Options to Advance State Energy Policies***
  - ❖ Or "State-Led Market Study"
- **The project provides Western States with a neutral forum, and neutral analysis, to independently and jointly evaluate the options and impacts associated with new or more centralized wholesale energy markets and potential footprints**
- **Today is the Q1 2021 quarterly stakeholder meeting for the project**
  - ❖ Timing of next meeting is TBD but will likely be in May 2021

State representatives from 11 Western States are participating in project



Lead Team

- **Representatives on Lead Team represent the interest of their respective states but take all stakeholder input into consideration**
- **Work coordinated primarily through monthly calls**
- **Group seeks decisions by consensus**
  - ❖ Formal votes are an option, if necessary (but have not been used)

Lead Team	Name	Organization
AZ Lead	Steve Olea	Arizona Corporation Commission
CA Lead	Grace Anderson	California Energy Commission
	Yulia Schmidt	California Public Utilities Commission
CO Lead	Erin O'Neill	Colorado Public Utilities Commission
	Keith Hay	Colorado State Energy Office
ID Lead	John Chatburn	Idaho Governor's Office of Energy and Mineral Resources
MT Lead	Jeff Blend	Montana Energy Office, Montana Department of Environmental Quality
	Ben Brouwer	Montana Energy Office, Montana Department of Environmental Quality

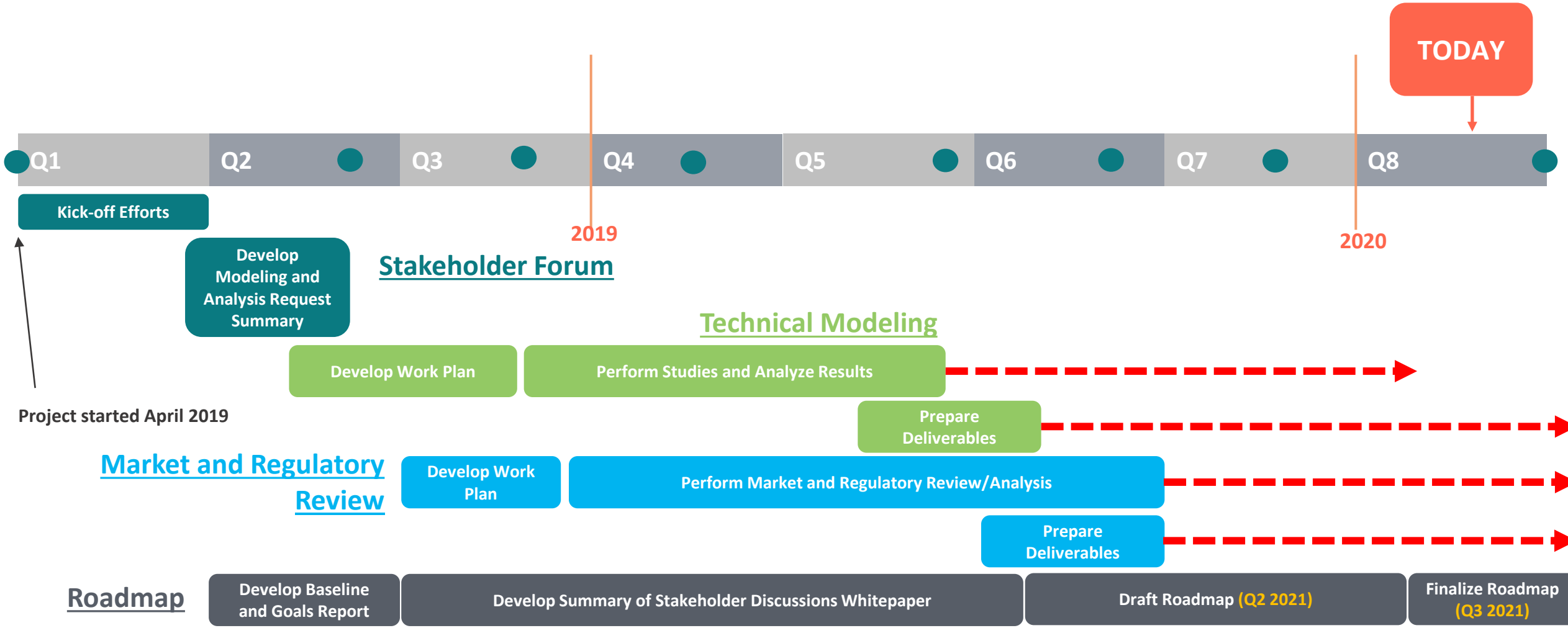
Lead Team	Name	Organization
NM Lead	Mark Gaiser	New Mexico Energy, Minerals and Natural Resources Department
	AnnaLinden Weller	New Mexico Energy, Minerals and Natural Resources Department
NV Lead	Hayley Williamson	Nevada Public Utilities Commission
	David Bobzien	Nevada State Energy Office
OR Lead	Kristen Sheeran	Oregon Energy and Climate Change Policy Advisory to Governor Kate Brown
	Letha Tawney	Oregon Public Utilities Commission
UT Lead	Chris Parker	Utah Department of Public Utilities
	Antonio Santos Aguilera	Utah Governor's Office of Energy Development
WA Lead	Steve Johnson	Washington Utilities and Transportation Commission
	Glenn Blackmon	Washington State Energy Office at the Department of Commerce
WY Lead	Bryce Freeman	Wyoming Office of Consumer Advocate

Project Overview & Progress To Date

Energy Strategies

Summary of project timeline

- Originally, a two-year timeline (eight quarters), but deadline extension received from DOE to provide flexibility given remote work challenges
  - Project completion now anticipated beginning of Q3 2021
  - Draft Roadmap expected Q2 2021
- Stakeholder Forum continues with final meeting anticipated in May 2021



Project Status Update

- ✓ **The Modeling and Analysis Request and Guidance Summary is complete:**
  - ✓ Discussed during the October 2019 stakeholder meeting
  - ✓ ***Highlights key technical questions posed by the Lead Team that the project will seek to address***
- ✓ **Technical Work Plan**
  - ✓ Approved by Lead Team (but open to revisions)
  - ✓ Presented to stakeholders in January 2020 meeting with revisions presented at May 2020 meeting
- ❑ **Technical Modeling efforts are ongoing**
  - ✓ 2020 case build and studies complete
  - ✓ 2030 case build complete
  - ✓ 2030 preliminary studies complete
  - ❑ 2030 final studies ongoing
- ✓ **Market & Regulatory Analysis Work Plan**
  - ✓ Approved by Lead Team in October 2020
- ❑ **Market & Regulatory Review underway**
  - ✓ Draft Market Factor Scorecard – complete (for review today)
  - ❑ Finalize Market Factor Scorecards and Market & Regulatory Review report
- ❑ **Preparation of deliverables is ongoing**

Review of Stakeholder Engagement Plan

- **Objective for today's meeting**
  - ❖ Update stakeholders on study results and ongoing work
  - ❖ Take verbal feedback from stakeholders
  - ❖ Invite the opportunity to provide written comments
    - ➢ Written comments can be submitted to kfraser@energystrat.com through March 17th
    - ➢ Note that we will review comments, but will not respond specifically to each comment received

- **To receive updates and future meeting announcements, navigate to this link to add your name to the project's stakeholder distribution list: http://bit.ly/2nBP6Gt**

- **When possible, we will distribute meeting materials in advance via this distribution list**

Market and Regulatory Review Scorecards/Analysis

Energy Strategies

Market & Regulatory Review

- "Market & Regulatory Review" designed to address more qualitative aspects of the Request from the Lead Team
  - ❖Help the states evaluate more qualitative aspects of different organized market configurations
  - ❖Purpose is to assess how regional market constructs supports state policy priorities
  - ❖Utilizes "Market Factor Scorecards" approach to achieve this
  - ❖Lead Team approved the Work Plan for this effort in October
- This slide deck provides preliminary analysis & scorecards and incorporates Lead Team feedback received to date
  - ❖Feedback and additional perspectives from stakeholders are welcomed and encouraged

Market Factor Scorecard Approach & metrics

- **Purpose of scorecards is to assess how regional market construct can support state policy priorities**
- Work Plan identified two overarching state energy policy priorities (which are not mutually exclusive, but each state may weight these priorities differently)
  - ❖ Increased Use of Clean Energy Technologies
  - ❖ Reliable, Affordable Provision of Energy to Consumers
- New scorecard for "Retaining State Authority on Key Jurisdictional Elements" added following stakeholder input
  - ❖ Metrics created from work that was identified in the Work Plan but was not envisioned as fitting under the Scorecard approach
- Work Plan outlined relevant metrics for each overarching policy goal (now slightly reorganized/modified)
- Market constructs evaluated:
  - ❖ Bilateral Only
  - ❖ Real-Time Market
  - ❖ Day-Ahead Market
  - ❖ Regional Transmission Organization

Metrics for the Market Factor Scorecards

Icon	Meaning
Excellent 	Market construct is expected to substantially support achievement of this metric
Very Good 	Market construct is expected to mostly support achievement of this metric
Good 	Market construct is expected to somewhat support achievement of this metric
Fair 	Market construct is expected to minimally support achievement of this metric
Poor 	Market construct is not expected to support achievement of this metric

Relevant Metrics for Increased use of Clean Energy Technologies

Market constructs will be evaluated against these metrics

- Efficient grid operation which allows low (and zero) marginal cost resources to be dispatched and reduces overall costs of integrating clean electricity technologies
- Lower barriers to access new generation in high-quality renewable resource locations
- ~~Expanded~~ Opportunities for clean electricity resources to be added to the grid (e.g. direct customer access to renewable/clean resource power purchase agreements)
- ~~Enhanced~~ Provides financing opportunities and ~~additional~~ a variety of revenue stream opportunities for clean electricity technologies
- Economically facilitates ~~Facilitation of~~ emissions reduction goals/requirements
- Transparent and timely information on pricing, resource operations, and emissions

Relevant Metrics for Reliable, Affordable Provision of Energy

Market constructs will be evaluated against these metrics

- Efficient grid operation which reduces costs and increases flexibility of transactions
- ~~Ability to reduce generation and transmission investment/capital costs~~
- Ability to unlock full potential of existing generation (lowering costs) and to decrease generation capital costs/investment ~~and transmission system to ensure reliable operations~~
- Ability to unlock full potential of the existing transmission system (lowering costs) and to decrease transmission capital costs/investments
- General ability to support reliable system operations
- ~~Enhanced~~ Visibility into electric system conditions to improve reliability
- Long-term mechanisms to support a system with adequate electric resources
- Increased opportunities for cost-effective demand-side resource participation
- Transparent and timely information available to regulators, consumer advocates and other stakeholders

Relevant Metrics for Ability of a Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements

Market constructs will be evaluated against these metrics

- Ability for state to retain authority over resource adequacy
- Ability for state to retain authority over the resource mix for the utilities it regulates
- Ability for state to retain authority over transmission planning and prudence/cost recovery for transmission investments
- Ability for states to retain authority over retail electric rates
- Ability for states to be involved in the process of obtaining approval to participate in the market
  - ❖ *Will include an appendix including a high-level review of likely approval processes for each market construct*

Key Assumptions & Caveats in Developing the Scorecards

- Scorecards are intended to capture relative differences between market structures
  - ❖ Ranking should be thought of as reasonably indicative, but not precise
- Required assumptions about what services would be included in each market and this analysis is based on those assumptions
  - ❖ Scorecard rankings will ***always*** depend, to some extent, on market design and every market design possibility is not considered in the scorecard
  - ❖ Perhaps most relevant for scorecard for retaining state regulatory authority on key jurisdictional elements where a range of rankings is utilized
- In considering state authority, and impacts to states authority, over various market constructs, Scorecard focuses on impacts to utilities that are regulated by state utility commissions
  - ❖ Non-state jurisdictional entities, such as Federal Power Marketing Administrations, publicly-owned power, and cooperatives are not generally factored into the scorecard
- References to “State authority” is primarily a reference to a State PUC authority

Assumed Market Construct Characteristics

Organized Market Type	Bilateral Market Only	Real-Time Market	Day-Ahead Market	RTO
Centrally optimized dispatch	No central optimization of electricity trades	Centrally optimized real-time dispatch; day-ahead unit commitment **not** optimized across participants	Centrally optimized real-time dispatch and day-ahead unit commitment	
Transmission tariffs	Individual transmission tariffs			Joint transmission tariff for participants in a given footprint
Transmission dedicated to market	Transmission rights required for all bilateral sales/purchases	Limited transmission dedicated to the market (other transactions must explicitly pay for transmission)		Transmission used up to reliability limit
Transmission Planning	Local transmission planning remains with individual transmission providers; regional planning and inter-regional coordination under Order 1000 remain as they are today			Joint transmission planning by RTO for full footprint for reliability, economic and public policy purposes; some lower voltage transmission planning remains at the local level (as is typical in RTOs)
Operational Control of Transmission	Remains with individual transmission providers			RTO has operational control of transmission
Reliability Obligations and Balancing Authority Area Boundaries	As they are today			RTO has primary reliability obligations; BAAs are consolidated

Assumed Market Construct Characteristics (continued)

Organized Market Type	Bilateral Market Only	Real-Time Market	Day-Ahead Market	RTO
Ancillary-Service Co-Optimization	No ancillary service co-optimization	Can, but does not have to, include ancillary service co-optimization and provision		Includes ancillary service co-optimization and provision in the market
Resource Adequacy Implications	Addressed by individual regulators; no market requirement	Market addresses intra-hour resource sufficiency, but does not impact long-term resource adequacy planning and processes	Market addresses day-ahead resource sufficiency, but does not impact long-term resource adequacy planning and processes	Market will include its own longer-term resource adequacy requirements that must be achieved (states may have more stringent requirements, though states' exact roles will depend on the governance structure)
Transparent Access to Market & Operational Information	Very little access to information, what is available is generally aggregated	Transparent access to pricing information for real-time transactions and transmission in the market	Transparent access to pricing information for day-ahead and real-time transactions and transmission in the market	Transparent access to pricing information for day-ahead and real-time transactions and transmission in the market
Ability for Large Commercial/Industrial Consumers to Enter into Power Agreements with Preferred Resource Types	Unlikely (inability for resource to easily sell its output in a bilateral market)	Unlikely (resource can only easily sell its output in the real-time market)	Possible (resource can easily sell its output in the day-time market and trading hubs likely to be established)	Highly likely (resources can easily sell output to the RTO as we have seen in SPP, MISO, etc.)
Retail Choice	No change to existing retail choice programs & traditional, vertically-integrated utility service provision is assumed under these market structures (as retail choice is a separate policy consideration from market constructs)			

Increased Use of Clean Energy Technologies Scorecard

Increased Use of Clean Energy Technologies	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Efficient grid operation which allows low (and zero) marginal cost resources to be dispatched and reduces overall costs of integrating clean energy technologies	*Fair* • ***Individual BAs*** optimize generation in their respective footprints • ***Manual process*** of determining optimal generation to dispatch and purchases/sales to make • External resources only used if price plus ***wheeling costs*** (which can be pancaked) are economic • ***Integration costs & curtailments unlikely to be minimized*** with many, relatively small BAAs that must balance within their own footprints	*Good* • ***Real-time transactions*** in the market can be ***centrally & economically optimized***, but amount of transactions ***limited by transmission availability*** and limitation to real-time timeframe • Ability to use ***some external generation in real-time without wheeling or pancaking*** or transmission rates • May ***reduce some integration costs*** and can ***reduce renewable curtailment*** via sharing of resources across a broader footprint in real-time optimization	*Very Good* • ***Day-ahead and real-time*** transactions can be ***centrally & economically optimized*** with ***more transmission available*** than real-time but less than an RTO • Ability to plan to use external generation in day-ahead timeframe ***potentially with reduced wheeling or pancaking of transmission rates*** should increase sharing of low/zero cost resources • May ***reduce integration costs*** and can ***reduce renewable curtailment*** via sharing of resources across a broader footprint in real-time and day-ahead optimization	*Excellent* • ***Vast majority*** of transactions expected to be ***centrally & economically optimized*** using the ***full capability of the transmission system*** • ***Wheeling costs and pancaking of transmission rates eliminated*** for transactions within the market footprint • ***BA consolidation*** will allow ***maximum sharing of ancillary services*** across the footprint, which should ***reduce renewable integration costs*** and BA consolidation should ***minimize renewable curtailment***

Ability of Market Construct to Support Increased Use of Clean Energy Technologies	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Lower barriers to access new generation in high-quality renewable resource locations	*Poor* • Utilities interested in accessing high-quality renewables in remote locations often pay ***pancaked transmission rates*** to reach those resources • ***Transmission availability limited*** by use of contract paths • These factors create significant ***barriers to procurement of new generation*** in high-quality renewable resource locations, frequently remote from load centers, for many utilities • Transmission planning ***decisions primarily made by transmission function of utilities***	*Poor* • ***Does not substantially change bilateral market barriers*** to access ***new*** generation, as new generation generally requires long-term agreements that cannot rely on dynamics which may be provided by a real-time market • Thus, for long-term transactions***, pancaked transmission rates and limited use of transmission via contract paths still create barriers***	*Good* • Depends on market design • Could ***reduce some barriers*** to long-term resource procurement via utility trading of resource qualities that ***might reduce rate pancaking*** • Potential to use or incorporate ***financial transmission rights could increase ability for remote resources to use existing transmission capacity*** • ***Voluntary nature*** of the market structure ***may create risks*** that are problematic for financing new projects	*Excellent* • ***Wheeling costs and transmission rate pancaking eliminated*** and no longer a cost barrier for long-term resource procurement in remote areas • Elimination of contract path and ***use of financial transmission rights can maximize reliable transmission use*** • ***Interconnection processes*** can be tailored to accommodate more resources • ***Joint transmission planning by an independent entity across a broader footprint*** can increase new transmission access

Ability of Market Construct to Support <u>Increased Use of Clean Energy Technologies</u>	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Opportunities for clean electricity resources to be added to the grid (e.g. direct customer access to renewable/clean resource power purchase agreements)	*<u>Good</u>* • ***Green tariffs*** can be used to meet needs of consumers interested in clean energy goals providing opportunities to add clean energy resources to the grid • ***Other options*** that can be used in highly liquid markets are ***limited by the illiquidity, rigidity in transaction structure, and transmission delivery requirements of bilateral markets***	*<u>Good</u>* • ***Green tariffs*** can also be used to meet goals of consumers, providing opportunities to add clean electricity resources to the grid • Real-time markets are ***unlikely to open up other avenues of direct consumer access to clean resources*** as they are voluntary (risk they could be stopped part way through resource's operation) and are ***generally <u>not</u> designed to accommodate the full output of new resources being sold into the market***	*<u>Very Good</u>* • ***Green tariff*** availability expected to continue • Addition of a day-ahead market may ***open up new contracting opportunities*** (e.g. financial PPAs) but will ***depend on market design*** • May help open up more resource locations for green tariff opportunities • However, ***voluntary nature of market may create too many risks*** to successfully develop new projects in this manner	*<u>Excellent</u>* • ***Green tariff*** availability expected to continue • ***Liquid and certain market construct can enable virtual PPAs*** • RTO regions have seen ***significant growth in virtual PPA*** constructs which has led to ***substantial additions of clean resources*** to the grid (≈80% of renewable energy procured by corporations exists within the organized market constructs of ISO/RTOs)

Ability of Market Construct to Support Increased Use of Clean Energy Technologies	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Provides financing opportunities and a variety revenue stream opportunities for clean electricity technologies	*Fair* • Financing opportunities ***generally require PPA with utility*** (or via green tariff) • ***Revenue steams often limited to PPA price*** with a ***lack of easily accessible revenue streams for other services*** that might be provided by clean electricity technologies	*Good* • Financing opportunities ***generally continue to require PPA with utility*** (or via green tariff) • ***Financing based on real-time energy liquidation only appears unlikely*** • Revenue steams ***mostly derived from the PPA price*** • Opportunity to ***sell incremental real-time output at market prices*** • Real-time markets ***could include some ancillary service components***, which may offer limited additional revenue streams to clean energy resources	*Very Good* • Expect ***financing will mostly continue to require PPA with utility*** (or via green tariff) • ***Financing based on day-ahead energy liquidation more likely*** than in a real-time market • Opportunities to ***optimize generation and revenue around bids*** in day-ahead and real-time • Day-ahead markets ***more likely to include additional ancillary service components***, which may offer additional revenue streams • ***Higher potential for capacity-based revenue*** sources	*Excellent* • ***Financing via standard PPA (and green tariff) continue*** • New ***opportunity to finance via a virtual PPA*** • Full suite of RTO ***day-ahead, real-time and ancillary service revenue streams*** may be available (depending on market rules/design) • ***Potential for capacity-based revenue streams*** with a joint RA construct or other capacity mechanism

Ability of Market Construct to Support Increased Use of Clean Energy Technologies	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Economically facilitates emissions reduction goals/requirements via market signals	*Fair* • ***Lack of central optimization*** of generation dispatch ***unlikely to result in most economic outcome for achieving emissions reductions***	*Good* • ***Central optimization of real-time bids*** can facilitate ***more economic achievement of emissions reductions goals*** for those transactions than a bilateral market • Challenges remain with different state rules and programs	*Very Good* • ***Central optimization of day-ahead and real-time bids*** within the market can facilitate more ***economic achievement of emissions reductions goals with more transactions optimized*** • Market optimization can consider ***economic and emissions impacts of resource starts*** • But, ***not all transactions are expected to flow through the market;*** some bilateral transactions would remain	*Excellent* • ***More transactions are included in the market and are centrally optimized***, allowing for the most economic achievement of emissions reductions goals • ***Some self-scheduling will likely occur***, but expect those transactions to be fewer than self-schedules + outside market transactions in a day-ahead market construct

Note: all market constructs must contend with the specifics of state emission reduction goals and differences between state policies. For instance, in the state of California, the cap-and-trade program regulates in state generation plus emissions associated with imported power. These types of designs can be challenging to implement in any market construct, as market optimizations are generally not designed to assign generation output to a specific load. But this metric focuses on economics and market signals for emission reductions

Ability of Market Construct to Support Increased Use of Clean Energy Technologies	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Transparent and timely information on pricing, resource operations, and emissions	*Fair* • ***Market prices*** generally only ***reported at limited locations*** with ***aggregated and averaged*** information • Resource ***operations and emissions information typically comes*** not as a result of the market construct but ***due to other reporting requirements*** (e.g. EIA, EPA)	*Good* • In addition to the information available in bilateral markets, more ***granular and timely information on real-time prices*** at a variety of locations generally released in a very timely manner • ***Some resource operations and emissions information may be available from the market operators***, but generally will continue to come from other sources • Provide operational ***information regarding transmission congestion***	*Very Good* • Market ***provides timely access to day-ahead and real time prices at more locations*** (as more generation resources are expected to actively bid into the market) • Market ***may provide additional information on resource operations*** and, potentially, emissions • Provide operational ***information regarding transmission congestion***	*Excellent* • Given that an RTO would generally require resource participation and bidding, there would ***likely be additional pricing transparency into more locations*** • FERC Order 844 requires ***reporting of uplift payment, resource commitment decision and more*** • As with day-ahead market ***may provide additional information on resource operations*** and, potentially, emissions • Provide operational ***information regarding transmission congestion***

Resulting DRAFT Scorecard for Increased use of Clean Energy Technologies

Increased Use of Clean Energy Technologies	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Efficient grid operation which allows low (and zero) marginal cost resources to be dispatched and reduces overall costs of integrating clean energy technologies	*Fair*	*Good*	*Very Good*	*Excellent*
Lower barriers to access new generation in high-quality renewable resource locations	*Poor*	*Poor*	*Good*	*Excellent*
Opportunities for clean electricity resources to be added to the grid (e.g. direct customer access to renewable/clean resource power purchase agreements)	*Good*	*Good*	*Very Good*	*Excellent*
Provides financing opportunities and a variety revenue stream opportunities for clean electricity technologies	*Fair*	*Good*	*Very Good*	*Excellent*
Economically facilitates emissions reduction goals/requirements via market signals	*Fair*	*Good*	*Very Good*	*Excellent*
Transparent and timely information on pricing, resource operations, and emissions	*Fair*	*Good*	*Very Good*	*Excellent*

Reliable, Affordable Provisions of Energy to Consumers Scorecard

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Efficient grid operation which reduces costs and increases flexibility of transactions	*Fair* • ***Individual BAs*** optimize generation in footprint • ***Manual process*** of determining optimal generation to dispatch • External resources only used if price plus ***wheeling costs*** (which can be pancaked) are economic, reducing prevalence of economic generation options • Transmission usage to facilitate ***trades limited by contract path method*** • Trades in bilateral markets sometimes ***limited to blocks*** (e.g. on-peak) and it may be ***difficult to trade*** (even when mutually beneficial) for shorter durations	*Good* • ***Real-time transactions*** in the market can be ***centrally & economically optimized***, but amount of transactions ***limited by transmission availability*** and limitation to real-time • Real-time ability to use ***some external generation without wheeling or pancaking*** of transmission rates • ***Outside of the real-time market***, longer-term trades continue bilaterally (with ***limited flexibility and mostly "block" trades***) but real-time trades add flexibility	*Very Good* • ***Day-ahead and real-time*** transactions can be ***centrally & economically optimized*** with ***more transmission available*** than real-time but less than an RTO • Ability to plan to use external generation in day-ahead timeframe ***with reduced wheeling or pancaking of transmission rates*** • ***More flexibility in transactions*** on a day-ahead basis, with more frequent (hourly + intrahour) trades taking place via the market optimization (less need to rely on inflexible block trades)	*Excellent* • ***Vast majority*** of transactions expected to be ***centrally & economically optimized*** using the ***full capability of the transmission system*** up to reliability limits • ***Wheeling costs and pancaking of transmission rates eliminated*** for transactions within the market • ***BA consolidation*** will allow ***maximum sharing of ancillary services*** across the footprint, which should ***reduce costs*** • ***High level of flexibility for hourly and intra-hourly transactions***

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Ability to unlock full potential of existing generation (lowering costs) and to decrease generation capital costs/investments	*Poor* • Generation ***optimization at individual BA level***, limiting potential of the generation system and likely ***increasing curtailments,*** which fails to unlock full generation potential • Potential for external ***generation to not be unlocked*** or fully utilized due to transmission wheeling cost barriers, increasing costs • ***Individual BAs*** hold reserves and meeting reliability tends to ***require more generation resources*** than if those were held over a larger footprint • ***Higher reserve margins*** necessary to maintain reliability • ***New generation investments*** are more likely given these factors and, when needed, they may be ***less efficient*** as they are less likely to be coordinated with neighboring areas	*Fair* • Unlocks ***additional generation capabilities with bidding opportunities in real-time and real-time SCED*** • ***Reduces curtailments*** (unleashing potential of existing generation) • SCED optimization generally limited to 5-10% of transactions in real-time; thus, ***much of the generation system remains optimized the same as a bilateral market*** • ***Individual BAs*** still ***hold reserves*** and meet reliability requirements but some optimization and sharing occurs in real-time • ***Reserve margins likely substantially similar to bilateral markets*** • ***New generation investment remains likely and is less likely to be coordinated***	*Good* • Unlocks ***additional generation capabilities and optimization with bidding opportunities in day-ahead (and real-time)*** • Ability to unlock generation potential may be ***limited to what is bid into this voluntary market (and what transmission is available);*** not all generation will be optimized • ***Ability to decrease generation investments very dependent on market design*** • ***Market may optimize ancillary services***, reducing reserve needs for individual BAs • ***Potential to reduce reserve margins*** with broader resource sharing • ***New generation investment*** still ***unlikely to be coordinated but potentially more so that bilateral or real-time*** • ***Potential for reduced wheeling costs may lead to more efficient generation investments***	*Very Good* • ***Excellent at optimizing and unlocking full potential of the generation that is bid into the market*** • ***Some resources will continue to self-schedule*** and their full potential may not be unlocked, even under an RTO • ***Access to full transmission system*** for optimization ***increases ability to unlock generation potential*** • ***Market optimization leads to efficient use of existing generation system*** (reducing need for new projects/investments) • BA consolidation can ***reduce need for new reserve-related generation capacity*** • ***Reduced planning reserve margins and diversity can reduce need for new generation*** • ***Future investments likely to be more efficient*** (with no wheeling cost barriers to access efficient generation) but still not fully coordinated or optimized across the footprint

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Ability to unlock full potential of existing transmission system (lowering costs) and to decrease transmission capital costs/investments	*Fair* • ***Transmission system capacity may go unused*** due to wheeling costs preventing full use of the transmission system • Contract path use of transmission results in ***inefficient use of existing transmission infrastructure*** especially for longer term uses (and ***can necessitate additional investments***) • But real-time use of the transmission system may be allowed up to reliability limits with new paradigm for Path Operations • When investments in ***new transmission is*** needed it may be ***less efficient*** as they are less likely to be coordinated with neighboring areas (though Order 1000 activities continue, have not demonstrated ability to drive coordinated investments in the West)	*Good* • ***Transmission system capacity may go unused*** due to wheeling costs preventing full use of the transmission system, but SCED and elimination of wheeling costs in real-time ***increases use of the existing transmission system's capability*** • Contract path use of transmission results in ***inefficient use of existing transmission infrastructure*** though ***real-time use can be more efficient***, potentially reducing need for some new investments (in limited instances) • ***New transmission*** investment still ***unlikely to be coordinated*** across a broad region (though Order 100 planning will continue)	*Very Good* • ***Use of transmission system and impact on investments very dependent on market design*** • Potential to use or incorporate ***financial transmission rights resulting in more efficient use of the existing transmission system*** still expect some use of contract path system/holding back transmission for bilateral uses, somewhat limiting efficient long-term use of the transmission system • ***Transmission system capacity better utilized with reduced or eliminated wheeling costs and SCED*** • ***New transmission*** investment still ***unlikely to be coordinated*** without joint transmission planning (Order 1000 continues)	*Excellent* • ***Financial transmission rights, elimination of rate pancaking/wheeling costs & use of SCED generally lead to efficient use of the full capabilities of the existing transmission system up to reliability limits*** (reducing need for new projects and investments) • ***Future investments likely to be more efficient*** (transmission jointly planned by the independent RTO, competitive solicitations utilized, and no wheeling cost barriers to efficient generation locations) • Cost allocation of new transmission investments may benefit or harm individual state/entities depending on design

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
General ability to support reliable operations	*Good* • Bilateral markets ***can and do achieve reliable operations*** • Addition of automated tools and consolidated operational responsibilities may improve reliability or deliver reliable operations at a lower cost • Lack of SCED to manage generation and energy flows, instead a number of ***more manual processes*** • Dispatching of resources to meet needs may be ***limited by transmission reservations*** and ***lack of known information on generation availability*** • ***Multiple parties have operational/reliability responsibilities*** on a relatively ***small geographic footprint*** • Imbalances and resource integration takes place on ***individual BAA level*** (though trades can take place to facilitate these needs, they are less coordinated) • ***Little automation of processes***, including responding to system contingencies • ***Reliability may be more challenging under this construct in the future***	*Very Good* • Addition of real-time ***SCED*** enhances reliability by ***managing generation and helping relieve transmission constraints*** • Dispatching of resources to meet needs able to ***take advantage of actual transmission availability*** (rather than reservations) potentially up to reliability limits • ***Additional information on generation availability*** and dispatch in real-time can support reliability • ***Multiple parties retain operational responsibility***, but there is ***greater coordination through the Market Operator***, enhancing reliability • SCED can ***automate the resolution of imbalances and support resource integration*** over larger footprint • ***Increased automation of processes*** (though some likely to remain less automated)	*Very Good* • Use of ***SCED for day-ahead unit commitment enhances reliability*** by ***managing generation and helping relieve transmission constraints in advance*** • Dispatching of resources to meet needs able to ***take advantage of actual transmission availability*** (rather than reservations), but if transmission is not put into the market reliability may not be maximized in day-ahead solution • ***Additional information on generation availability*** and dispatch in day-ahead can support reliability • ***Multiple parties retain operational responsibility***, but there is ***greater coordination through the Market Operator***, enhancing reliability • SCED can ***automate the resolution of imbalances and support resource integration*** over larger footprint • ***Increased automation of processes*** and addition of shared tools	*Excellent* • ***SCED use across footprint and various time horizon***s enhances reliability by ***managing generation and helping relieve transmission constraints*** and providing advanced ability to address issues • Dispatching of resources to meet needs able to ***take advantage of full capabilities of the transmission system*** • Additional ***information on generation availability and must offer provisions*** can support reliability • ***Vast majority of generation*** likely to be bid in and ***available for market optimization to increase reliability*** (though some self-schedules will remain) • Many ***operational responsibilities consolidated with the Market Operator***, enhancing reliability • ***BA consolidation*** allows best ability to resolve imbalances, increase automation, and support resource integration over larger footprint

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Visibility into electric system conditions to improve reliability	*Fair* • ***Visibility*** into system conditions ***somewhat limited*** which could hinder reliable operations in some instances • ***Reliability Coordinator has most visibility*** into system conditions across a wide area, individual BAs and transmission providers for their areas/lines, but may have limited visibility for some generation resources • For ***non-operators there is generally little visibility into system conditions***	*Good* • ***Better visibility*** into system conditions and increased situational awareness with ***market operator and addition of SCED and other tools*** • ***Reliability Coordinator continues to have wide area view*** but there is ***increased visibility to Market Operators of generator information*** and other data with the addition of the market • ***Non-operators will get increased visibility as well*** through disclosure of additional information by the market operator (likely a lack of visibility on transactions outside the market)	*Very Good* • ***Better visibility*** into system conditions and increased situational awareness with ***market operator and addition of SCED, including visibility on a day-ahead basis*** • ***Reliability Coordinator continues to have wide area view*** but there is ***increased visibility to generator information*** and other data with the addition of the market and, ***likely, additional market participants/data requirements*** • ***Non-operators will get increased visibility as well*** through disclosure of additional information by the market operator (likely a lack of visibility on transactions outside the market)	*Excellent* • ***Better visibility*** into system conditions and increased situational awareness with ***market operator and addition of SCED and other tools*** • ***Reliability Coordinator continues to have wide area view*** and consolidation of BAs leads to ***more centralized reliability responsibilities which may improve overall visibility and reliable outcomes*** • Addition of a ***mid-term reliability construct*** (e.g. RA requirements or capacity market) to ***support visibility into reliable operations*** in longer term • ***Non-operators may get increased visibility as well*** through disclosure of additional information by the market operator and most transactions in the market

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Transparent and timely information available to regulators, consumer advocates and other stakeholders	*Fair* • Market ***prices generally only reported*** at ***limited locations*** with ***aggregated and averaged*** information • ***Limited ability for regulators, consumer advocates*** and stakeholders to ***access bilateral trade data*** • ***Resource and transmission*** related information may be available but typically comes not as a result of the market construct but ***due to other reporting requirements*** (e.g. EIA, WECC) • Can be ***difficult to obtain information on transmission flows and utilization***	*Good* • In addition to the information available in bilateral markets, ***more granular and timely information on real-time prices at a variety of locations*** • Some ***resource operations and transmission flows*** information may be ***available from the market operators***, but generally will continue to come from other sources	*Very Good* • Market provides ***timely access to day-ahead and real time prices at more locations*** (as more generation resources are expected to actively bid into the market) • Market may provide ***additional information on resource operations*** • Expect market will provide more ***transparency into transmission flows and utilization***	*Excellent* • Given that an RTO would generally require resource participation and bidding, there would ***likely be additional pricing transparency into more locations*** • Additional information on ***resource operations*** • Expect information on ***transmission flows and utilization to be available*** to consumer advocates and other stakeholders on a timely basis

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Long-term mechanisms to support a system with adequate electric resources	*Fair* • ***Long-term adequacy through individual utility resource plans***; requirements can vary • ***No overarching long-term reliability requirements on a system wide basis*** (entities considering voluntary, regional programs, but they are not yet implemented) • ***Potential for high bilateral prices*** may provide additional ***adequacy incentives***	*Good* • ***Long-term adequacy the same as bilateral*** • ***Mechanisms to ensure sufficiency in the real-time market may provide additional incentives*** to ensure longer-term adequacy • ***Potential for high real-time prices*** may also ***provide incentives*** for adequate supplies	*Good* • ***Long-term adequacy the same as bilateral*** • ***Market rules to ensure sufficiency in the market may provide additional incentives to ensure longer-term adequacy*** • ***Potential for high prices and impacts of failing the market's resource sufficiency tests*** may also ***provide incentives*** for adequate supplies	*Excellent* • Generally, ***include a system wide RA metric/planning reserve margin*** to support mid to long-term reliability objectives • Depending on market design, RTO ***may have capacity market or other backstop procurement authority*** to support long-term resource adequacy

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Increased opportunities for cost-effective demand-side resource participation	*Fair* • Some opportunities for demand-side resource participation but ***generally not widely available to all demand-side resource types or across all areas***	*Good* • Market construct can generally ***accommodate demand-side resource participation*** (but whether it is enabled or not will ***depend on market design*** and ***participant decisions***)	*Very Good* • Market construct can generally ***accommodate demand-side resource participation*** (but whether it is enabled or not will ***depend on market design*** and ***participant decisions***)	*Excellent* • Several ***FERC Orders help to ensure demand-side resources can participate in an RTO*** (including Order 719, 745, and 2222 for distributed energy resources)

Resulting DRAFT Scorecard for Reliable, Affordable Provision of Energy to Consumers

Ability of Market Construct to Support Reliable, Affordable Provision of Energy to Consumers	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Efficient grid operation which reduces costs and increases flexibility of transactions	*Fair*	*Good*	*Very Good*	*Excellent*
Ability to unlock full potential of existing generation (lowering costs) and to decrease generation capital costs/investments	*Poor*	*Fair*	*Good*	*Very Good*
Ability to unlock full potential of existing transmission system (lowering costs) and to decrease transmission capital costs/investments	*Fair*	*Good*	*Very Good*	*Excellent*
General ability to support reliable operations	*Good*	*Very Good*	*Very Good*	*Excellent*
Visibility into electric system conditions to improve reliability	*Fair*	*Good*	*Very Good*	*Excellent*
Transparent and timely information available to regulators, consumer advocates and other stakeholders	*Fair*	*Good*	*Very Good*	*Excellent*
Long-term mechanisms to support a system with adequate electric resources	*Fair*	*Good*	*Good*	*Excellent*
Increased opportunities for cost-effective demand-side resource participation	*Fair*	*Good*	*Very Good*	*Excellent*

Retain State Regulatory Authority on Key Jurisdictional Elements Scorecard

Special Considerations for Retention of State Authority Scorecards

- These elements were originally **not** proposed to be included in the "Scorecard" framework due to the difficulty of ranking the impacts to State authority
  - ❖ Originally proposed to be a written summary contained in an appendix
  - ❖ Stakeholder feedback encouraged moving this piece into a "Scorecard" format for ease of review/use
- **Ranking of this scorecard's metrics will significantly vary based on specifics surrounding, among other things, the individual State positions, the make-up of utilities the State regulates, and *on the nuances of an individual RTO's market governance and design***
  - ❖ This effort is not intended to assume specific details regarding market governance/market design and must reflect the potential range of outcomes that could result from different structures
- Thus, this scorecard includes a number of "ranges" to reflect this uncertainty and the diversity of potential outcomes and to reflect Lead Team feedback that has been received
- Additionally, these rankings are intended to capture ***practical implications*** of market formation, rather than to exclusively focus on legal implications/changes to authority

Special Considerations for Retention of State Authority Scorecards

- The Lead Team notes, in particular for the RTO market construct, that States may improve their RTO/ISO experience (helping achieve the higher end of these rankings) through:
  - ❖Careful State PUC consideration of conditions of approval of requests by jurisdictional utilities to join an ISO/RTO;
  - ❖Comprehensive review of the impacts of proposals to unbundle State PUC regulated rates; and
  - ❖Informed engagement by a State Commission in the planning, decisions and governance of an ISO/RTO (including participation in a “Regional State Committee”)

Ability of Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Ability for state to retain authority over resource adequacy	*Good –* *Excellent* • ***State commissions generally have jurisdiction over resource adequacy*** requirements of the utilities they regulate, often via an IRP process • Provides the ***state authority over resource adequacy of utilities under their jurisdiction which could be considered excellent*** • ***For utilities that operate across multiple states, there may be practical limitations on individual state authority*** over resource adequacy which may be, effectively, shared with other states • ***Potential for regional RA programs could impact state authority even under a bilateral market construct*** • Utilities that are not state regulated may have resource adequacy decisions made by their governing bodies (and not the State)	*Good –* *Excellent* • ***State commissions generally have jurisdiction over resource adequacy*** of the utilities they regulate, often via an IRP process • ***No changes to the authority of states over resource adequacy*** through implementation of a real-time energy markets • ***Real-time market resource sufficiency requirements*** may prevent real-time energy flows from being maximized, but ***do not impact state authority over resource adequacy*** • ***For utilities that operate across multiple states, there may be practical limitations on individual state authority*** over resource adequacy which may be, effectively, shared with other states • ***Regional RA programs may impact state authority***	*Good –* *Very Good* • ***State commissions generally have jurisdiction over resource adequacy*** requirements of the utilities they regulate, often via an IRP process • ***No significant changes are expected to the authority of states over resource adequacy*** in a day-ahead market • ***Practical limitations on multi-state utilities continue to exist*** • ***Impacts to state RA authority depend on market design, but day-ahead capacity and resource requirements*** to prevent "leaning" may have a ***marginal impact on*** state resource adequacy decisions though they are generally ***not expected to impact state authority***	*Poor –* *Good* • ***Greatly depends on market design***, whether capacity market exists, etc. • Some RTOs demonstrate that, ***with the right governance structure, a group of states can retain significant authority over resource adequacy*** in an RTO (e.g. SPP and MISO); but ***individual states must share that authority with other states*** that participate in the RTO and may have limited ability to influence resource adequacy decisions if they are in the minority • ***RTOs with weaker state roles*** have demonstrated that ***states can lose some control over resource adequacy*** (e.g. capacity markets)

Ability of Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Ability for state to retain authority over the resource mix of utilities it regulates	*Good –* *Excellent* • ***State commissions generally have jurisdiction over resource mix decisions*** through a number of mechanisms including an IRP process and an ability to ***approve/deny cost recovery for resource investments*** • ***States have significant authority over the resource mix*** of regulated utilities • ***For utilities that operate across multiple states, there may be practical limitations on individual state authority over the resource mix,*** as decisions by other states can impact the resource mix of the utility as a whole • Utilities that are not state regulated (e.g. publicly-owned power) may have resource mix decisions made by their governing bodies but may be subject to state resource mix requirements (e.g. RPS)	*Good –* *Excellent* • ***State commissions generally have jurisdiction over resource mix decisions*** through a number of mechanisms including an IRP process and an ability to ***approve/deny cost recovery for resource investments*** • ***No changes to the authority of states over the resource mix*** in real-time energy markets • ***For utilities that operate across multiple states, there may be practical limitations on individual state authority over the resource mix,*** as decisions by other states can impact the resource mix of the utility as a whole	*Good –* *Excellent* • ***State commissions generally have jurisdiction over resource mix decisions*** through a number of mechanisms including an IRP process and an ability to ***approve/deny cost recovery for resource investments*** • ***No significant changes are expected to the authority of states over the resource mix*** in a day-ahead market • ***Day-ahead requirements*** to prevent "leaning" may have a ***marginal impact on future resource decisions*** that may impact state decisions on resource mix, but are ***not expected to impact state authority*** • ***Market prices may have a greater impact on resource mix decisions*** than in real-time/bilateral	*Fair –* *Very Good* • ***State commissions generally have jurisdiction over resource mix decisions*** through a number of mechanisms including an IRP process and an ability to ***approve/deny cost recovery for resource investments*** • ***Market prices and market rules may have a greater impact on resource mix decisions*** than in real-time or bilateral markets • ***Legally, no change in state authority over resource mix decisions of utilities they regulate, but may be practical implications to individual state authority*** from market requirements that can impact future resource decisions and greater ties to other states and their resource decisions

Ability of Market Construct to <u>Retain State Regulatory Authority on Key Jurisdictional Elements</u>	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Ability for state to retain authority over transmission planning and prudence/cost recovery for transmission investments	*<u>Good –</u>* *<u>Very Good</u>* • ***Utilities must comply with FERC transmission planning*** requirements (e.g. Order 890 and 1000) and states have varying roles in those processes • ***Many states PUCs or other agencies have some form of transmission permitting/ CPCN authority*** • ***FERC has jurisdiction over unbundled costs of retail transmission*** in interstate commerce but most (though not all) ***states retain authority for bundled retail rates*** and ***what transmission costs are recovered in retail electric rates***	*<u>Good –</u>* *<u>Very Good</u>* • ***No changes are expected from a bilateral market*** • Utilities comply with FERC transmission planning requirements and states have varying roles • ***Many states PUCs or other agencies have some form of transmission permitting/ CPCN authority*** • As in a bilateral market, ***FERC has jurisdiction over unbundled costs of retail transmission*** in interstate commerce but most ***states retain authority for bundled retail rates including the transmission component***	*<u>Good –</u>* *<u>Very Good</u>* • ***No changes are expected from a bilateral market*** • A day-ahead market is ***<u>not</u> contemplated to include joint transmission planning***, so ***transmission planning and siting authority is expected to be the same*** as under a bilateral or real-time market • Most states, as in a bilateral or real-time market, ***will retain authority over bundled retail rates*** (and what transmission costs are recovered in retail electric rates)	*<u>Fair –</u>* *<u>Good</u>* • ***RTO is engaged in some local planning (at least); RTO performs regional transmission system planning and interregional coordination,*** potentially decreasing state involvement in transmission planning • ***Transmission permitting/CPCN authority unlikely to change providing at least "fair" authority for states*** • ***Transmission cost allocation rules*** for pricing transmission service occur at RTO-level, but ***state ability to influence those rules depend on market design*** • ***May see unbundling of transmission rates*** (though not a given) which would give FERC authority over transmission component of retail rates

Ability of Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Ability for state to retain authority over retail electric rates	*Good –* *Excellent* • State PUCs ***have authority over the determination of bundled retail electricity rates*** • Can choose to give up bundled rates (as Arizona did) but relatively unlikely in this market construct • ***May be practical limitation on an individual state's authority when the regulated utility operates over multiple states***	*Good –* *Very Good* • State PUCs ***retain authority over the determination of bundled retail electricity rates*** • ***Real-time market revenues and costs may make rate setting more complex*** for state regulatory agencies and, ***potentially, harder to challenge***, even though authority is unchanged from bilateral market • ***Practical limitation on an individual state's authority when the regulated utility operates over multiple states***	*Good –* *Very Good* • State PUCs ***retain authority over the determination of bundled retail electricity rates*** • ***Market revenues and costs,*** which now are a much more significant portion of total transactions***, may make rate setting more complex potentially, harder to challenge*** even though authority is unchanged from bilateral market • ***Practical limitations on multi-state utilities continue***	*Fair –* *Good* • State PUCs ***retain authority over the determination of bundled retail electricity rates*** • "Unbundling" of rates (resulting in FERC jurisdiction over transmission costs) possible but unrelated to market formation • ***Potentially more difficult for states to disallow or challenge certain costs*** (e.g. transmission, RA-related) if they are involved in decisions around these costs at the RTO level (or even if they are not)

Recall, this assessment assumes no changes to retail choice programs and traditional, vertically-integrated utility service provision for most of the West is generally assumed under all of these market structures.

Ability of Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements	**Bilateral Only**	**Real-Time Only**	**Day-Ahead**	**RTO**
Ability for states to be involved in the process of obtaining approval to participate in the market construct	*Fair* • Generally, no approval needed to participate in bilateral trading • States can ***review trading costs for prudence and can review and approve risk policies around market trading activities*** but are generally not involved in the process of approving participating in the market	*Good –* *Very Good* • Level of state involvement ***depends on the individual state*** • ***History*** of approval processes for real-time markets ***shows little state involvement*** with most approvals coming from FERC • PUC groups (such as the PUC EIM group) were involved in early EIM FERC filings • ***States, like other stakeholders, can intervene, comment, and protest in FERC approval processes*** • ***Some states have approved*** or otherwise been involved in real-time energy market decisions	*Good –* *Very Good* • Given that functional control will **not** be turned over in a day-ahead market, ***state PUC approval of this market construct is expected to be rather limited and similar to a real-time market though there is still significant uncertainty*** given that there isn't a clear market design model for this type of market • State PUCs may be able to ***exercise some authority in determining whether to allow implementation and ongoing costs*** in rate base and may develop conditions for such inclusion	*Excellent* • Regulated utilities seeking to ***turn over functional control*** of transmission facilities to an RTO generally ***need to obtain approval from state PUCs*** • ***State PUCs can (and frequently have) placed conditions on the ability of a regulated utility to join a market*** as part of that approval process • These ***conditions have been used to increase states' authority*** over various RTO elements (such as transmission planning and cost allocation)

Resulting DRAFT Scorecard to Retain State Regulatory Authority Over Key Jurisdictional Elements

Ability of Market Construct to Retain State Regulatory Authority on Key Jurisdictional Elements	Bilateral Only	Real-Time Only	Day-Ahead	RTO
Ability for state to retain authority over resource adequacy and resource mix	Good – Excellent	Good – Excellent	Good – Very Good	Poor – Good
Ability for state to retain authority over the resource mix of utilities it regulates	Good – Excellent	Good – Excellent	Good – Excellent	Fair – Very Good
Ability for state to retain authority over transmission planning and prudence/cost recovery for transmission investments	Good – Very Good	Good – Very Good	Good – Very Good	Fair – Good
Ability for state to retain authority over retail electric rates	Good – Excellent	Good – Very Good	Good – Very Good	Fair – Good
Ability for states to be involved in the process of obtaining approval to participate in the market construct	Fair	Good – Very Good	Good – Very Good	Excellent

Update on Technical Modeling Efforts and 2030 Studies

Energy Strategies

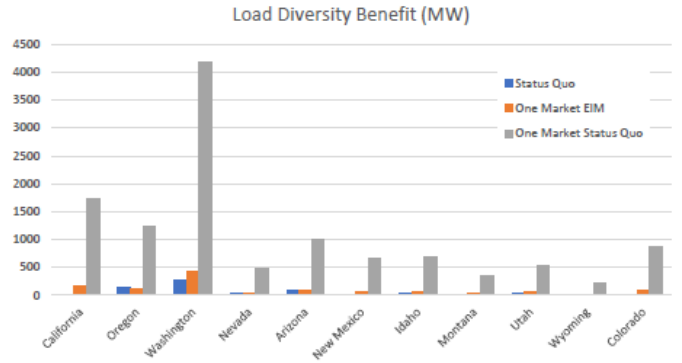
Revisiting Highlights from Q4 2020 Stakeholder Meeting

Key Observations from 2020 study

- Study estimates measurable gross benefits for most states under both market configurations
- RTO scenario has greater gross benefits than EIM scenario
  - Load diversity drives material portion of savings in RTO
  - Critical to recognize already-realized EIM benefits
- Normalizing savings by state load suggests benefits are consistent in order of magnitude (but not equal)
- Interstate trade of power significantly enhanced by market formation
  - Small (<1%) but still measurable impacts to emissions, mostly due to running more efficient generators
  - Minor impact to renewable energy curtailment
  - No changes to transmission congestion on major transmission paths

Annual Capacity Saving ($M/year) for Market Footprint

Market Scenario	Market Footprints	
	Status Quo	One Market
Real-Time Only	$0 - $25.2M	$0 - $47.8
RTO	N/A	$478.0



2020 Study Results: Western States Overview

2020 Scenario	Western States' Combined APC Savings		Increase in Inter-state Trade		CO_2 Emission Reduction	
	$M	%	$M	%	Short Tons (000s)	%
Benefit of West-wide expansion of real-time only (EIM) market	$105	1%	$238	8%	149	0.1%
Benefit of new West-wide RTO	$811	8%	$1,813	60%	1,543	0.7%

- Changes above are annual values calculated relative to 2020 Status Quo system that represents **current** levels of real-time market participation ($2018)
- Regional trade represents the dollar **sum of total imports and exports** for all Western states (aggregation of balancing areas)
- No material changes to **system curtailments** because Status Quo case had low curtailments

One Market EIM (Real-Time Only) Benefits

Results indicate a combined savings ranging $105M - $127M as the result of Western system consolidation into EIM-only market

- Shifting dispatch causes minor cost increases for Oregon, Nevada, and Montana, rest of states experience savings

State	Gross Benefits ($M)			Total Annual Benefits ($M)	
	Capacity Savings		APC Savings		
	Low Range	High Range	Base	Low Range	High Range
California	$0.00	$6.77	$18.14	$18.14	$24.91
Oregon	$0.00	-$0.53	-$0.87	-$0.87	-$1.40
Washington	$0.00	$6.04	$22.11	$22.11	$28.15
Nevada	$0.00	$0.48	-$3.39	-$3.39	-$2.91
Arizona	$0.00	$0.73	$41.71	$41.71	$42.44
New Mexico	$0.00	$2.62	$8.58	$8.58	$11.20
Idaho	$0.00	$0.80	$7.58	$7.58	$8.38
Montana	$0.00	$1.33	-$2.68	-$2.68	-$1.35
Utah	$0.00	$0.55	-$4.11	-$4.11	-$3.56
Wyoming	$0.00	$0.37	$4.35	$4.35	$4.72
Colorado	$0.00	$3.46	$13.44	$13.44	$16.90
Total	$0.00	$22.62	$104.87	**$104.87**	**$127.49**

One Market RTO Benefits

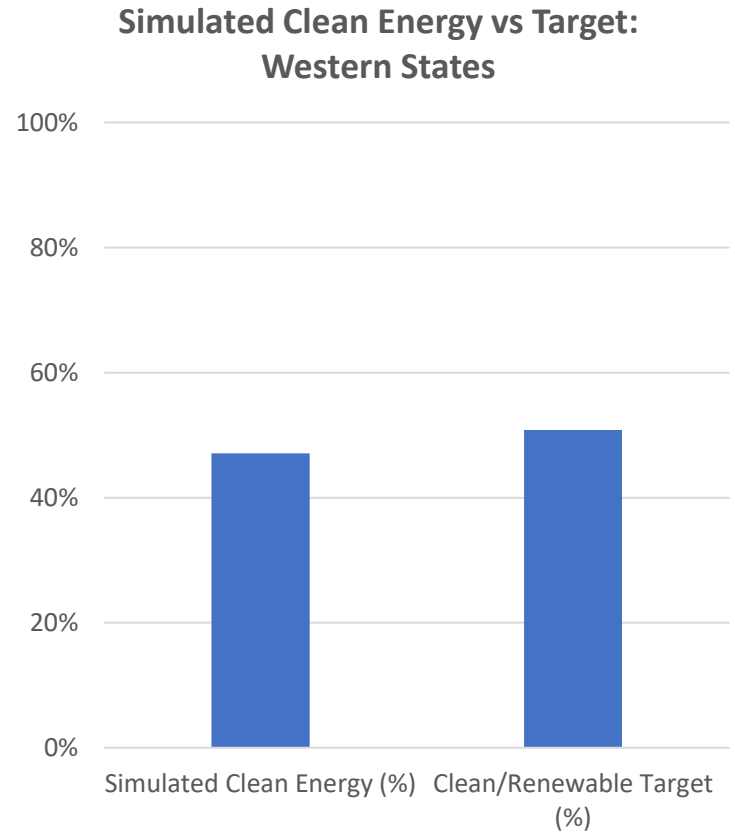
Results indicate $1.3B in annual combined benefits as the result of Western RTO in 2020

- Approximately $453M in benefits achieved from capacity savings, and $811M from increased operational efficiency (reduced APC)
- Normalization of benefits relative to state's annual energy consumption illustrates relative benefits of RTO market expansion for each state

State	Gross Benefits ($M)		Total Annual Benefits ($M)
	Capacity Savings	APC Savings	
California	$69	$234	$303
Oregon	$44	$62	$106
Washington	$157	$168	$324
Nevada	$18	$5	$23
Arizona	$37	$172	$209
New Mexico	$26	$26	$52
Idaho	$26	$27	$53
Montana	$14	$8	$21
Utah	$20	$29	$48
Wyoming	$8	$21	$29
Colorado	$35	$60	$95
Total	$453	$811	$1,264

Update on 2030 Studies

- The 2030 case has clean energy penetration reasonably consistent with enacted policy and voluntary goals
  - The Lead Team reviewed a state-by-state summary of the resource portfolio and assumptions in November 2020
- Currently troubleshooting study cases and validating results of preliminary runs
- Have compiled estimates of ongoing market costs costs
  - Used only to put quantified benefits into context
  - Decided to focus on ongoing costs vs. implementation costs



Ongoing Market Costs

- Purpose: Add context to gross market benefits results by comparing them to potential market implementation costs
  - ***The combination of the two data points do not result in a "net" benefits assessment as the gross benefits analysis does not capture all quantifiable benefits and the implementation costs do not reflect all categories of potential costs***
- Notes on methodology:
  - Captures only the incremental costs of the marketing being formed/assumed in the study, ensuring consistency with the incremental benefits approach
  - Range of costs captures uncertainty surrounding potential providers
  - High end cost range presented here expected to be higher than actual costs of most market configurations, as the high-end costs data sources do not incorporate additional economies of scale that would be expected with a larger market footprint
  - Per-unit market costs are consistent among footprints, which is inline with the study's principle of not evaluating specific market providers
  - Costs are focused on ongoing expenses to simplify comparisons with ongoing benefits and because of discrepancies in the types of implementation costs included in source data
  - All costs are presented in 2018$ (consistent with benefit results)

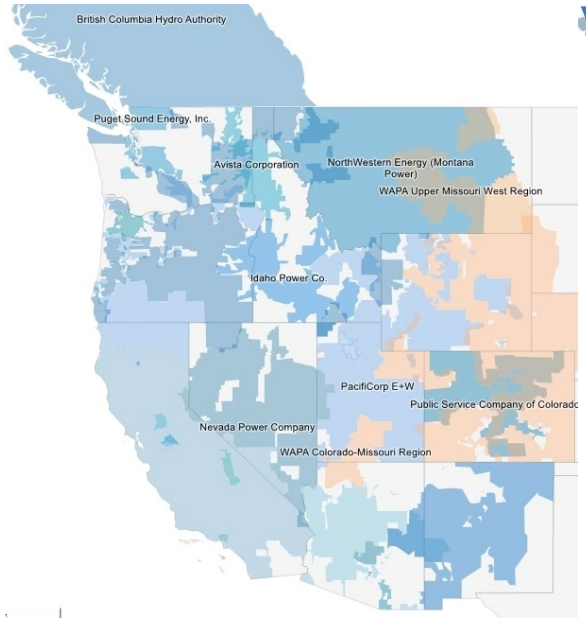
Ongoing Cost Assumptions - $/MWh of Load

Market Type	Low Cost Estimate ($/MWh)	High Cost Estimate ($/MWh)
Real-time Market (EIM)	$0.01	$0.21
Day-Ahead Market	$0.15	$0.45
RTO	$0.33	$0.90

- Low-end real-time/EIM market costs are consistent with Western EIM (per MWh of load) while high costs are consistent with SPP WEIS costs for the currently committed footprint
- Day-ahead market cost range is based on potential CAISO EDAM and assumed levels of transactions that occur
  - *Least certainty/experience with what these costs might look like*
- Low-end RTO costs are based on SPP proposal for MWTG while high-end costs are CAISO's historic administrative costs from FERC metrics report
  - *The high end cost estimates are expected to be higher than actual costs of most market configurations, as the historic costs in the FERC report inherently do not reflect any economies of scale that might be gained from a larger footprint with more MWh to spread costs over*
- Costs are applied to loads in each market footprint that require incremental/new ongoing market services

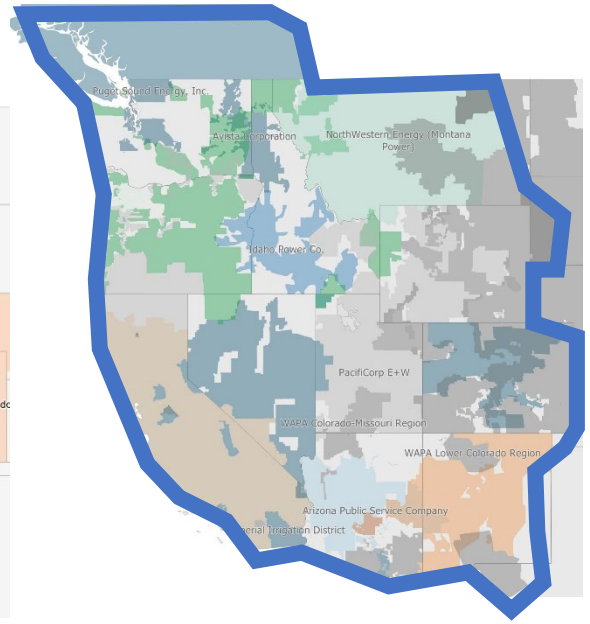
Ongoing Market Costs: 2020 Study Year

Status Quo



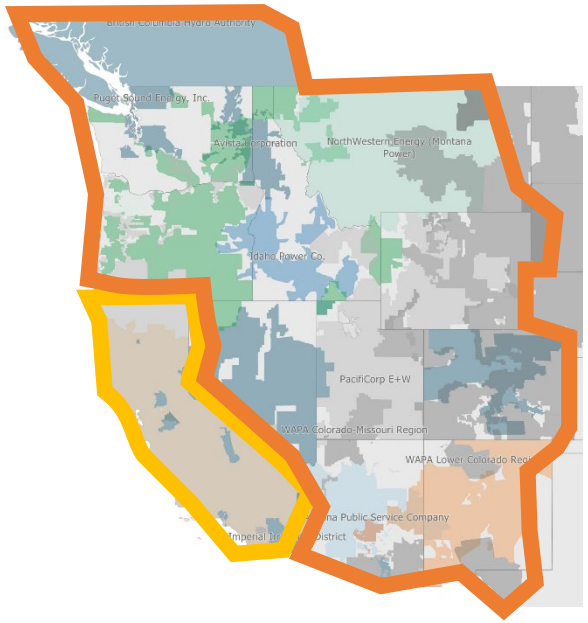
EIM: No incremental cost

One Market



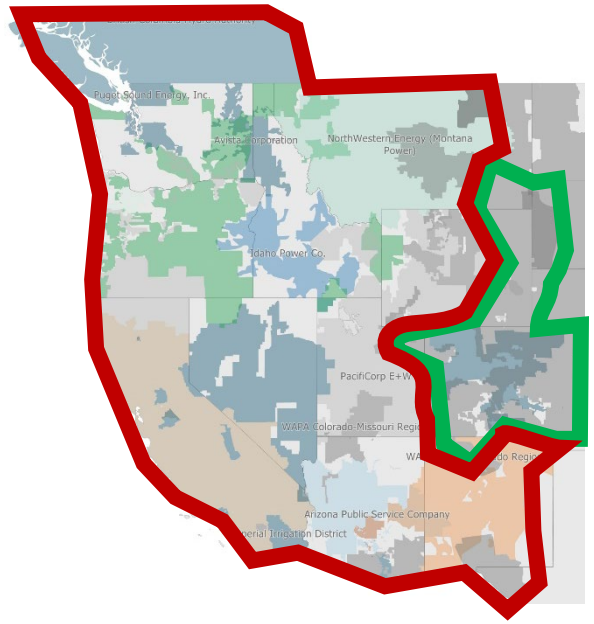
EIM: $8-52 million/year
RTO: $166-456 million/year

Two Market A



Not Studied

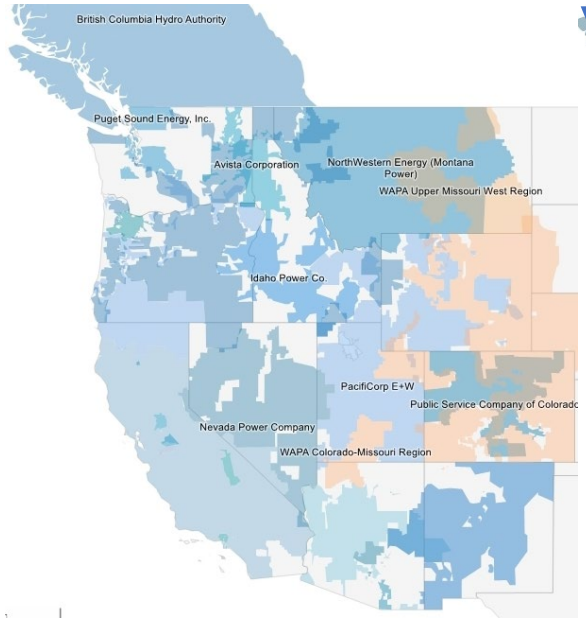
Two Market B



Not Studied

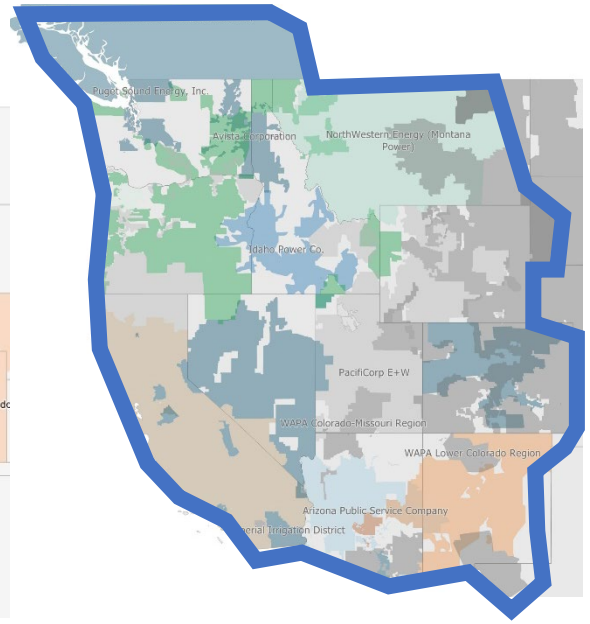
Ongoing Market Costs: 2030 Study Year

Status Quo



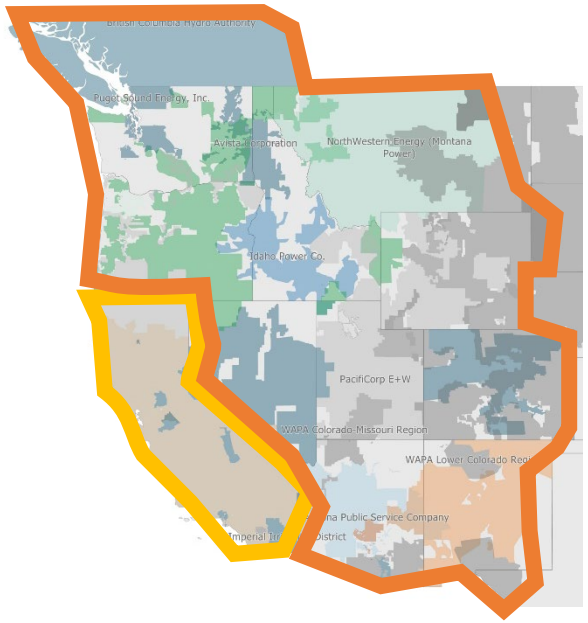
EIM: No incremental cost
Day-ahead: $77-226 million/year

One Market



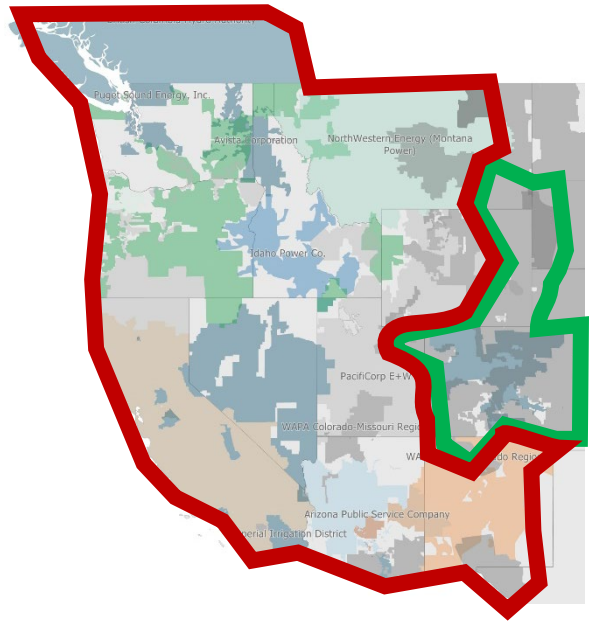
Day-ahead: $85-254 million/year
RTO: $187-513 million/year

Two Market A



Day-ahead: $85-254 million/year
RTO: $187-513 million/year

Two Market B



Day-ahead: $85-254 million/year
RTO: $187-513 million/year

Next Steps

Energy Strategies

Request for Written Stakeholder Comments & Next Meetings

- **We invite the opportunity for stakeholders to provide written comments on the items discussed today**
- **Process for submitting comments:**
  - ❖Written comments can be submitted to kfraser@energystrat.com through March 17th
  - ❖Note that we will review comments, but will not respond specifically to each comment received
- **Upcoming meetings**
  - ❖ Anticipate Q2 2021 Stakeholder Meeting in May 2021

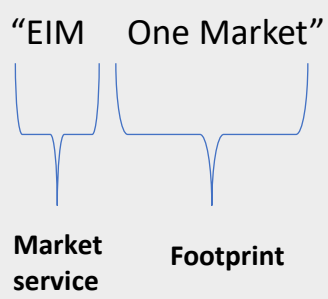
Appendix

Core Questions

- **<u>Foundational:</u> The only market that we are "assuming" into the Status Quo future is planned expansion of the Western EIM footprint (announced entities). These 2020 and 2030 Status Quo cases will be our primary point of comparison for the other Core Studies.**

1. **In the <u>near-term</u>, what are the relative benefits of expanding EIM markets through either one West-wide footprint versus a two-market footprint system?**
   - ❖ 2020: EIM Status Quo vs. EIM One Market
   - ❖ 2020: EIM Status Quo vs. EIM Two Market B
2. **What is the 2020-2030 trajectory of benefits, if any, for a One Market RTO?**
   - ❖ 2020 RTO One Market vs. 2030 RTO One Market
3. **In the <u>long-term</u>, if the footprint of the Status Quo EIM does not grow, what incremental benefits are provided by adding services to include Day-ahead?**
   - ❖ 2030: EIM Status Quo vs. Day-ahead Status Quo
4. **In the <u>long-term</u>, what are the relative benefits of expanding the Status Quo EIM to a larger West-wide footprint while also expanding market services to either day-ahead or Full RTO?**
   - ❖ 2030: EIM Status Quo vs. Day-ahead One Market
   - ❖ 2030: EIM Status Quo vs. RTO One Market

How to read this terminology:



Core Questions (continued)

5. **In the long-term, assuming a day-ahead market forms (but not an RTO), how do the benefits of Two Market footprints compare against the One Market footprint?**
   - ❖ 2030: Day Ahead One Market vs. Day Ahead Two Market B
6. **In the long-term, how do the benefits of Day-Ahead services compare with an RTO in a One Market footprint?**
   - ❖ 2030: Day Ahead One Market vs. RTO One Market
7. **In the long-term, how are the benefits of an RTO impacted by market footprints?**
   - ❖ 2030: RTO One Market vs. RTO Two Market A
   - ❖ 2030: RTO One Market vs. RTO Two Market B

Sensitivities

1. **In the long-term, how do benefits change if more transmission is built?**
   - ❖ 2030: EIM Status Quo vs. EIM Status Quo w/ Transmission
   - ❖ 2030: RTO One Market vs. RTO One Market w/ Transmission
   - ❖ 2030: RTO Two Market B vs. RTO Two Market B w/ Transmission
2. **In the long-term, how sensitive are RTO scenarios to a Federal or West-wide carbon pricing regime?**
   1. 2030: RTO One Market vs. RTO One Market w/ Carbon Price
   2. 2030: RTO Two Market A vs. RTO Two Market A w/ Carbon Price
   3. 2030: RTO Two Market B vs. RTO Two Market B w/ Carbon Price