implement those policies will be made during the post-ROD policy process, the Rate Case, and Terms and Conditions tariff process.

**32. Does joining the EIM change BPA's relationship with its preference customers?**

No, if BPA joins the EIM this would not change the statutory protections and relationship our preference customers are entitled to.

## TARIFF

**33. BPA undertook a huge effort in 2018 to be able to update its Open Access Transmission Tariff. What changes to the tariff need to take place during the TC-22 case to enable participation in an EIM?**

When a balancing authority joins the EIM, it must adopt applicable tariff language. BPA will adopt these necessary changes through the TC-22 proceeding after exploring options with customers and stakeholders in the pre-terms and conditions workshops. Beyond participation in the EIM, many commercial changes are fundamental to the grid modernization effort and will be reflected in our tariff and business practices. .

## IMPLEMENTATION

**34. How will the EIM impact BPA staffing levels?**

BPA does not currently plan to change its overall staffing levels. There may be some areas of BPA that see an increase in staffing, but it will be offset by reductions elsewhere.

**35. What work do BPA and its customers need to do between signing the EIM implementation agreement and the proposed go-live date of March 1, 2022?**

The needed work to be completed by customers will be identified in the next phase of the EIM process if BPA signs the EIM implementation agreement. If BPA signs the agreement this summer, BPA would begin work on the EIM projects identified on the Grid Modernization Roadmap and begin developing a detailed project management plan with the CAISO to identify the milestones and dates for each of the deliverables in order to go live on March 1, 2022.

**36. How will BPA get all this work done?**

In order to accommodate the additional work and complexity of BPA's business, BPA added an extra year to the typical implementation timeline to join the EIM. BPA may also have to prioritize its workload, which may mean reducing or stopping certain work in order to accomplish EIM work.

**37. What are the next steps?**

Next steps include Policy Implementation decisions phase which will roll into the pre-rate case workshops and pre-terms and conditions workshops in preparation for the necessary BP-22 Rate Case and TC-22 Tariff Case. This work would start immediately if BPA signs the EIM implementation agreement.

DRAFT 09/20/2019

FOR INTERNAL USE ONLY

# BPA talking points

## BPA signs implementation agreement to join energy imbalance market

*September 2019*

**What this is**

BPA signed an EIM implementation agreement on Sept. 26, 2019, with the California Independent System Operator to join the Western Energy Imbalance Market. With the implementation agreement in place, BPA will begin work on EIM-specific projects identified in the grid modernization roadmap as well as begin developing a detailed project plan with the CAISO to ensure the necessary systems, processes and training are in place prior to a proposed "go-live" date of March 1, 2022. The agreement also allows BPA to start participating in both EIM entity meetings and other market development opportunities.

Along with the implementation agreement, BPA issued a record of decision addressing customer and constituent comments on the letter to the region released in June. The final decision on whether to join the EIM will follow a close-out letter to the region and a public comment period in the fall of 2021.

**Key messages and storyline**

- Participating in the EIM is one goal outlined in BPA's strategic plan to optimize the value of the federal and power transmission systems through modernizing assets and system operations.

- BPA appreciates the collaborative effort and broad participation our customers and constituents in the development of the record of decision on the EIM and implementation agreement. BPA remains committed to continued transparency throughout the process on deciding whether or not to join the EIM ahead of a proposed go-live date in 2022.

- BPA recognizes that an EIM is just one opportunity to increase the value of the carbon-free flexibility of the federal hydropower system while helping to integrate more wind and solar generation. Joining the EIM will enable BPA to participate in the development of new products and markets that could provide more benefits for BPA's flexible, carbon-free power.

**Background**

The Western EIM is a voluntary market operated by the CAISO that dispatches generation in the most economic way every 5 minutes, balancing supply and demand across a large

geographic footprint. EIM participation will provide BPA with increased visibility in the dispatch and marketing of federal power and transmission assets. The market is security-constrained, meaning that the transmission and reliability constraints of the electric grid are honored. Further, the increased visibility of conditions across the grid that the EIM provides is expected to enhance reliability. BPA would preserve its autonomy and retain authority over generation and transmission operations.

New tools and capabilities associated with joining the EIM will help to more fully realize the value of the flexible, carbon-free hydro attributes of the Federal Columbia River Power System across an expanding EIM footprint. BPA can exit the market at any time for any reason, such as if market rules change and result in a negative impact to BPA.

In July 2018, BPA began actively exploring becoming a member of the EIM as part of its broader strategic plan to strengthen financial health and maintain a competitive edge in the utility landscape. BPA launched a stakeholder engagement process at that time to determine how and under what conditions BPA would join the EIM.

BPA issued a letter to the region in June 2019 which included a business case for signing an implementation agreement with CAISO as well as several policy decisions for how BPA would structure its EIM implementation. BPA collected feedback through a public comment period on the letter to develop the record of decision.

More information on the EIM as a market and its business value can be found here.

***For more information, contact:*** Steve Kerns, 503-230-7542

**RECORD OF DECISION QUESTIONS AND ANSWERS**

1. **Has BPA changed any proposed decisions in the letter to the region in the ROD?**

   BPA has not made any changes to its policy decisions. BPA adjusted its EIM principles in response to comments received, as described below. BPA also offered clarifications on various topics.

2. **What are the seven policy decisions in the ROD?**

   BPA asked for comments on seven policy proposals in the letter to the region. The ROD outlines BPA's decisions on those policy proposals. These policy decisions are foundational to the post-ROD policy decisions that will need to be made ahead of and in the BP and TC processes. BPA may reconsider these decisions if structural or operational changes are significant and it warrants a second review. Below is a short summary of each policy decision but additional information is available in section 3.5 of the ROD.

   A. *Federal generation participation model*
      BPA plans to participate in the EIM with the split into three resource zones that participate as aggregated participating resources. The three zones include the Upper Columbia dams (Grand Coulee and Chief Joseph), Lower Columbia dams (McNary, John Day, The Dalles, and Bonneville), and Lower Snake dams (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor). The amount of generation produced by these resources that is not bid into the EIM, as well as all other federal resources in the

balancing area, will be treated as an aggregated non-participating resource for purposes of the EIM.

B. *Transmission usage – interchange*
BPA is proposing to adopt the interchange rights holder methodology to make transmission available for EIM transfers. Under this methodology, a transmission customer may donate some or all of its point-to-point transmission to the EIM. The customer continues to pay for the transmission but could be eligible to collect any congestion revenue generated. BPA believes this methodology will balance the need to provide transmission to the EIM with collecting enough revenue to adequately and fairly recover the costs of the Federal Columbia River Transmission System.

C. *System operations tools*
BPA evaluated whether or not it would need its operational controls for balancing reserves and oversupply management protocol under the EIM. BPA determined both OCBR and OMP would still be needed to ensure BPA's system reliability and environmental responsibilities are met and that they can work within the EIM.

D. *Carbon obligations and related matters*
BPA is currently not allowed to purchase carbon allowances needed to participate in California's portion of the EIM unless it goes through a third party. BPA has decided to opt out of selling directly into California via the EIM unless Congress provides authorization for BPA to directly purchase allowances under California and other state carbon programs. At this time, BPA does not believe this issue precludes its participation in the EIM. BPA also acknowledges that there are improvements in how greenhouse gas accounting is implemented and intends to stay engaged in future stakeholder processes that will remedy the shortcomings.

E. *Local market power mitigation/default energy bids*
BPA was concerned with how hydropower was valued in local market power mitigation and pricing set in default energy bids. BPA believes its concerns have been satisfied under LMPM enhancements CAISO filed with FERC. If the filing is rejected, BPA will reassess its options.

F. *Load aggregation*
BPA plans to have one load aggregation point. The single point will be easier to implement than multiple points for both operations and settlements and this approach will likely reduce startup costs. BPA is open to more points in the future after it has more experience participating in the EIM.

G. *Resource sufficiency – BAA level*
BPA evaluated whether or not the CAISO's resource sufficiency standards would be prohibitive to joining the market. BPA has determined they are not. There will be additional policy decisions on how resource sufficiency is implemented in the post-ROD policy phase.

**3. Should BPA consider the business case in the ROD final?**

BPA is considering the business case final at this time. Some comments asked BPA not to consider the business case final until the close-out process where BPA would officially decide to join the EIM and go-live. BPA believes that without any unforeseen market changes or other external factors that the business case is sound. If major changes were to occur, it would re-evaluate the cost-benefit analysis.

**4. Why does BPA have the legal authority to join the EIM?**

BPA determined it has the legal authority to join the EIM and that a decision to join the EIM is consistent with its statutory obligations and legal requirements.

The legal assessment was done based on BPA's current understanding of the EIM. If there are significant structural or organizational changes to the EIM after this decision, BPA will evaluate those changes as it moves through the implementation stage towards participation to ensure continued consistency with its legal obligations.

**5. Why did BPA update its EIM participation principles? What has changed?**

Comments suggested that BPA should refine its EIM participation principles. The EIM participation principles will be used throughout the process of joining the EIM, including a final determination for each principle set forth in the close-out letter in 2021. The final set now include six principles, up from four. The principles are:

1. BPA's participation is consistent with its statutory, regulatory and contractual obligations.
2. BPA will maintain reliable delivery of power and transmission to its customers.
3. BPA's participation is discretionary and BPA retains its ability to effectively exit the market in the event participation is no longer consistent with these principles.
4. BPA's participation is consistent with a sound business rationale.
5. BPA's participation is consistent with the objectives of the 2018-2023 Strategic Plan.
6. BPA's evaluation of EIM participation includes transparent consideration of the commercial and operational impacts on its products and services.

6. **Should BPA's interest in the CAISO's day-ahead market enhancements be an important consideration?**

   The proposed enhancements to CAISO's day-ahead market are important elements of a well-functioning market. BPA will continue to strongly advocate in the CAISO's stakeholder process for development of a day-ahead flexible ramping product. BPA will also continue to look for viable opportunities for the development of other market products that more clearly identify the needs and compensation for longer-term energy, capacity and flexibility.

7. **Why are Slice customers invested in BPA's EIM decision?**

   Slice customers have been particularly engaged in BPA's EIM processes because, unlike Block and Load Following customers who should see any secondary revenue benefits directly in their power rates if BPA decides to quantify the secondary revenue benefit in rates, there is no guarantee that Slice customers will benefit from BPA's participation in the EIM. Slice customers also take on the obligation to schedule generation for their loads and sales and are therefore subject to gen inputs and ancillary service charges. Furthermore, some Slice customers have resources that may be candidates for EIM participation.

8. **Are Slice customers supportive of BPA's decision to join the EIM?**

   Slice customers are supportive of BPA's decision to sign the EIM implementation agreement, but have not fully endorsed a final decision to join the EIM. Slice customers have a number of questions and concerns that will not be addressed until BPA completes the Phase III and BP-22 and TC-22 processes

9. **What are some of Slice customers' outstanding issues?**

   Slice customers are concerned about resource sufficiency. Under the Slice product, Slice customers, not BPA, are responsible for meeting their retail load obligations. While Slice customers are not held to a resource sufficiency test, they are expected to go into each hour load and resource balanced. Variation in actual loads after the tagging deadline, is managed through imbalance contracts with BPA Transmission. As BPA enters into the EIM, there are questions about whether BPA will sub-allocate its resource sufficiency obligation and what that will mean for Slice customers from both a process and settlements perspective.

   Another main area of interest is how the misalignment between the Slice customers' contractual tagging deadline of T-30 and EIM deadlines at T-75, T-55 and T-40 will be resolved or will translate into settlements.

   Slice customers are also keenly interested in understanding what new systems, processes and requirements BPA will place on customers as a result of its decision to join.

10. **What are the five phases to EIM participation adopted in the ROD and where is BPA today?**

    A five phase approach to EIM participation was proposed in the letter to the region and adopted in the ROD. Phase I was exploration which concluded in June 2019. This included the monthly stakeholder meetings and gathering informal feedback from stakeholders on details and nuances BPA faced if it joined the ROD. Phase II concludes with the signing of the ROD and implementation agreement in September and included crafting EIM principles and making some policy decisions.

BPA is now heading into Phase III which are the additional policy decisions that need to be made about how BPA plans to implement the EIM in its operations, tariff and rates. Examples of policy topics to be discussed are included in section 5 of the ROD. BPA plans to kick off this process in conjunction with the rates and tariff processes in the fall of 2019 with final decisions made by August 2020.

Phase IV is the rate and tariff proceedings which will include details of how BPA's EIM participation may impact rate or tariff changes. This process is expected to conclude with final rates in July 2021. And finally in Phase V, starting in October 2021, BPA would issue its final close-out letter about whether or not it should officially join the EIM in 2022. Additional details about this phased approach is in Section 2 of the ROD.

**11. Will BPA consider participating in an extended day-ahead market? Will there be a public process like EIM?**

Most stakeholders supported BPA's participation in the development of a possible EDAM proposal from the CAISO. However, an EDAM proposal is in the early phases of policy development and little is known about the market design or the intended implementation process at this time. If BPA were to consider whether and how to join EDAM, BPA would likely undertake a separate stakeholder process which could include a record of decision.

## IMPLEMENTATION AGREEMENT QUESTIONS AND ANSWERS

**12. What is an EIM implementation agreement?**

Each participating entity must sign an implementation agreement that outlines the terms of our partnership to prepare for BPA's participation in the EIM. The agreement also outlines scheduled milestones and associated payments to the CAISO for costs of related system changes, software licenses and other configuration activities.

**13. Where is the agreement published?**

The agreement may be accessed on the external BPA webpage titled Energy Imbalance Market at www.bpa.gov/goto/EIM.

**14. What are the costs associated with the implementation agreement and why does BPA need to pay them?**

Signing the implementation agreement initiates a particular set of technical work by the CAISO and BPA to prepare for BPA's potential participation in the EIM. It commits BPA to pay the CAISO six equal payments of $311,650, due upon the completion of each of the six milestones, for a total payment of $1,870,000.

**15. Does the implementation agreement include anything unique to BPA?**

BPA worked with the CAISO to establish a set of provisions that are specific to BPA. The provisions described in section 4.2 of the ROD are applicable to BPA's potential participation in the EIM will be memorialized in subsequent participation agreements, such as the EIM entity agreement. These provisions are to ensure that BPA can still meet its statutory, regulatory and contractual requirements in the market and that BPA will retain its authority over the power and transmission systems while realizing as much value as possible from market participation.

The provisions look to guarantee that BPA will have access to models or automation support from the CAISO during its implementation such as access to resource aggregation models for how it plans to bid in federal generation or in ways to automate certain processes.

The final provisions outline several market changes that the CAISO is considering to pursue, for example changing the base schedule submission timeline and improving the flexible ramping sufficiency test. While BPA believes these are important market enhancements, BPA's participation is not expressly contingent upon these enhancements.

**16. What will BPA do now that the implementation agreement is signed?**

BPA will launch its phase III policy decision-making process in the fall of 2019. This process will engage customers on a variety of outstanding policy decisions that must be made in order to move ahead with implementation. BPA plans to have a meeting on the scope and timing of the rates, tariff and EIM policy decisions on Oct. 23. More details on the meeting and its content will come in early October.

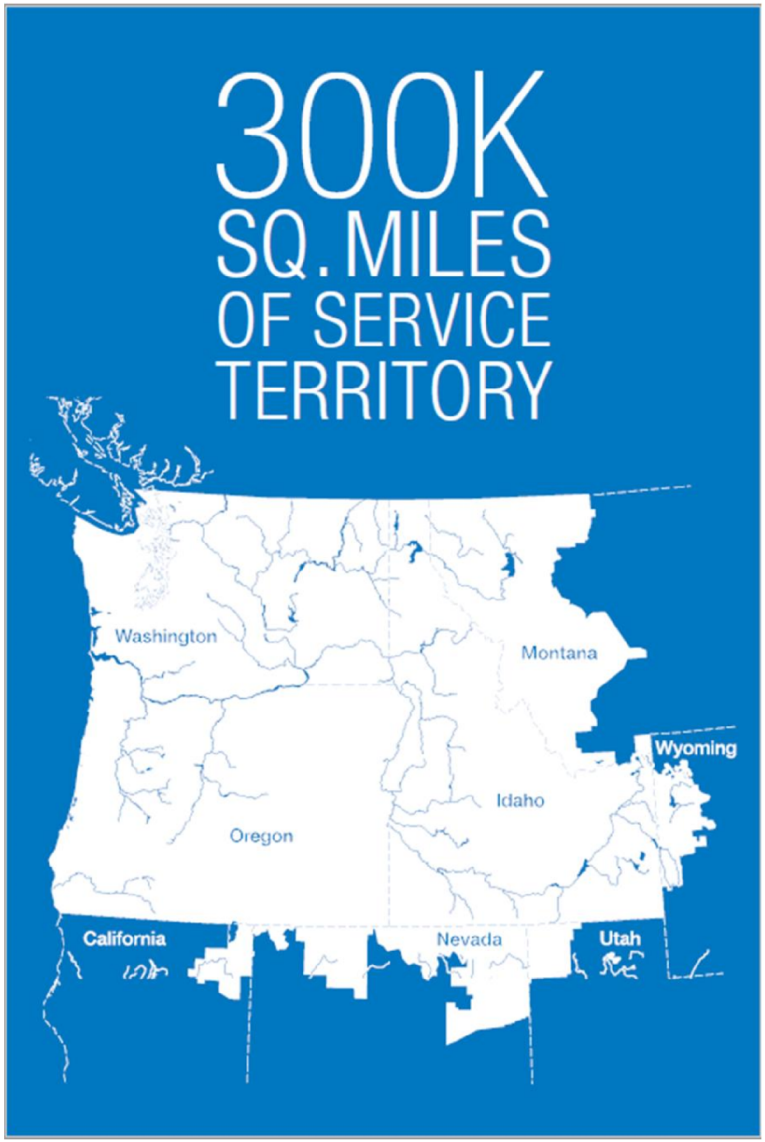
At the same time, BPA will start work on EIM implementation projects internally such as the projects outlined on the grid modernization roadmap as well as working through how current processes and tools may need to change in order to participate in the EIM. These two work streams will work in tandem as many policy decisions will drive implementation choices and many implementation discussions could uncover additional policy questions. More information on these work streams will be coming in October for both internal and external audiences.



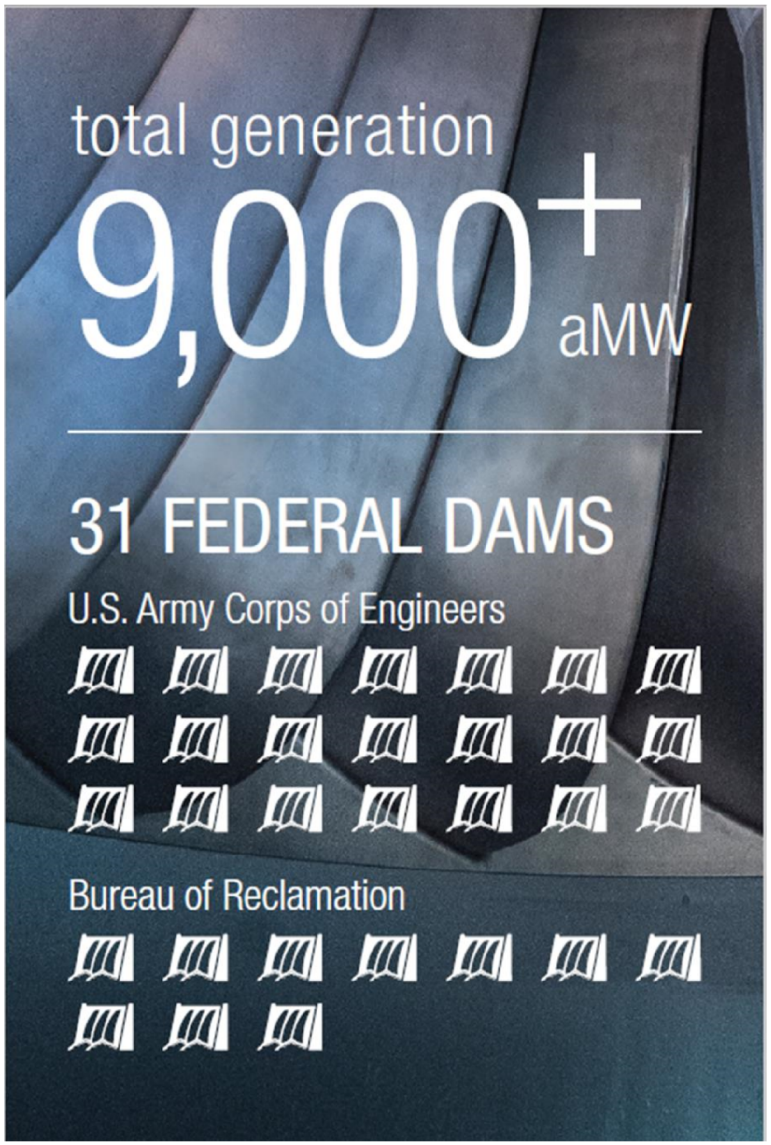

# CEATI EIM WORKING GROUP

Sarah Burczak, Bonneville Power Administration

March 2, 2020




- BPA is a nonprofit and self-funded federal power marketing administration and part of the Department of Energy.
- BPA seeks to deliver power at the best value while mitigating the impacts on the environment. BPA prioritizes adequate, efficient and reliable power and is committed to cost-based rates.
- 143 preference power customers and 546 transmission customers.
- BPA operates and maintains about three-fourths of the high-voltage transmission in its service territory, which includes Idaho, Oregon, Washington, western Montana and small parts of eastern Montana, California, Nevada, Utah and Wyoming.




- BPA provides about 28 percent of the electric power in the Northwest.
- BPA's fuel mix:
  - 86% hydropower
  - 11% nuclear
  - 3% other
- Bureau of Reclamation and U.S. Army Corps of Engineers own and operate the hydroelectric projects. BPA markets the power generated.

# BUSINESS RATIONALE

- A well designed electricity market is built on a foundation of resource adequacy and has features that:
  - Provide for intra-hour energy balancing.
  - Compensate explicitly for capacity resources that provide system reliability and flexibility.
- BPA views the Western EIM as one piece of a well-designed market.
  - Additional market functions are required to fully compensate BPA for the capacity value of the flexible and carbon-free federal power system.



BONNEVILLE POWER ADMINISTRATION

# Five Phases to Western EIM Decision




**Exploration** July 2018–June 2019

**Implementation agreement** June–Sept. 2019

**Policy decisions** Oct. 2019–Aug. 2020

**BP-22 & TC-22** Nov. 2020–July 2021

**Close-out** Late 2021

# EVALUATION PRINCIPLES

- BPA is evaluating whether or not to move forward toward joining the Western EIM based on six principles:

1. Consistent with statutory, regulatory and contractual obligations.
2. Maintain reliability.
3. Voluntary participation.
4. Sound business rationale.
5. Consistent with the objectives of BPA's strategic plan
6. Transparency of commercial and operational impacts on products and services.

# EXPLORATION PROCESS

- Stakeholder process kicked off in July 2018.

# COST-BENEFIT ANALYSIS

- Contracted with E3 to conduct a benefit analysis
- Parameters:
  - 24-hour energy neutrality relative to historical actual generation to avoid river management issues
  - System feasible min/max limits
  - Net of regulation, EIM-dispatchable capacity limited to available INC/DEC spin
  - All other generation in BPA's balancing authority area is held constant in both the BAU case and EIM case
  - BPA estimated resource sufficiency requirements

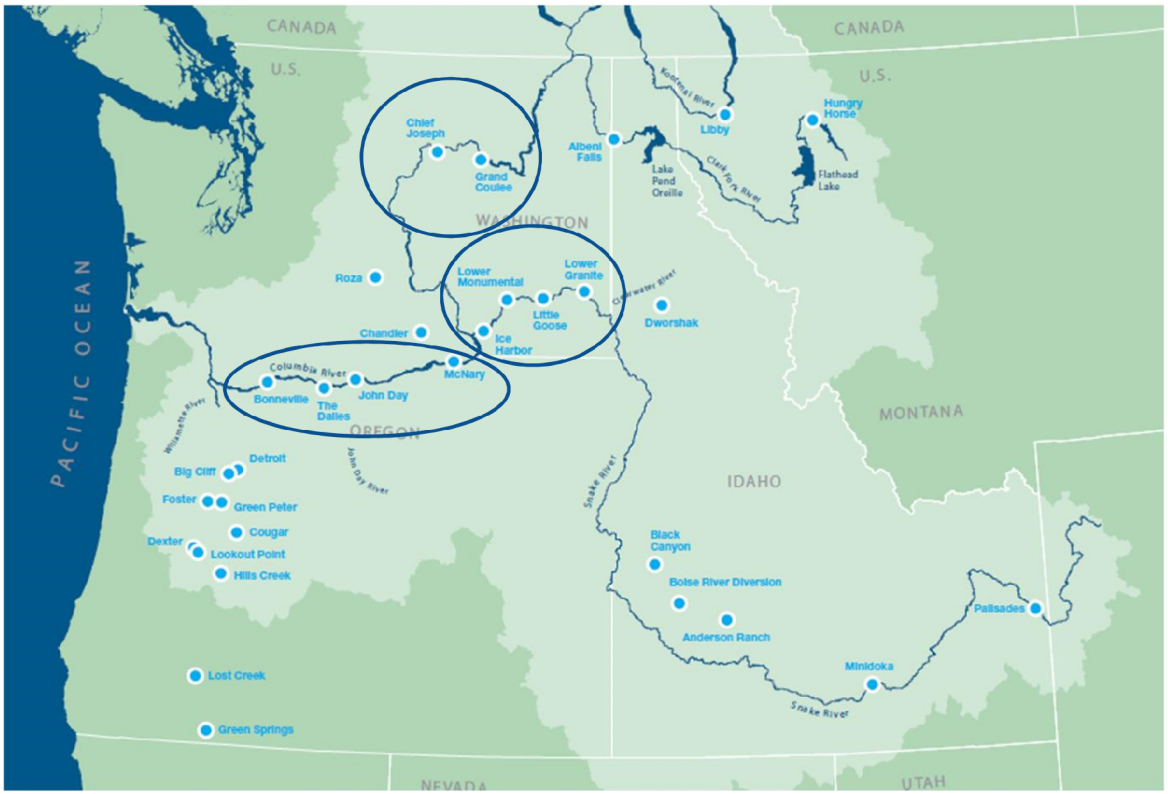
# COST-BENEFIT ANALYSIS RESULTS

- Startup costs: $29.7 million to $35.1 million
- Ongoing costs: $6.9 million a year
- Gross benefits: $36.1 million to $40.4 million a year
- **Net benefits: $29.2 million to $33.5 million a year**

# SEVEN POLICY DECISIONS FINALIZED

- Federal generation participation model
- Transmission usage – interchange
- System operations tools
- Carbon obligations and related matters
- Local market power mitigation/default energy bid
- Load aggregation
- Resource sufficiency – balancing authority area level

# PARTICIPATING RESOURCES




- BPA sells power based on its system mix, not by plant.
- BPA will bid into the EIM in three aggregated resources.
- Each of the aggregated resource groups will have a participating resource and a non-participating resource associated with them.

# EIM PHASE III POLICY

- EIM charge code allocation
- Resource sufficiency – sub-balancing authority area level
- Transmission usage for network
- EIM losses
- EIM tariff changes
- Requirements for participating and nonparticipating resources
- Metering and data requirements
- Evaluation of operational controls

# IMPLEMENTATION



- Utilicast brought on as EIM integrator
- Projects list
- CAISO project planning
- Cross-agency impact

# EIM TIMELINE

- [illegible] Grid Modernization Projects [illegible] EIM Decision Phases, CAISO EIM Milestones, EIM Projects [illegible] ram and EIM

| | FY 2019 | FY 2020 | FY 2021 | FY 2022 |
|---|---|---|---|---|
| EIM Decision Phases | Phase II: Implementation Agreement | Phase III: Policy Decisions | Phase IV: Rate and Tariff Proceedings | Phase V: Close-Out* |
| CAISO EIM Milestones | Implementation Agreement Effective Date | Detail Project Management Plan | Unit & Integration Testing; Market Simulation Testing | Parallel Operations Testing; EIM Go-Live: March 1, 2022 |
| EIM Projects | Projects - Identify | Projects – Define/Integrate | Projects – Deliver | Post go-live evaluation |

*Phase V will not start until the rates and tariff process concludes and a letter is drafted. Phase V must also be complete before the start of parallel operations.

# QUESTIONS

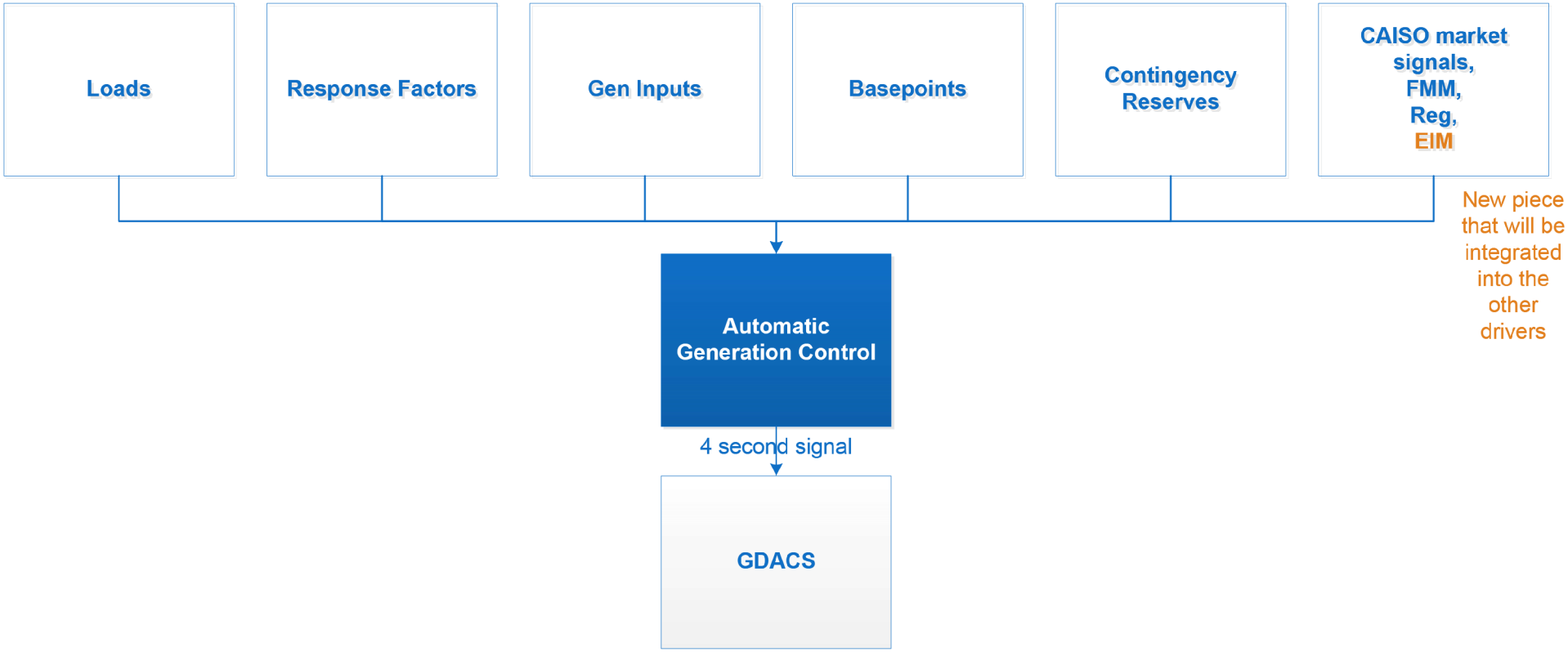
- What was the learning curve to be able to test and then participate in the market?
- Do you have any lessons learned on implementing new systems?
- For bid and base schedule development, how did you calculate in the wear and tear of units into the bid?
- How did you model constraints on the system – did you model in the Master File, use outage cards or adjust bid strategy?
- How did you incorporate long-term opportunity costs and price flexibility of fuel storage?

# FOR MORE INFORMATION

www.bpa.gov/goto/gridmodernization

www.bpa.gov/goto/EIM

# NEW AGC SLIDE? - appendix

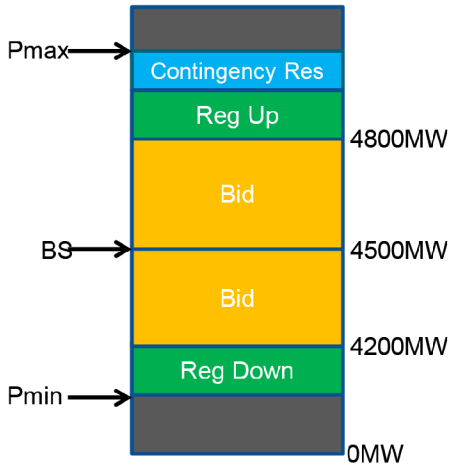


**APR**
**GCL + CHJ**

GDF*:
GCL 0.67
CHJ 0.33

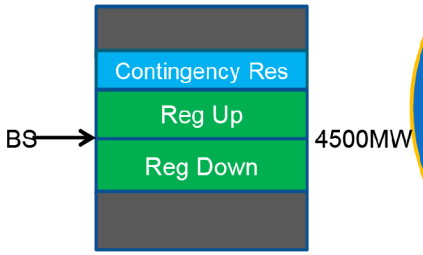
*GDF is calculated based on BP set by hydro scheduler. GDF here controls the distribution of MW for both BS and bid range.

| | BP (MW) | GDF |
|---|---|---|
| GCL | 3000 | 3000/4500 = 0.67 |
| CHJ | 1500 | 1500/4500 = 0.33 |
| SUM | 4500 | 1 |



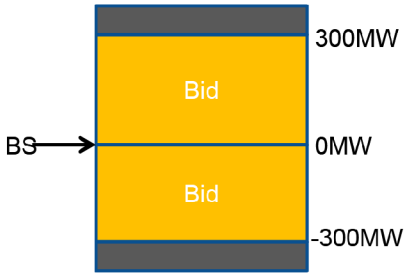

**ANPR**
**GCL + CHJ**

GDF**:
GCL 0.67
CHJ 0.33




**APR (NGR)**
**GCL + CHJ**

GDF***:
GCL 0.3
CHJ 0.7




**Controls the distribution of MW for BS (input to CAISO's EIM network model)

***Controls the distribution of MW for bid range




# EIM Stakeholder Meeting

**Dec 18, 2018**

**9am -12pm**

**Rates Hearing Room**

Version 1.0

# For our WebEx and phone participants:

- We have muted all calls on entry, if you have a question, you will need to unmute by using *6. Then please identify yourself by name and let us know who you represent.
- Please do not put this call on hold OR take other calls while you are dialed into this one.
- If we identify a noisy line, you may be disconnected from the meeting.

# Agenda

| | |
|---|---|
| 9:00-9:05 | • Welcome, Safety Moment, Introductions |
| 9:05 – 9:10 | • Topics for Today's Meeting<br>• Review of BPAs EIM Principles<br>• Review Timeline |
| 9:10 – 10:30 | • Settlements Discussion |
| 10:30 – 10:40 | • Break |
| 10:40 – 11:30 | • Continue Settlements Discussion<br>• Non-Federal Generation Participation |
| 11:30 – Noon | • Next Steps<br>• Question and Answer Session |

# Topics For Today's Meeting

- Review of EIM Stakeholder Topics Discussed to Date
- Timeline Review
- Issues that BPA presented at the July 24th EIM Stakeholder meeting that we will be discussing in more depth **today**:

1. **EIM Settlements**
2. Market Power
3. Treatment of Transmission
4. Generation Participation Model (FCRPS)
5. Governance
6. **Relationship of EIM to Other Emerging Markets**
7. **BA Resource Sufficiency**
8. **Carbon Obligation in EIM**

**Issue we will be discussing today.**

Issues discussed at previous EIM Stakeholder meetings.

**These issues will be discussed at future meetings.**

- Non-Federal Generation Participation
- Question and Answer Session

# Statement of BPA's Principles:

1. Participation is consistent with statutory, regulatory, and contractual obligations.

2. Maintain reliable delivery of power and transmission to our customers.

3. Resource participation in the EIM is and always will be voluntary.

4. BPA's decision to participate in the EIM will be based on a sound business rationale.

# Timeline Leading up to the ROD

Agendas for previous and future monthly EIM Stakeholder meetings:

| | |
|---|---|
| July 24 | •Grid Modernization Overview, Strategic Plan Connection, Intro to 8 Issues BPA is Reviewing, Initial Cost Benefit Analysis |
| September 13 | •EIM 101 |
| October 11 | •Process Plan, Transmission, Generation, Governance |
| November 14 | •Process Plan, Market Power |
| December 18 | •Settlements, Non-Federal Generation Participation |
| January 16 | •Resource Sufficiency, Relationship of EIM to other Emerging Markets |
| February 20 | |
| March 13 | **Table Tops:** Discussion of Impacts to Customers |
| April 10 | |
| May 15 | |
| June | |
| July | •Letter to the Region with a 30 day public comment |
| August | •BPA drafts Record of Decision (ROD) |
| September | •Final ROD for signing the EIM Implementation Agreement |

These meetings will be full day.

**Issues to be Discussed at upcoming monthly EIM Stakeholder meetings:**

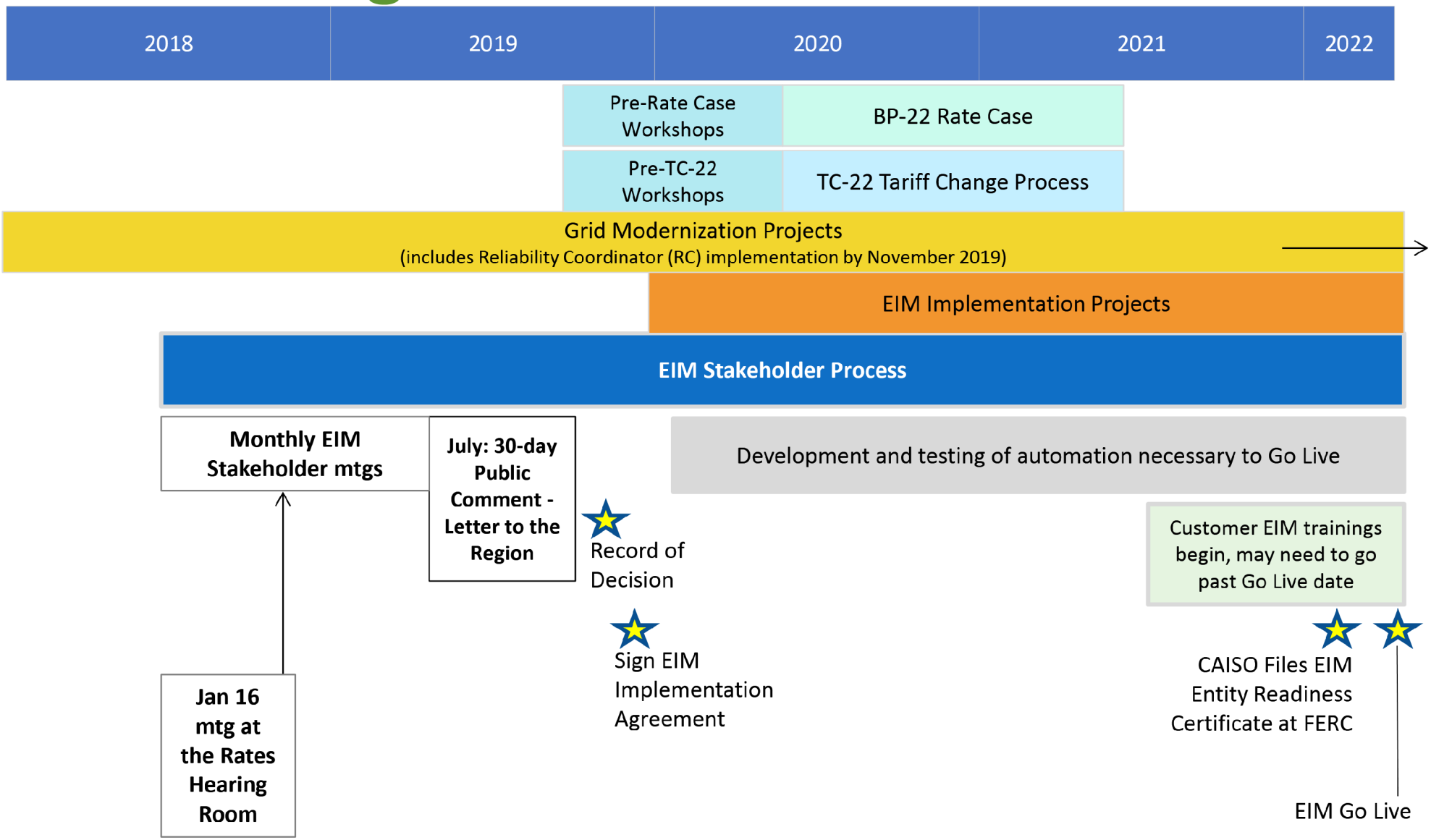
1. Power Products
2. Generation Inputs BP-22
3. Cost Benefit Analysis
4. Market Mitigation
5. Transmission
6. Carbon Issues
7. Governance

Signing of the EIM Implementation Agreement authorizes BPA to begin spending on EIM implementation projects with the CAISO but does not bind BPA to join the EIM.



Previous EIM Stakeholder Meeting Materials are available here: www.bpa.gov/goto/EIM

# BPA's High Level EIM Timeline






Previous EIM Stakeholder Meeting Materials are available here: www.bpa.gov/goto/EIM

# EIM Settlements – Introduction to BPA's Approach

# Goal for Today

- Educate on processes and impacts regarding **BPA's relationship with the Market Operator** (CAISO) to better prepare you for ongoing EIM stakeholder engagement regarding settlements:
  - Introduction to BPA's EIM Settlements Scoping Approach
  - Overview of Settlement Interactions if BPA joins the EIM
  - Educate on existing EIM processes
  - Review BPA's identified EIM Settlement process challenges
  - Work through some simple EIM Settlement Scenarios

- **Disclaimer:** All scoping efforts have been / are being completed under the assumption that BPA will join the Energy Imbalance Market (EIM), although no determination has been made. The remaining slides are reflective of this assumption.

# Long-Term EIM Settlements Objectives

- Establish an EIM Settlements function which
  - Supports BPA's Strategic Plan objectives
  - Supports ease of doing business with BPA for our customers in a simplified process to the extent possible.
  - Enables transparency of processes and information with BPA's customers
  - Provides high quality (accurate and timely) outputs for our customers

# EIM Settlements Learning Approach

- EIM Settlements Scoping Task (April – July 2018)
  - Understand requirements for a successful EIM Settlements function at BPA.
  - Understand challenges and impacts to BPA and our customers

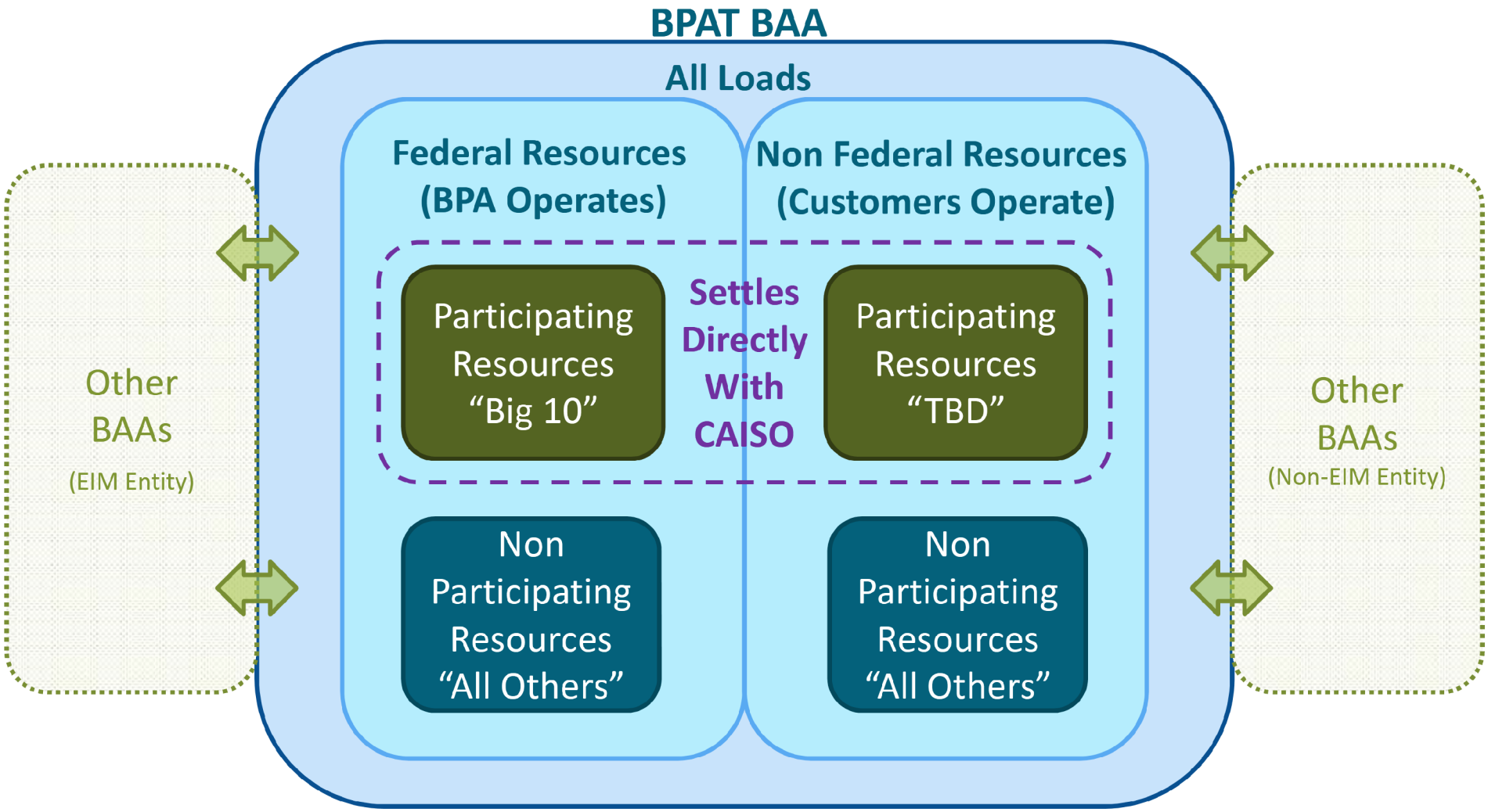
- Information Gathering
  - CAISO Web Based Trainings
  - Benchmarking with existing EIM Entities
  - CAISO Business Practice Manuals & Configuration Guides
  - External Training Courses
  - Internal SME knowledge

# EIM Settlements Learning Approach

- Initial scoping determined that continued analysis should occur
  - What should we do now to be prepared if BPA decides to join the market?
    - Preliminary evaluation of internal processes and functions to prepare for organizational changes
      - Alignment with interconnected Grid Mod projects
    - Further knowledge development about market settlement impacts
    - Improvement of existing CAISO settlement processes

# EIM Settlements Interactions

# EIM Settlement Interactions – Alternate View




**Everything settles with BPAT except Participating Resources**

# EIM Settlements – Current Processes Overview

# What are EIM Settlements

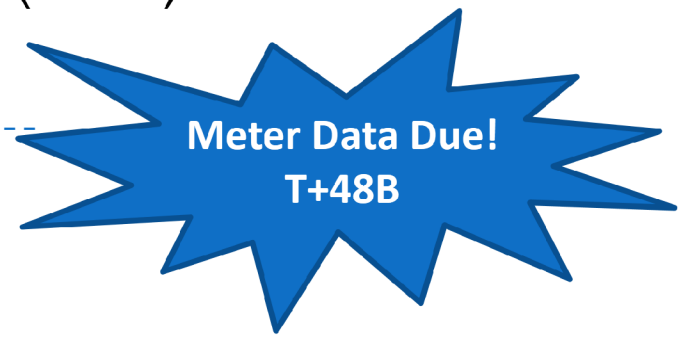
- Processes related to, and resulting in, the invoicing of charges and credits for EIM activity.
  - Settlements-Related Data Submission and Collection
  - Shadow Settlements (Validation)
  - Invoicing of EIM Charge Codes
  - Payment and Receipt of Funds for EIM Charges and Credits
  - Settlements-Related Dispute Management
  - Pre-Settlements & Market Operations Feedback

# EIM Settlements – CAISO Process

- CAISO invoices the EIM Entity and Participating Resource Scheduling Coordinators weekly for EIM Settlements
  - Wednesday, by 10:00 AM (exceptions for holidays)
    - Invoice = payment is owed to CAISO
    - Payment Advice = CAISO owes money to you
- All payments for weekly invoices are due by 10:00 AM, 4 business days after the date the invoice is published
  - Typically, 10:00 AM the following Tuesday
- CAISO pays out on Payment Advices by 2:00 PM the same day (+4B)

# EIM Settlements – CAISO Process

- Settlement statements are published daily by CAISO for at least 3, and up to 7, versions
  - Trade Day + 3 Business Days (T+3B)
  - T+12B
  - T+55B
  - T+9M (Months)
  - T+18M
  - T+33M
  - T+36M




- Settlement statements are included on the Invoice following the statement publish date
- CAISO has a formal dispute process whenever there are questions or discrepancies with the settlement statements or invoices

# EIM Settlements – CAISO Process

- CAISO disputes are based on the Settlement Statement (SS)
  - The time allowed to file is based on the SS published date (not the invoice published date)

| Settlement Statement | Dispute Deadline | Disputable Content |
|---|---|---|
| T + 3B | Not disputable | Not disputable |
| T + 12B | T +26B | All content except estimated meter data |
| T + 55B | T + 77B | All statement content |
| T + 9M (+ 194B) | T + 10M (+ 216B) | Incremental changes from T + 55B |
| T + 18M (+ 383B) | T + 19M (+ 405B) | Incremental changes from T + 9M |
| T + 33M (+ 693B) | T + 34M (+ 715B) | Incremental changes from T + 18M |
| T + 36M (+ 759B) | Not disputable | Not disputable |

# EIM Settlements Application

- Generating Resources
  - Participating
    - Elective (voluntary) participation by offering resource bids into the EIM
    - Has a **distinct, direct** relationship with CAISO (PRSC)
      - Big 10 hydro – FCRPS
      - Non-Fed – TBD
  - Non-Participating
    - Applies to all generating resources within BAA which do not voluntarily participate
- Interchange (CAISO's calls it Intertie)
  - Points of interchange between neighboring BAAs to the EIM Entity
- Load
  - All load in the BAA

Reminder: All settlements occur between CAISO and the EIM Entity (EESC), **except** settlements for Participating Resources which settle between CAISO and the Participating Resource Scheduling Coordinator (PRSC) directly

# EIM Settlement Charge Codes

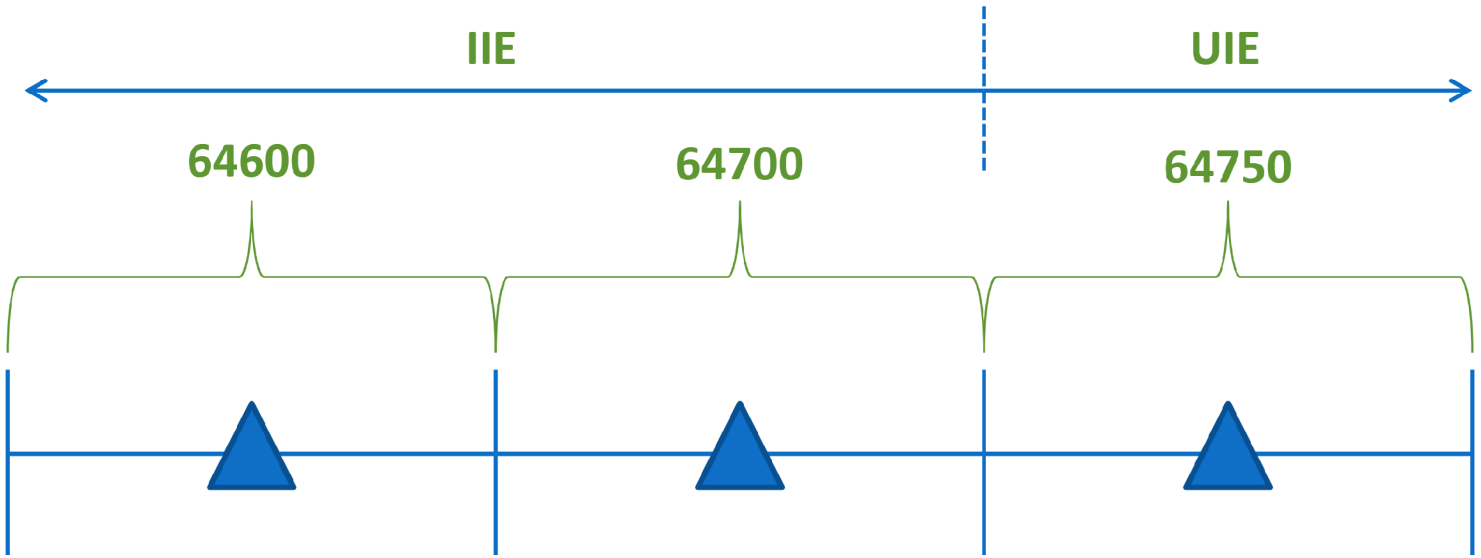
- CAISO currently settles on 42 distinct Charge Codes
  - 5 are applicable only to the Participating Resource Scheduling Coordinator
  - 12 are applicable only to the EIM Entity Scheduling Coordinator (BPAT)
  - 25 are applicable to either/both

# EIM Settlement Charge Codes

- CAISO Charge Code Categories
  - Primary Charges
    - Imbalance Energy
      - Instructed
      - Uninstructed
    - Ancillary Services (e.g. flex ramp)
  - Market Clearing / Neutrality / Cost Recovery
    - Cost Recovery (Over/Under Scheduling)
    - Congestion (RT Offsets)
    - Bid Cost Recovery
    - Pass Through Billing (PTB)
    - Invoice Deviation Interest
    - EP Penalty
  - Timing / Process Efficiency
    - Interest
    - Late Payment Penalty
    - Other (Shortfall Allocation)
  - Administrative
    - Grid Management Charge
    - PIRP (Forecasting Service Fee)

# EIM Settlement Charge Codes

- Imbalance Energy
  - Fifteen Minute Market (FMM) Instructed Imbalance Energy (CC 64600)
  - Real Time Dispatch (RTD) Instructed Imbalance Energy (CC 64700)
  - Uninstructed Imbalance Energy (CC 64750)



# EIM Settlement Charge Codes

- Ancillary Services & Cost Recovery
  - Over/Under Scheduling Settlement & Allocation (CC 6045 & CC 6046)
  - Real Time Imbalance Energy Offset (CC 64770)
  - Flexible Ramp Uplifts
    - Daily Flexible Ramp Up Uncertainty Award Allocation (CC 7077)
    - Monthly Flexible Ramp Up Uncertainty Award Allocation (CC 7078)
    - Daily Flexible Ramp Down Uncertainty Capacity Settlement (CC 7081)
  - Real Time Bid Cost Recovery Allocation (CC 66780)
  - Real Time Congestion Offset (CC 67740)
  - Real Time Marginal Losses Offset EIM (CC 69850)

# EIM Settlement Process Challenges

# EIM Settlement Challenges

- Identified potential Challenges
  - Dispute Submission Timing
  - Market Data Transparency
  - Number and Timing of Recalculation Settlement Statements
  - Frequency of CAISO Invoices
  - Settlement Quality Meter Data (SQMD) Submission Timing

# EIM Settlement Challenges

- **Dispute Submission Timing**
  - **Current EIM Process**
    - Average dispute window closes about +21B from the Settlements Statement published date
  - **Challenges**
    - How do we enable BPA's customers the ability to review data and file disputes within CAISO's filing window?
    - Ensuring customers have access to settlement data early enough to have an adequate opportunity to review & file a dispute if warranted
      - Customers' capability to process large volumes of data in a relatively short period of time.

# EIM Settlement Challenges

- **Market Data Transparency**
  - **Current EIM Process**
    - Some data used to calculate EIM Settlement Charge Codes amounts is considered proprietary
    - EIM Entities have the flexibility to determine how and which Settlements support data to provide to their customers in addition to their invoices
  - **Challenges**
    - About 5-10% of the Charge Code dollars cannot be 100% verified (Proprietary data)
    - Lack of a centralized repository for market data results in inconsistent sharing of supporting Settlements data amongst EIM Entities

# EIM Settlement Challenges

- **Number and Timing of Recalculation Settlement Statements**
  - **Current EIM Process**
    - Three guaranteed revisions (T+3B, T+12B, T+55B)
    - Likely four additional revisions (T+9M, T+18M, T+33M, T+36M)
      - Recalculation statements could be considered similar to BPA's Prior Period Adjustment (PPA) process
      - Delta issued on next invoice; no historical true-up of invoices
  - **Challenges**
    - Impacts to financial accounting and reporting
    - Timing between revisions T+55B → T+ 36M are lengthy
      - If you're owed money on a true-up of the T+55B statement, you won't receive it until T+9M is published, etc.

# EIM Settlement Challenges

- **Frequency of CAISO invoices**
  - **Current EIM Process**
    - Weekly invoicing of EIM Entities
    - Mandatory weekly payments to CAISO at +4B
      - Must pay even if a dispute is filed (enables CAISO to retain a revenue neutral position)
  - **Challenges**
    - Bearing the financial burden of the invoice timing discrepancies
      - We don't currently have a good sense of the magnitude of the financial impact
        - » Impacts to cash flow
    - BPA Staff resourcing for on-time processing

# EIM Settlement Challenges

- **Settlement Quality Meter Data (SQMD) Submission Timing**
  - **Current EIM Process**
    - SQMD due to CAISO by T+48B
    - $1,000/day per “meter point” penalty if submitted late
  - **Challenges**
    - BPA analyzing likely penalties based on historical data given current processes and capabilities, compared to the costs of investing in mitigating actions
      - Reprogramming of meters to report events or other metering investments
      - Increased field personnel to respond to issues
      - Internal meter validation processes

# EIM Settlement Scenarios

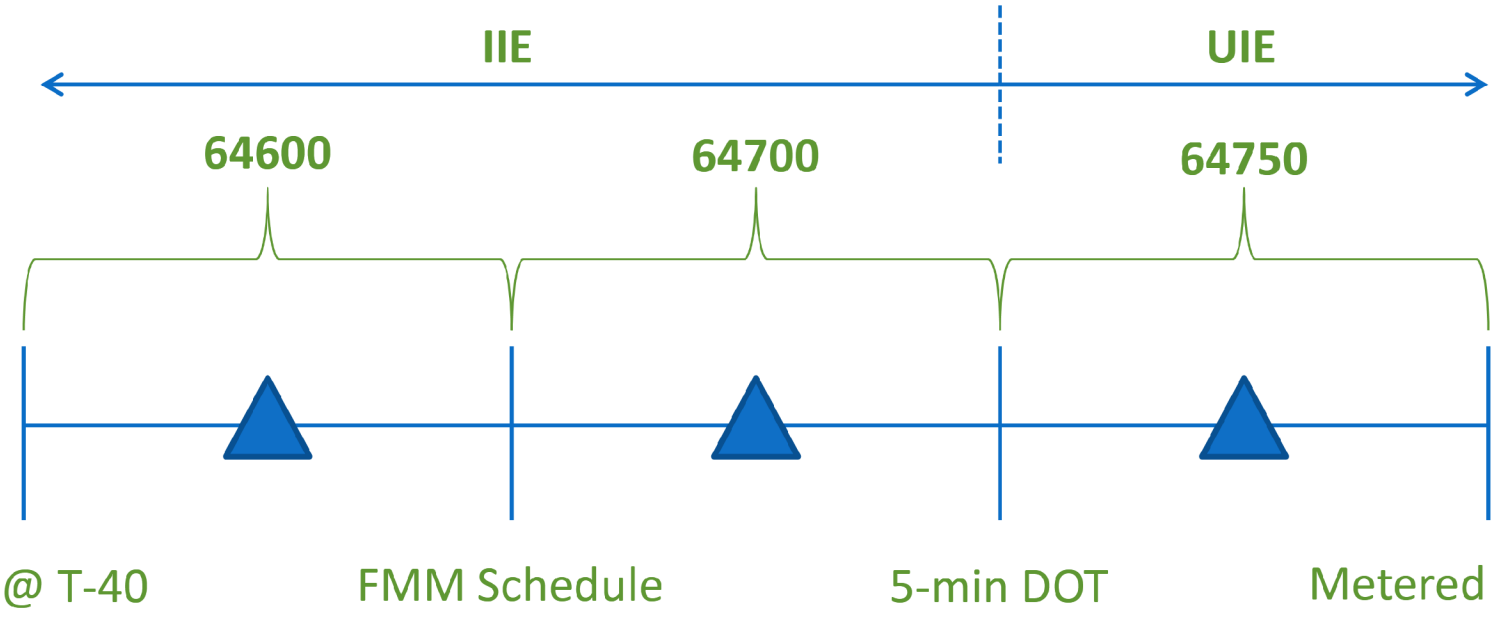
# EIM Settlement Scenarios - Context

- All scenarios will be from the perspective of BPA's relationship with CAISO as the Market Operator
  - Participating Resource (**Generating)**
  - Non-Participating Resource **(Generating)**
  - Point-to-Point **Interchange** Settlement
  - **Load** Imbalance

- Allocations between BPAT as the EIM Entity and BPA's Customers are To Be Determined, therefore these scenarios will not be covered in this presentation.

# EIM Settlement Scenario - Context

- Today we will focus on the primary Charge Codes (CC) related to Imbalance Energy and how they apply in different (common, simplified) scenarios
- All scenarios are based on CAISO's financially-binding schedule submission timeline of T-40
- All volumes will be shown in MWs
- All Locational Marginal Prices (LMPs) will be shown in MWh
- All amounts will be rounded (no decimals)

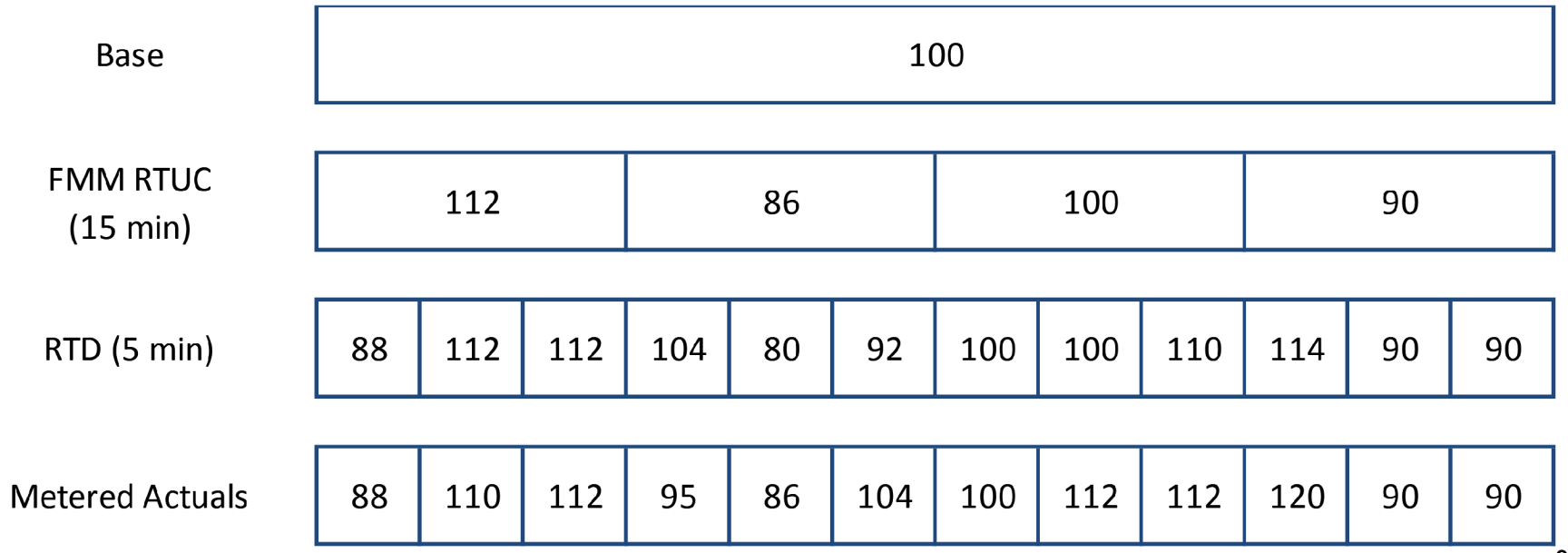


# EIM Settlement Scenario - Context

- **What is a Locational Marginal Price (LMP)?**
  - LMPs are the result of the EIM optimization, and represent the marginal cost of providing the next increment of energy demand
    - (i.e. the cost to serve the next MW of load)
  - There are thousands of LMP points, or pNodes, within the EIM Area
  - LMPs provide price signals that account for the additional costs of electricity caused by **congestion**, **line loss** at various points on the electricity grid, and **Green House Gas (GHG) compliance** for serving California load.
  - LMPs allow the EIM to efficiently determine the interaction of energy supply and energy demand

# EIM Settlement Scenario - Context

- There are four main categories of volumes used to calculate the Instructed Imbalance Energy (IIE) and Uninstructed Imbalance Energy (UIE) Charge Codes



# EIM Settlement Scenario - Context

- In addition, there are two LMPs that are used to determine the settlement totals

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Base | 100 | | | | | | | | | | |
| FMM RTUC (15 min) | 112 | | | 86 | | | 100 | | | 90 | |
| FMM LMP | $20 | | | $22 | | | $25 | | | $20 | |
| RTD (5 min) | 88 | 112 | 112 | 104 | 80 | 92 | 100 | 100 | 110 | 114 | 90 | 90 |
| RTD LMP | $30 | $35 | $30 | $32 | $28 | $20 | $20 | $25 | $30 | $32 | $35 | $25 |
| Metered Actuals | 88 | 110 | 112 | 95 | 86 | 104 | 100 | 112 | 112 | 120 | 90 | 90 |

# Participating Resources

# EIM Settlement Scenario – Participating Resource

## CC 64600: FMM Instructed Imbalance Energy

- A Base Schedule of 100 MW is submitted by CAISO's financially-binding T-40

| | | | | | |
|---|---|---|---|---|---|
| Base | 100 | | | | ÷ 4 |
| | - | | | | |
| FMM RTUC (15 min) | 112 | 86 | 100 | 90 | |
| | x | | | | |
| FMM LMP | $20 | $22 | $25 | $20 | |
| | = | | | | |
| **FMM IIE** | **($60)** | **$77** | **$0** | **$50** | |

Total FMM IIE for the hour = $67 (charge)

- FMM IIE = (Base – FMM RTUC) ÷ 4 x FMM LMP
- $FMM\ IIE_1$ = (100 – 112) ÷ 4 x $20
- $FMM\ IIE_1$ = (-12) ÷ 4 x $20
- $FMM\ IIE_1$ = -$60

# EIM Settlement Scenario – Participating Resource

## CC 64700: RTD Instructed Imbalance Energy

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FMM RTUC (15 min) | 112 | | | 86 | | | 100 | | | 90 | | | ÷ 12 |
| | - | | | | | | | | | | | | |
| RTD (5 min) | 88 | 112 | 112 | 104 | 80 | 92 | 100 | 100 | 110 | 114 | 90 | 90 | |
| | x | | | | | | | | | | | | |
| RTD LMP | $30 | $35 | $30 | $32 | $28 | $20 | $20 | $25 | $30 | $32 | $35 | $25 | |
| | = | | | | | | | | | | | | |
| **RTD IIE** | **$60** | **$0** | **$0** | **($48)** | **$14** | **($10)** | **$0** | **$0** | **($25)** | **($64)** | **$0** | **$0** | |

Total RTD IIE for the hour = ($73) (credit)

- RTD IIE = (FMM RTUC – RTD) ÷ 12 x RTD LMP
- $RTD\ IIE_1$ = (112 – 88) ÷ 12 x $30
- $RTD\ IIE_1$ = (24) ÷ 12 x $30
- $RTD\ IIE_1$ = $60

# EIM Settlement Scenario – Participating Resource

## CC 64750: RTD Uninstructed Imbalance Energy

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RTD (5 min) | 88 | 112 | 112 | 104 | 80 | 92 | 100 | 100 | 110 | 114 | 90 | 90 |
| | - | | | | | | | | | | | ÷ 12 |
| Metered Actuals | 88 | 110 | 112 | 95 | 86 | 104 | 100 | 112 | 112 | 120 | 90 | 90 |
| | x | | | | | | | | | | | |
| RTD LMP | $30 | $35 | $30 | $32 | $28 | $20 | $20 | $25 | $30 | $32 | $35 | $25 |
| | = | | | | | | | | | | | |
| **RTD UIE** | **$0** | **$6** | **$0** | **$24** | **($14)** | **($20)** | **$0** | **($25)** | **($5)** | **($16)** | **$0** | **$0** |

Total RTD UIE for the hour = ($50) (credit)

- RTD UIE = (RTD – Metered Actuals) ÷ 12 x RTD LMP
- RTD $IIE_1$ = (88 – 88) ÷ 12 x $30
- RTD $IIE_1$ = (0) ÷ 12 x $30
- RTD $IIE_1$ = $0

**This scenario results in a total credit of ($56) for the operating hour** ($67 - $73 - $50)

# Non-Participating Resources

# EIM Settlement Scenario – Non Participating Resource

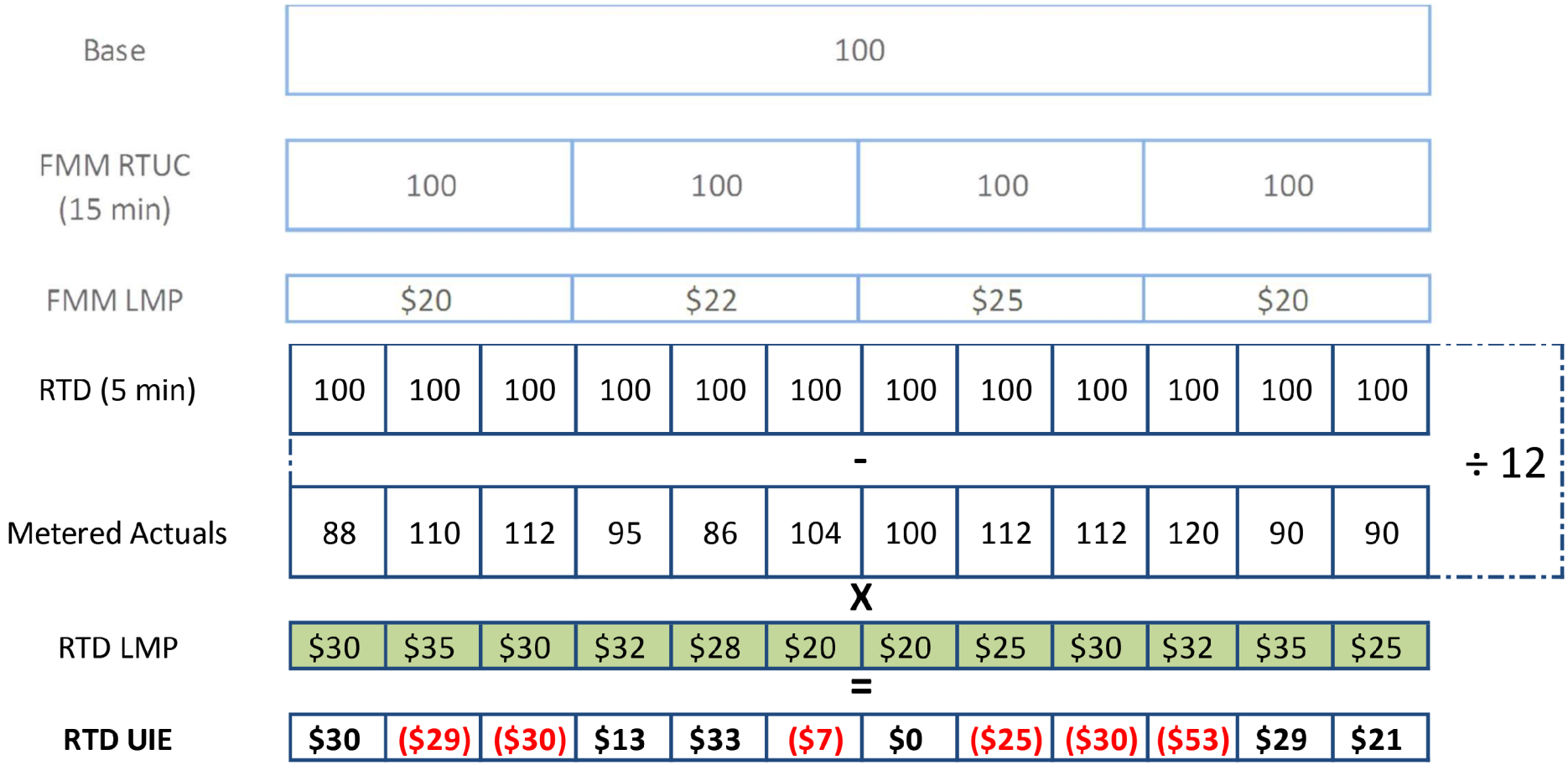
- The primary difference for Non-Participating Resources is that the FMM RTUC and RTD values equal the Base Schedule submitted by T-40
  - CAISO does not "instruct" Non-Participating Resource movements

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Base | 100 | | | | | | | | | | | |
| FMM RTUC (15 min) | 100 | | | 100 | | | 100 | | | 100 | | |
| FMM LMP | $20 | | | $22 | | | $25 | | | $20 | | |
| RTD (5 min) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Metered Actuals | 88 | 110 | 112 | 95 | 86 | 104 | 100 | 112 | 112 | 120 | 90 | 90 |
| RTD LMP | $30 | $35 | $30 | $32 | $28 | $20 | $20 | $25 | $30 | $32 | $35 | $25 |

# EIM Settlement Scenario – Non Participating Resource

## CC 64750: RTD Uninstructed Imbalance Energy

- No change to the Base Schedule after T-40
  - Results in $0 FMM & RTD **IIE** amounts
  - Will have non-zero RTD **UIE** amounts if metered actuals differ from the Base Schedule




Total RTD UIE for the hour = ($48) (credit)

# EIM Settlement Scenario – Non Participating Resource

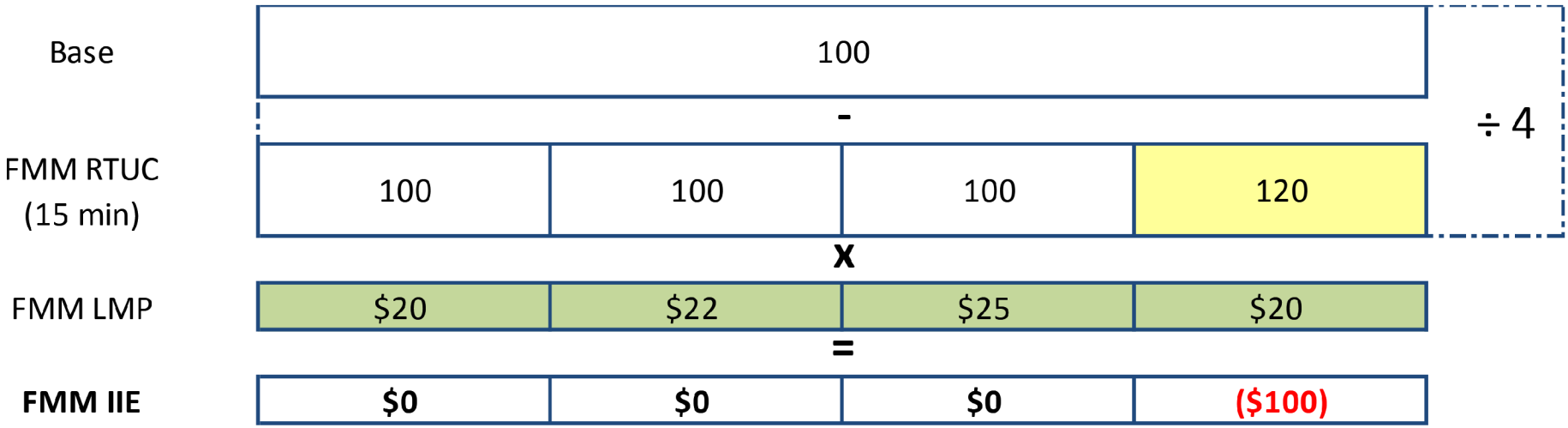
- **If the schedule is updated after T-40, there will be IIE settlement impacts**
  - E.g. the BAA sends a manual dispatch to operate at 120 MW at T-0 (top of the Trade hour)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Base | 100 | | | | | | | | | | |
| FMM RTUC (15 min) | 100 | | | 100 | | | 100 | | | 120 | |
| RTD (5 min) | 100 | 100 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Metered Actuals | 115 | 120 | 112 | 118 | 120 | 120 | 122 | 125 | 115 | 115 | 120 | 120 |

- Any market runs that have not initiated will reflect the updated schedule amount.
  - The first 3 FMM runs have already processed (T-37.5, T-22.5, T-7.5)
  - The first 2 RTD runs have already processed (T-7.5, T-2.5)
- Because there was a need to adjust the schedule, it is expected that metered actuals would also increase to reflect meeting the demand.

# EIM Settlement Scenario – Non Participating Resource

## CC 64600: FMM Instructed Imbalance Energy

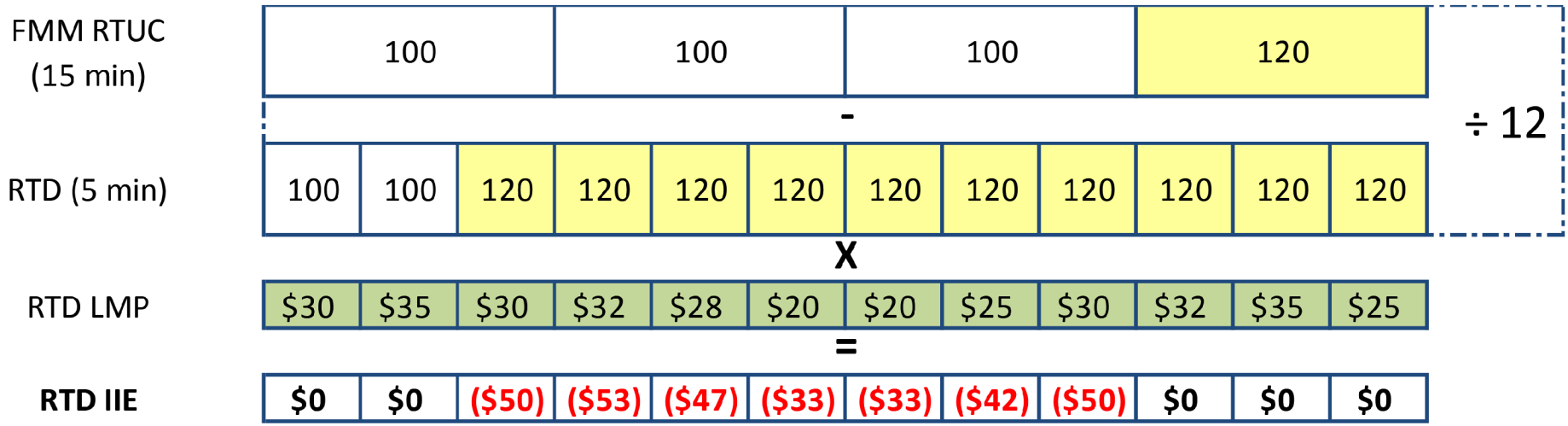



Total FMM IIE for the hour = ($100) (credit)

- FMM IIE = (Base – FMM RTUC) ÷ 4 x FMM LMP
- $FMM\ IIE_4$ = (100 – 120) ÷ 4 x $20
- $FMM\ IIE_4$ = (-20) ÷ 4 x $20
- $FMM\ IIE_4$ = -$100

# EIM Settlement Scenario – Non Participating Resource

## CC 64700: RTD Instructed Imbalance Energy




Total RTD IIE for the hour = ($308) (credit)

- RTD IIE = (FMM RTUC – RTD) ÷ 12 x RTD LMP
- $RTD\ IIE_4$ = (100 – 120) ÷ 12 x $32
- $RTD\ IIE_4$ = (-20) ÷ 12 x $32
- $RTD\ IIE_4$ = -$53

# EIM Settlement Scenario – Non Participating Resource

## CC 64750: RTD Uninstructed Imbalance Energy

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RTD (5 min) | 100 | 100 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | - | | | | | | | | | | | ÷ 12 |
| Metered Actuals | 115 | 120 | 112 | 118 | 120 | 120 | 122 | 125 | 115 | 115 | 120 | 120 |
| | X | | | | | | | | | | | |
| RTD LMP | $30 | $35 | $30 | $32 | $28 | $20 | $20 | $25 | $30 | $32 | $35 | $25 |
| | = | | | | | | | | | | | |
| **RTD UIE** | **($38)** | **($58)** | **$20** | **$5** | **$0** | **$0** | **($3)** | **($10)** | **$13** | **$13** | **$0** | **$0** |

Total RTD UIE for the hour = ($58) (credit)

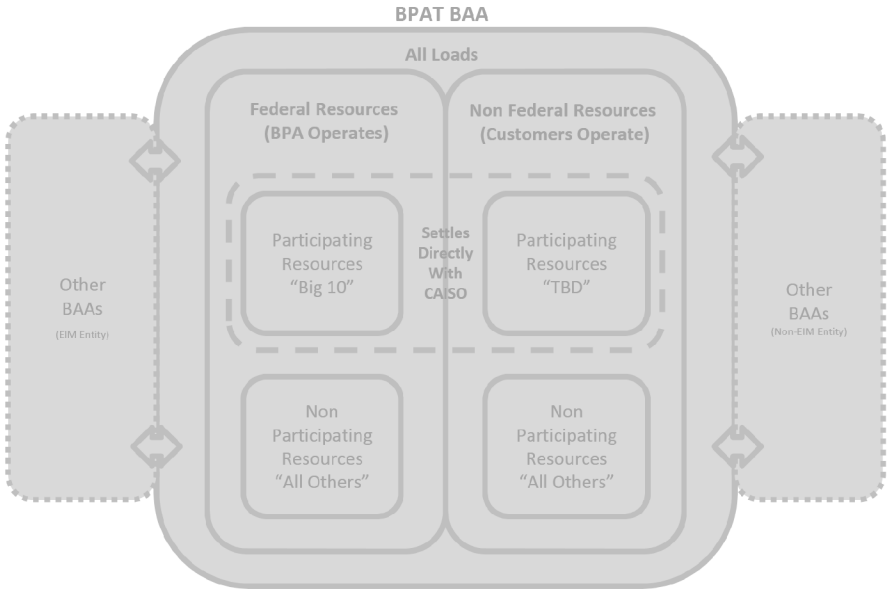
- RTD UIE = (RTD – Metered Actuals) ÷ 12 x RTD LMP
- RTD $IIE_4$ = (120 – 118) ÷ 12 x $32
- RTD $IIE_4$ = (2) ÷ 12 x $32
- RTD $IIE_4$ = $5

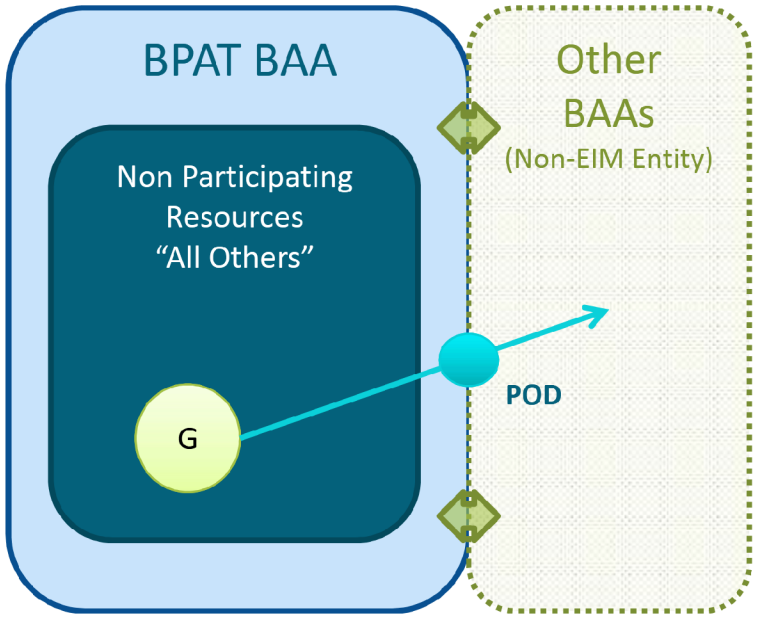
**Changing the schedule after T-40 results in a total credit of ($466) for the operating hour** (-$100 - $308 - $58)

# Interchange (Interties)

# EIM Settlement Scenario – Point-to-Point Interchange

- Interchange settles at the Point of Interchange identified between BAAs
- Imbalance for Interchange is typically only settled as IIE (CC 64600 & CC 64700)
  - The financially-binding Base Schedules for Interchange are owed to CAISO on the same schedule as the Base Schedules for Resources (T-40)
  - If the Interchange Base Schedule is updated after T-40 (e-tag update), non-zero IIE will be assessed for the remaining portion of the market hour left to run



# EIM Settlement Scenario – Point-to-Point Interchange

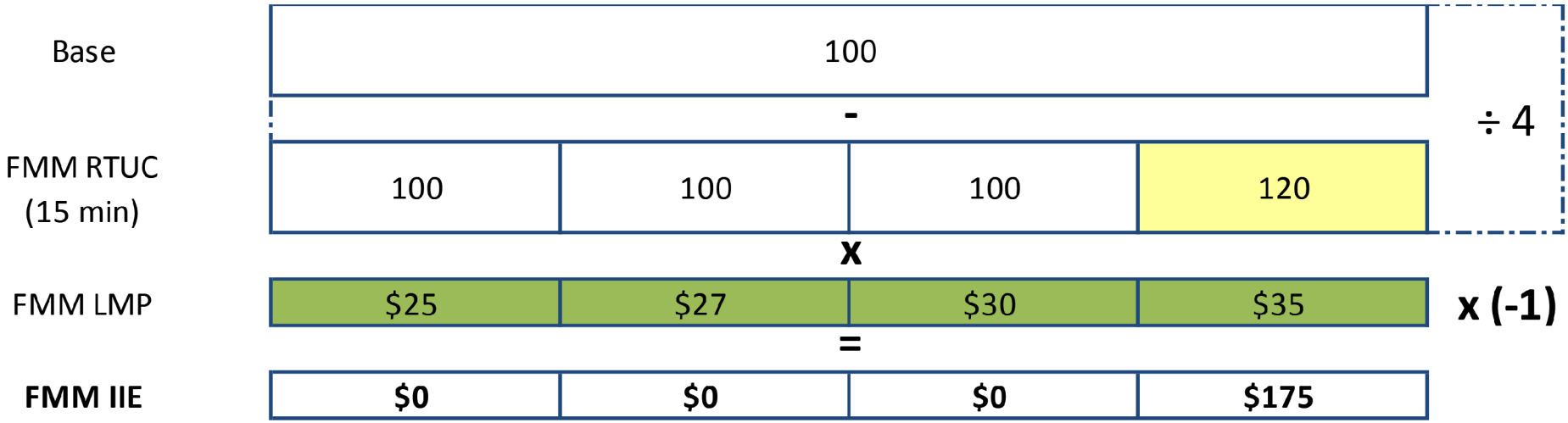
- **Using the previous Non Participating Resource example where the schedule is updated after T-40, there will also be an associated tag update after T-40 for the export schedule**
  - The Generator was manually dispatched to INC +20 MW, so they will be paid to meet the demand. This was a result of a demand schedule being too low, so there will be payment from the Interchange Point POD since it is the demand that is causing the need to INC.
  - The dollar differences will be in the LMPs at the Non Participating Resource and the Interchange Point (POD)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Base | 100 | | | | | | | | | | |
| FMM RTUC (15 min) | 100 | | | 100 | | | 100 | | | 120 | |
| RTD (5 min) | 100 | 100 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Metered Actuals | 115 | 120 | 112 | 118 | 120 | 120 | 122 | 125 | 115 | 115 | 120 | 120 |

# EIM Settlement Scenario – Point-to-Point Interchange

## CC 64600: FMM Instructed Imbalance Energy

– In this scenario, the LMPs at the Interchange POD are higher than at the Non Participating Resource



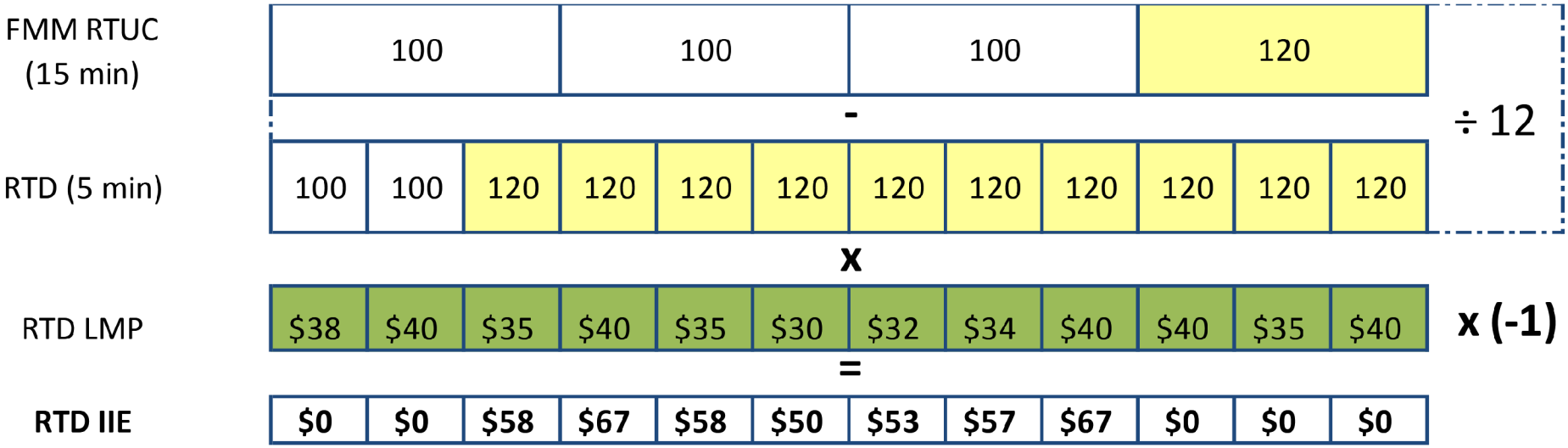

Total Interchange FMM IIE for the hour = $175 (charge)

- FMM IIE = ((Base – FMM RTUC) ÷ 4 x FMM LMP) x (-1)
- $FMM\ IIE_4$ = ((100 – 120) ÷ 4 x $35) x (-1)
- $FMM\ IIE_4$ = ((-20) ÷ 4 x $35) x (-1)
- $FMM\ IIE_4$ = $175

# EIM Settlement Scenario – Point-to-Point Interchange

## CC 64700: RTD Instructed Imbalance Energy

– In this scenario, the LMPs at the Interchange POD are higher than at the Non Participating Resource




Total RTD IIE for the hour = $410 (charge)

- RTD IIE = ((FMM RTUC – RTD) ÷ 12 x RTD LMP) x (-1)
- $RTD\ IIE_4$ = ((100 – 120) ÷ 12 x $40) x (-1)
- $RTD\ IIE_4$ = ((-20) ÷ 12 x $40) x (-1)
- $RTD\ IIE_4$ = $67

**Changing the tag after T-40 results in a total charge of $585 for the operating hour** ($175 + $410)

# EIM Settlement Scenario – Point-to-Point Interchange

- **What results, is the following settlement for the Non Participating Resource generator and point of interchange**
  - Non-Participating Resource FMM IIE (CC 64600) = ($100)
  - Non-Participating Resource RTD IIE (CC 64700) = ($308)
  - Non-Participating Resource RTD UIE (CC 64750) = ($58)

**+**

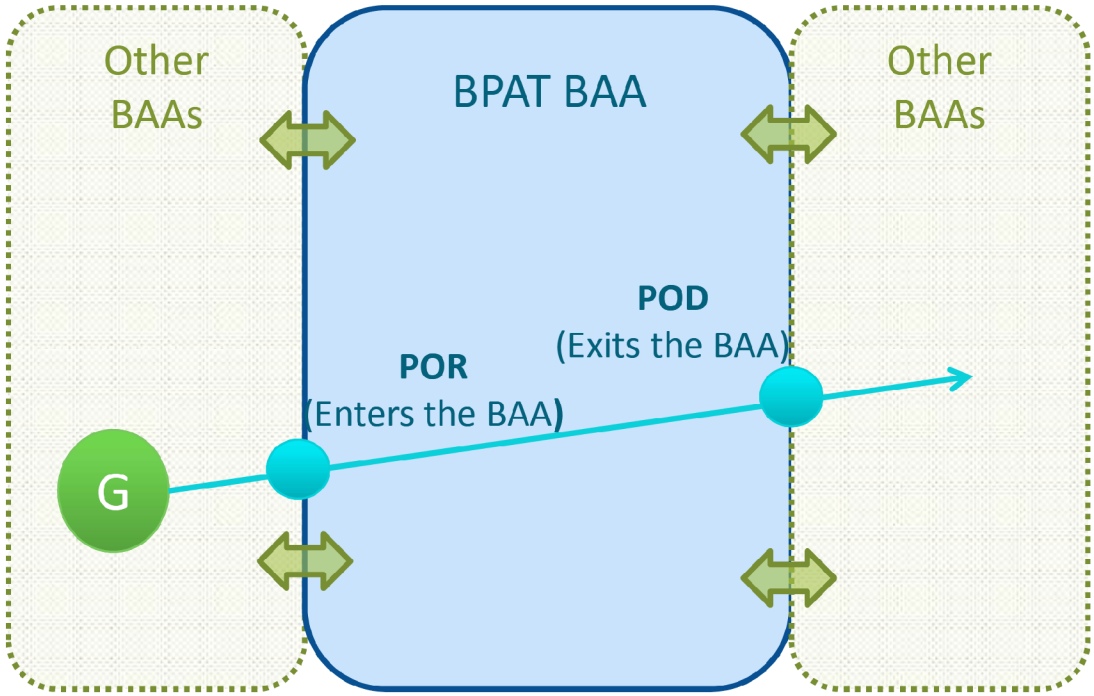
  - **Interchange FMM IIE (CC 64600) = $175**
  - **Interchange RTD IIE (CC 64700) = $410**

**=**

**$119 charge to the EIM Entity Scheduling Coordinator**

# EIM Settlement Scenario – Wheel-Through Interchange

- Wheel-through Interchange is settled similarly to Point-to-Point
  - Both Interchange Points (POR and POD) will be settled for IIE
    - If one or more of the adjacent BAAs are also an EIM Entity, CAISO will settle for Interchange with each EIM Entity involved
    - If one or more of the adjacent BAAs is not an EIM Entity, CAISO will settle for interchange only with the EIM Entity for that specific Point of Interchange



# Load Imbalance

# EIM Settlement Scenario – Load Imbalance

- Load Imbalance is only settled for UIE (CC 64750)
  - Compares the Load Base Schedule to the Load "Metered Actuals"

- Load "Metered Actuals" are determined by a calculation before being submitted to CAISO

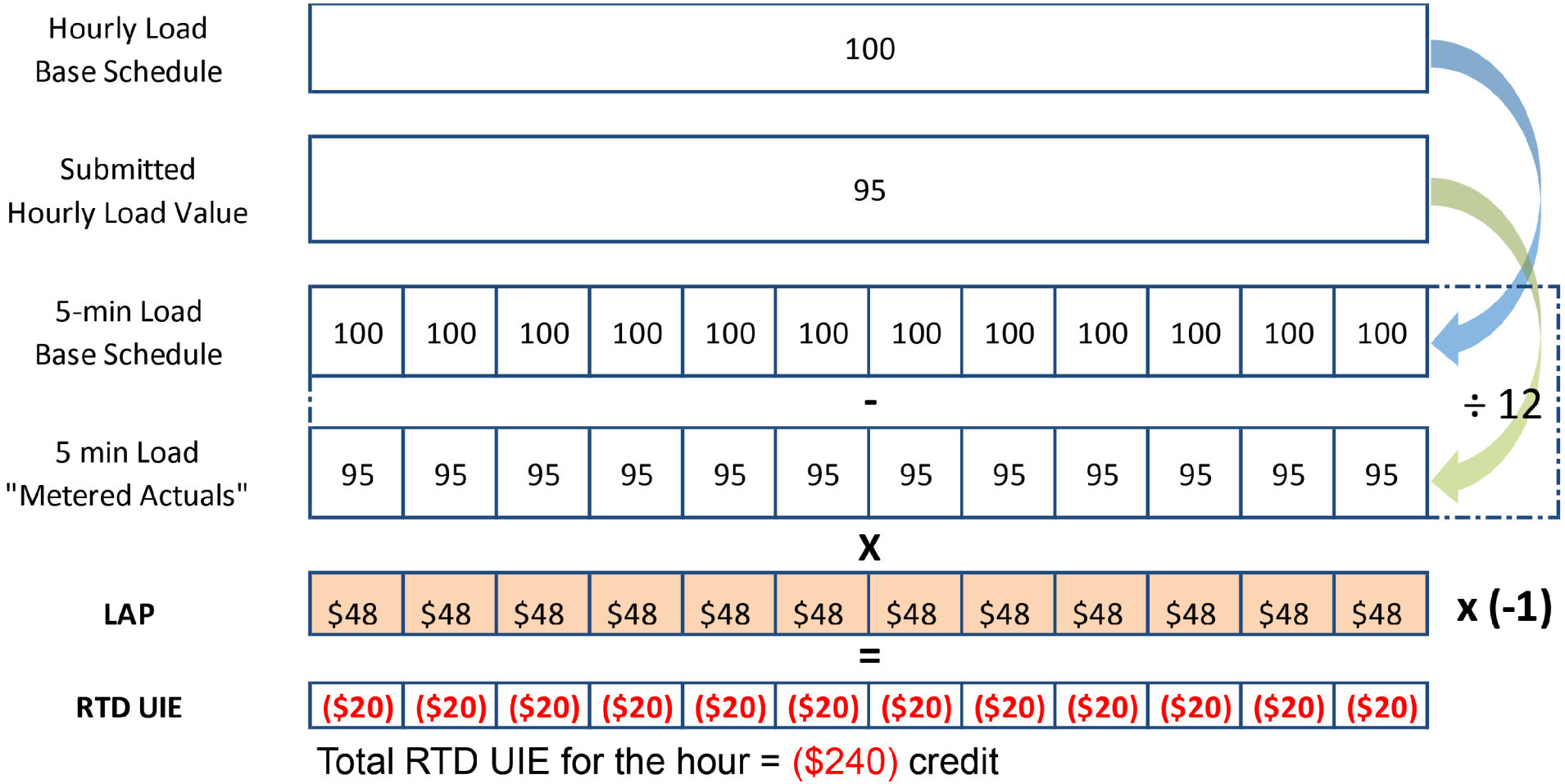
  $= \text{Sum}(GEN_{SQMD}) - \text{Sum}(INT_{SQMD}) - \text{Real Time Losses}$

- Load Settles at a Load Aggregation Point (LAP) price
  - Weighted average of the GEN and INT LMPs for the entire BAA

- Load is submitted to CAISO at the largest granularity of any specific Generation or Interchange meter point submitted, but always settled at the 5-minute LAP
  - If load is submitted at a granularity greater than 5-min, CAISO divides each hour accordingly to get the 5-min load values

# EIM Settlement Scenario – Load Imbalance

## CC 64750: RTD Uninstructed Imbalance Energy




Total RTD UIE for the hour = ($240) credit

- RTD UIE = ((Base – Actuals) ÷ 12 x LAP) x (-1)
- $RTD\ UIE_1$ = ((100 – 95) ÷ 12 x $48) x (-1)
- $RTD\ UIE_1$ = ((5) ÷ 12 x $48) x (-1)
- $RTD\ UIE_1$ = -$20

# In-Flight Work

# In-Flight Work

- Metering Inventory and Strategy
- Continued development of Charge Code knowledge
- Define internal processes
- Other Grid Mod projects
  - Customer Portal replacement
  - Customer Billing Center replacement

- The EIM Settlements topic will be revisited during an upcoming EIM Stakeholder meeting, likely in March 2019

# Non-Federal Generation Participation

# Non-Federal Generation Participation

- BPA will develop tools and processes for the non-FCRPS resources becoming EIM Participating Resources.

- Such participation will be offered consistent with principles of open access and non-discrimination.

- BPA has not made any determinations about how the provision of any Ancillary and Control Area Services may need to change under EIM participation, but we do expect to have discussion on topics including, but not limited to, the following as part of BP/TC-22 processes:
  - Resource sufficiency
  - VER/DER integration charges
  - Self-supply of balancing reserves
  - Data and metering requirements for EIM Participating and Non-Participating Resources
  - Scheduling Coordinator Metering Entity services
  - Transmission requirements for Participating Resources
  - Prior notice required by EIM Entity

# EIM Participating Resource Agreements

- BPA will determine specific requirements, agreements, and forms unique to BPA as part of its tariff and BP development.

- The following agreements are required for ALL EIM Participating Resources
  - EIM Participating Resource Agreement (CAISO/Resource)
    - http://www.caiso.com/Documents/AppendixB19_EIMParticipatingResourceAgreement_Asof_Jul01_2014.pdf
  - EIM Participating Resource Scheduling Coordinator Agreement (CAISO/SC)
    - http://www.caiso.com/Documents/AppendixB20_EIMParticipatingResource_SchedulingCoordinatorAgreement_Asof_Jul01_2014.pdf.

# Next Steps

- Next meeting scheduled for **Wednesday January 16th** at the Rates Hearing Room in the afternoon.
  - WebEx and Phone participation will be available
  - Agenda and materials will be distributed in advance via Tech Forum

- We welcome feedback on this meeting. Your comments will help shape future EIM Stakeholder Meetings, please email us at techforum@bpa.gov and reference "EIM Stakeholder Meeting" in the subject. Comments are due by January 3rd Thursday.

- For more information on BPA's EIM Stakeholder process and meetings please visit: https://www.bpa.gov/Projects/Initiatives/EIM/Pages/Energy-Imbalance-Market.aspx

- For more information on BPA's Grid Modernization Initiative please visit: https://www.bpa.gov/goto/GridModernization

# Question and Answer Session

# Appendix

# Locational Marginal Price (LMP) Examples

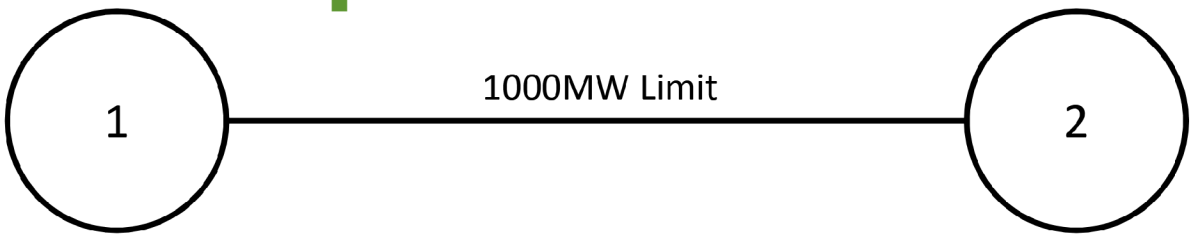
# LMPs & GHG

- GHG compliance cost component of the LMP is the rate the market uses to calculate a payment to each generator in an EIM BAA for its output that is determined to serve ISO imbalances. This payment is funded through the price paid within the ISO for imbalance energy embedded in the system marginal cost of energy.

- For resources in an EIM entity's BAA, there are no GHG compliance costs when the resources serve load outside of the ISO. The EIM design allows EIM participating resources to submit two bids: (1) an energy bid and (2) a GHG bid adder.

- To avoid charging EIM entities for GHG compliance outside of California, the LMP of nodes in the EIM footprint outside of the ISO balancing authority area will include a negative GHG component if there is an EIM transfer into the ISO; otherwise, the value is zero.

# LMP Example

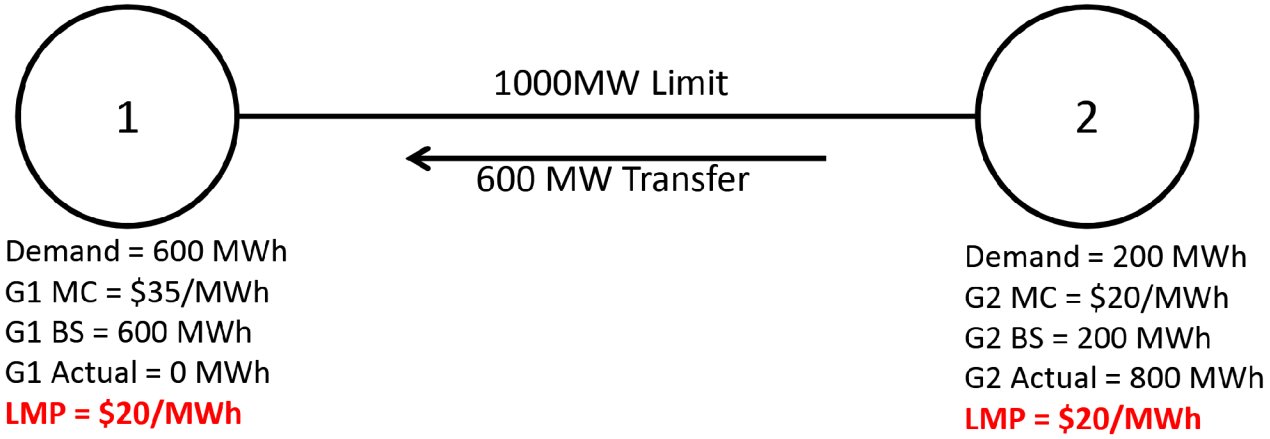



Demand = 600 MWh
Generator 1 (G1) Marginal Cost (MC) = $35/MWh
G1 Base Schedule (BS) = 600 MWh

Demand = 200 MWh
Generator 2 (G2) Marginal Cost (MC) = $20/MWh
G2 Base Schedule = 200 MWh

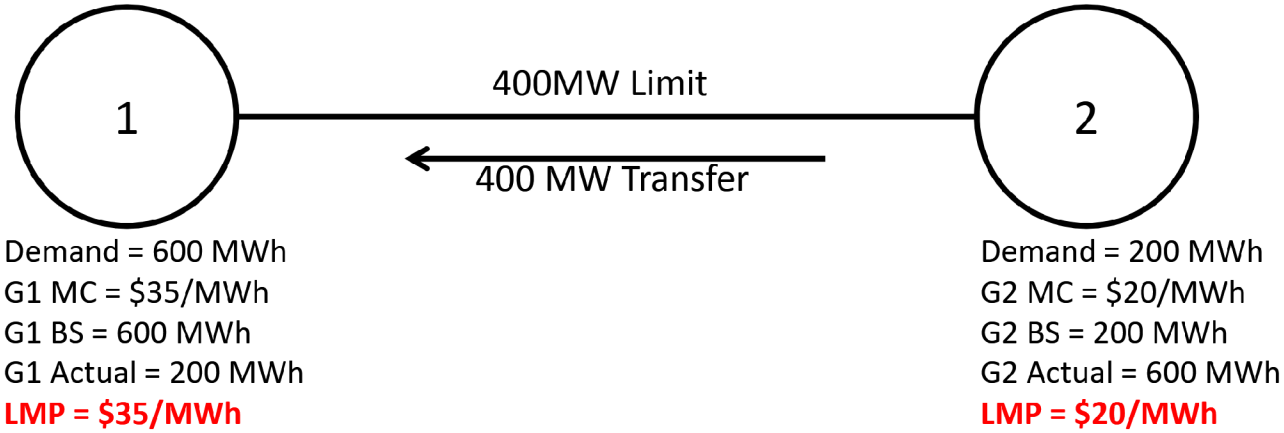
- The marginal cost of energy in zone 1 is higher ($35) than in zone 2 ($20).
- Demand is higher in zone 1 (600 MWh) than in zone 2 (200 MWh)
- There is a transmission line between the two zones & we are ignoring losses
- Assume each generator is serving their local demand
- Assume each generator, G1 and G2, has sufficient capacity to serve the total demand (800 MWh)

# LMP Example (unconstrained)



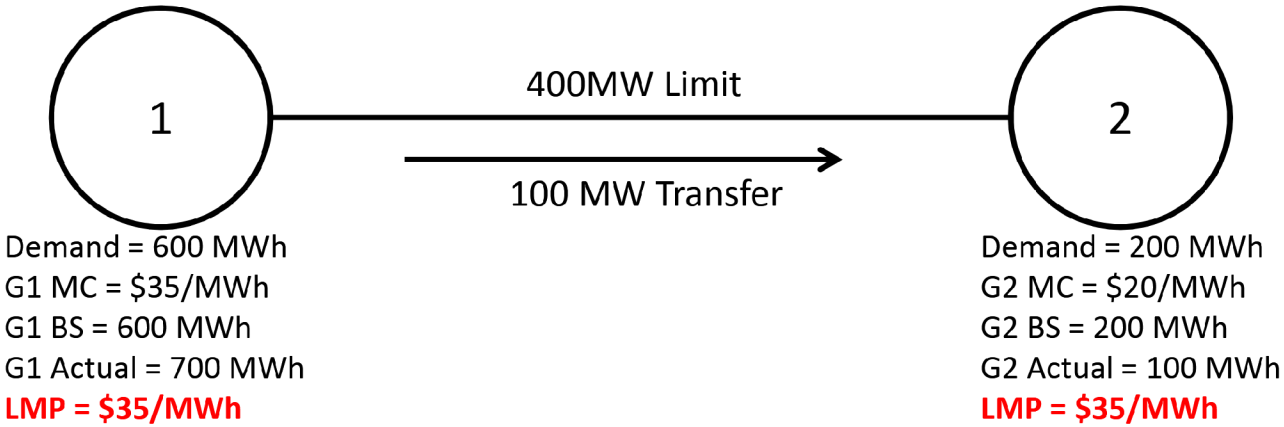

- If the transfer of energy between the two zones is unconstrained
  - G2 would serve the local 200 MWh of demand and the 600 MWh of demand in zone 1
  - There would be a transfer of 600 MWh from zone 2 to zone 1
- The LMP (i.e., cost to serve the next increment of demand) at both zone 1 and zone 2 would be $20/MWh
- G1 would pay $20/MWh for the replacement energy from G2, saving $15/MWh
- G2 would be paid $20/MWh for the additional 600 MWh of energy produced to serve zone 1's demand

# LMP Example (constrained)



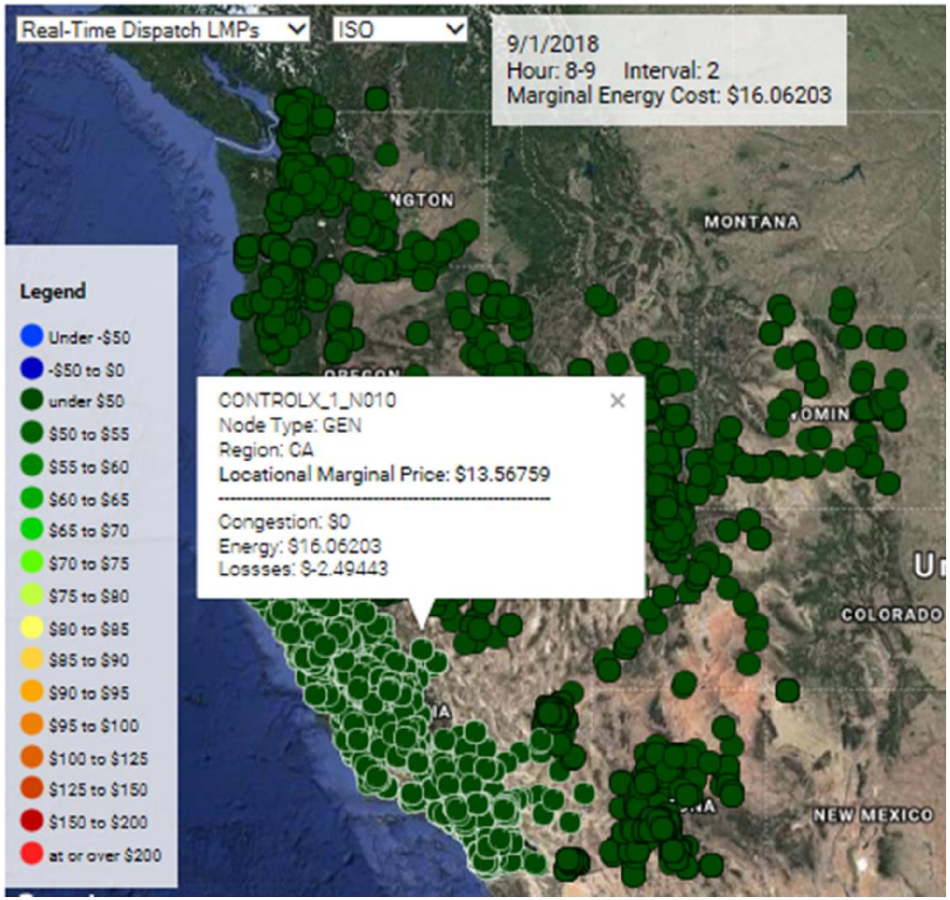

- If the transfer of energy between the two zones was limited to 400 MW
  - G2 would serve the local 200 MWh of demand, but could only transfer 400 MWh to zone 1 due to the constraint
  - G1 would have to service the remaining 200 MWh of demand in zone 1
  - The marginal cost of energy (LMP) in zone 2 would be $20/MWh
  - The marginal cost of energy (LMP) in zone 1 would be $35/MWh
- G1 would pay $35/MWh for the 400 MWh energy from G2
- G2 would be paid $20/MWh for the additional 400 MWh of energy produced to serve zone 1's demand
- EIM would collect from G1 $14,000 ($35 x 400)
- EIM would pay G2 $8,000 ($20 x 400)
- EIM collected excess revenue of $6000 ($14,000 - $8,0000) - this excess revenue is called "congestion revenue."

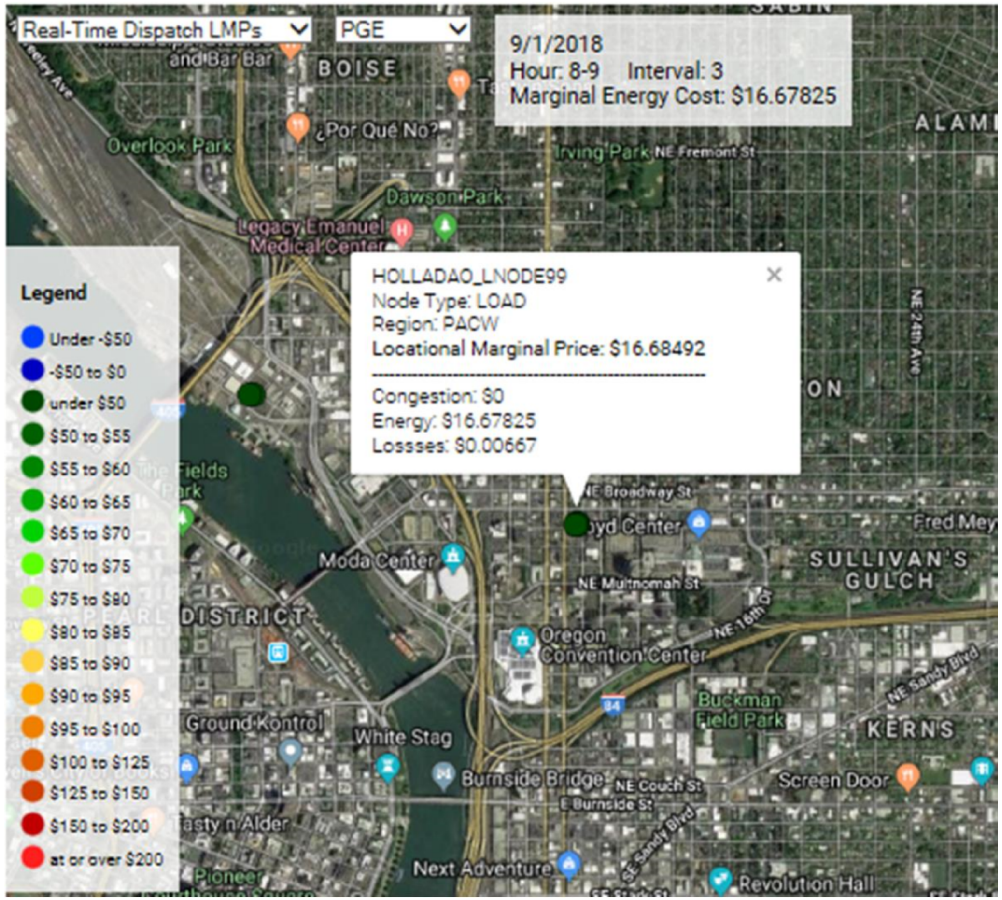
# LMP Example (G2 Derate)



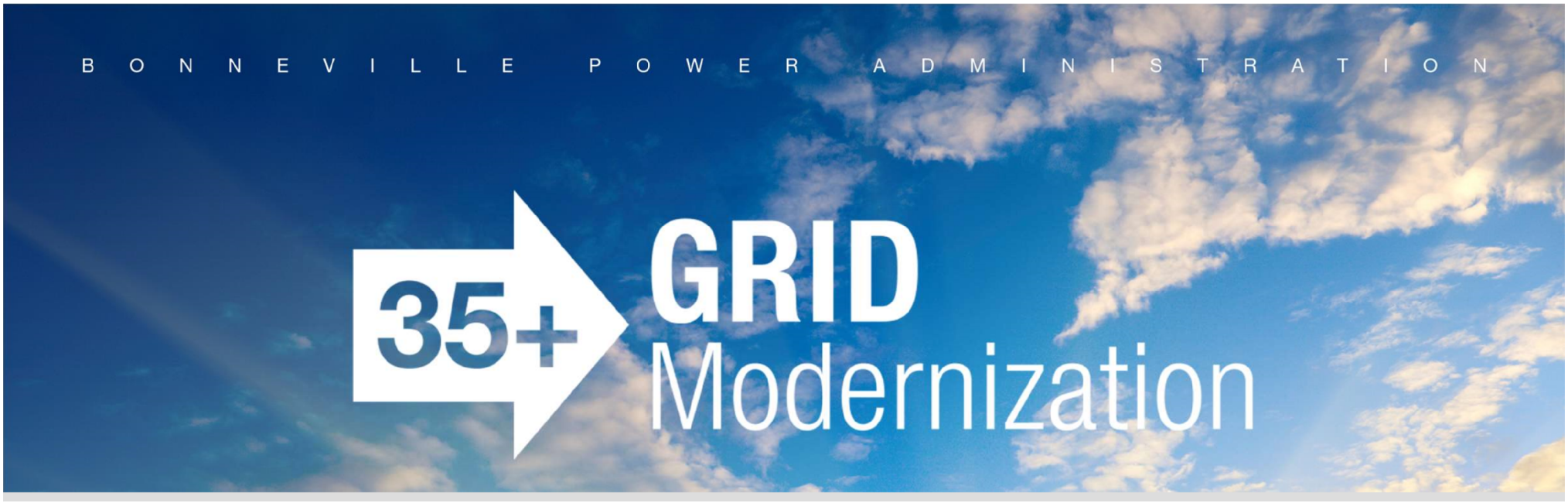

- What if G2 could only generate 100 MWh due to a real-time derate?
  - G1 would need to serve the last 100 MWh or load in zone 2
  - The marginal cost of energy (LMP) in zone 2 would be $35/MWh
  - The marginal cost of energy (LMP) in zone 1 would be $35/MWh
- G2 would pay $35/MWh for the 100 MWh energy from G1
- G1 would be paid $35/MWh for the additional 100 MWh of energy produced to serve zone 2's demand
- EIM would pay G1 $3,500 ($35 x 100)
- EIM would collect from G2 $3,500 ($35 x 100)
- EIM is revenue neutral ($3,500 - $3,500) – No Congestion Revenue

# LMP Price Map




http://www.caiso.com/PriceMap/Pages/default.aspx




# EIM Kickoff With Utilicast




January 10, 2020

# EIM Kickoff With Utilicast

Primary Objectives of this workshop:

1. Bring Utilicast staff up to speed on BPA EIM effort
2. Begin establishing working relationships between projects and Utilicast staff
3. Leverage Utilicast experience in planning/verifying near term EIM Objectives

# Agenda

1. **Overview:** (8:00-9:00)
   a) Utilicast Introductions - 10 min
   b) Background & Program Overview -15 min
   c) Project Structure/Roles & Responsibilities -15 min
   d) Utilicast onboarding /availability timelines -10 min
   e) Interaction protocol/ method of contact for Utilicast SMEs- 10 min
2. **Active Projects / Work-streams:** (9:00-12:15)
   a) EIM-related work-stream presentations by project leads -15 min each

   Lunch Break - 45 min
3. **EIM Schedule -Timeline:** (1:00-2:30)
   a) Baselining where we're at today
   b) Key Activities over the next 3 - 6 months
   c) EIM Lessons Learned – schedule impacts

   Break - 10 min
4. **Regional Dialog - Interaction with other EIM Utilities** (2:40-3:10)
5. **Open Policy Issues that Could Impact EIM implementation** (3:10-4:00) (Russ Mantifel)
6. **Closing / Next Steps:** Meeting Cadence for Weekly Core Project Team, Other BPA meetings, CAISO Track meetings (4:00-4:30)

# Role, Ramp, Experience

| Utilicast Resource | Role | Ramp Period | CAISO Tracks | Experience | Recent Clients | Education |
|---|---|---|---|---|---|---|
| Rick Schaal<br>Full Time | Program Management Lead | Dec 2019 | Track 1, All Tracks | 34 Years EMS/MMS Project Deliveries | SCL, Tacoma, Evergy, NWPP | BA Comp Sci - Seattle U |
| Jennifer Wang<br>Part Time | Business Analyst | Jan 2020 | Track 4, All Tracks | 16 Years Project Planning and Implementation | PGE, MISO, Dominion, Cargill | M.S. / B.S. Business Administration, Decision and Information Sciences |
| Brian Ellison<br>Full Time | Power Generation Lead | May 2020 | Track 4, 3,5,6 | 15 Years - Markets Software Development & Integration | SCL, PGE, KCP&L | BBA IT - University of Texas |
| Ryan Kroelinger<br>Full Time | BA Entity Lead | Feb 2020 | Track 3, 4,6 | 13 Years - Grid Operations, AGC Dispatch, Trading | SRP | BS Mathematics, NERC Certified |
| Zach Gill-Sanford<br>Part Time | BA Entity Lead | Jan 2020 | Track 3, 2,4,6 | 11 Years - Transmission Strategy, Policy, Planning, Integration | LADWP, SCL, Avista, PSE | BSEE University of Washington |
| Andrea Donald<br>Full Time | Settlements & Metering Lead | May 2020 | Track 5, 4,6 | 18 Years - Energy Markets Solution Implementations | SCL, PCI, SPP, MISO | BS Comp Sci - Southeastern Louisiana U |
| Chuck Richter<br>Part Time | Generation Hydro Optimization | Jan 2020 | Tract 3, 4,6 | 20 Years - Power and Markets Specialist | SCL, MISO, CENACE | BSEE SDSU, MS/PhD Iowa State |
| Brian Holmes<br>When Required | EIM Project Advisor, Utilicast EIM Solutions | Jan 2020 | All Tracks | 18 Years Energy Markets Specialist | LADWP, Avista,PNM, SENER | BS/MS Economics - UC Davis, PMP |

# Communications Protocol

- BPA Work Locations/General Availability
  - HQ, 3rd Fl #, Bull Pin #3309-N19 & Dittmer, Cubical #2359 and #2362
  - Most consultants travel in Mondays, out on Thursdays
- Email Communications
  - Cc Roger and Rick
  - Use Utilicast email addresses
  - Responses usually within same or next day
- Meeting Invites
  - Use Utilicast email for invites
  - In Person – limited until staff are on-boarded
  - Tele-conference – as current schedule will allow
- Cell/Text
  - OK to use, Text is not always reliable

Core team will be fully onboard and engaged by the beginning of May; until then availability might be limited at times due to previous client needs

Utilicast's Contract is T&M which means every time you contact Utilicast, a revenue quality Meter turns on!

# Utilicast Team – Contact Information

| Utilicast Resource | Email | Phone |
|---|---|---|
| Rick Schaal | rschaal@utilicast.com | 425-999-6786 |
| Jennifer Wang | jwang@utiliicast.com | 727-644-1983 |
| Brian Ellison | bellison@utilicast.com | 214-563-9398 |
| Ryan Kroelinger | rkroelinger@utilicast.com | 480-316-3463 |
| Zach Gill-Sanford | zgillsanford@utilicast.com | 206-369-9594 |
| Andrea Donald | adonald@utilicast.com | 727-608-6002 |
| Chuck Richter | crichter@utilicast.com | 425-765-4349 |

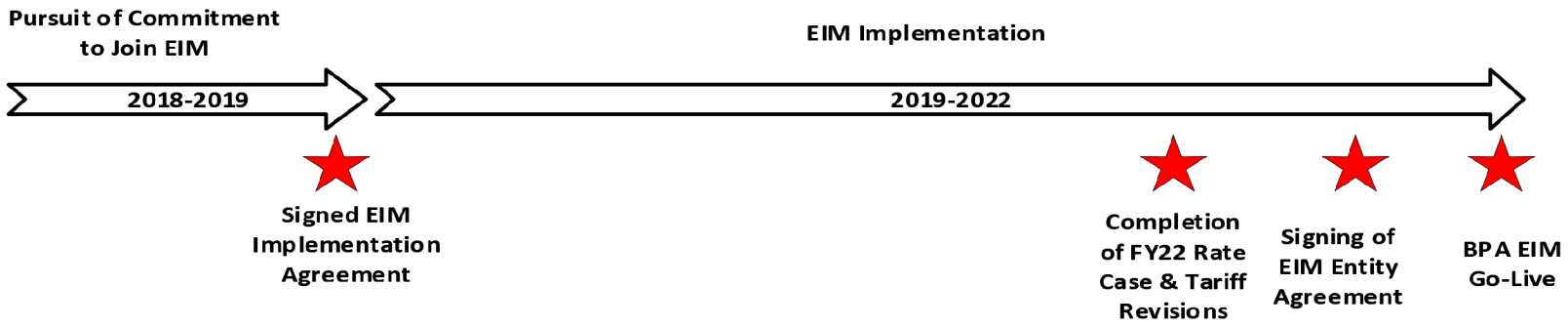
Remember: The meter is running!

# EIM Program Background & Overview

- History of BPA's pursuit of participation in a within-hour energy market:
  - 2011-2016: NWPP pursuit of a regional market
  - 2016-2017: BPA California Engagement Effort
  - 2018-2019: Commitment to Pursue EIM - effort culminating in 9/26 signing of EIM Implementation Agreement
  - 2019-2022: Implement EIM systems & processes – culminating in EIM Closeout, Entity Agreement & EIM participation

# Commitment to Pursue EIM

- Significant stakeholder process and CAISO partnership
- Culminated in 9/26/19 EIM Implementation Agreement (https://www.bpa.gov/Projects/Initiatives/EIM/Doc/WEIM-signed-implementation-agreement.pdf)
  - Commits CAISO to some special provisions – including an API for BAAOP functions (e.g. Manual Dispatch, Load Bias etc)
  - Adopts a March 2, 2022 implementation date
- Signing of EIM Entity Agreement is contingent on final stakeholder process & Agency "Record of Decision" that will follow our FY 21-22 Rate Case & Tariff revisions



# Grid Mod Program

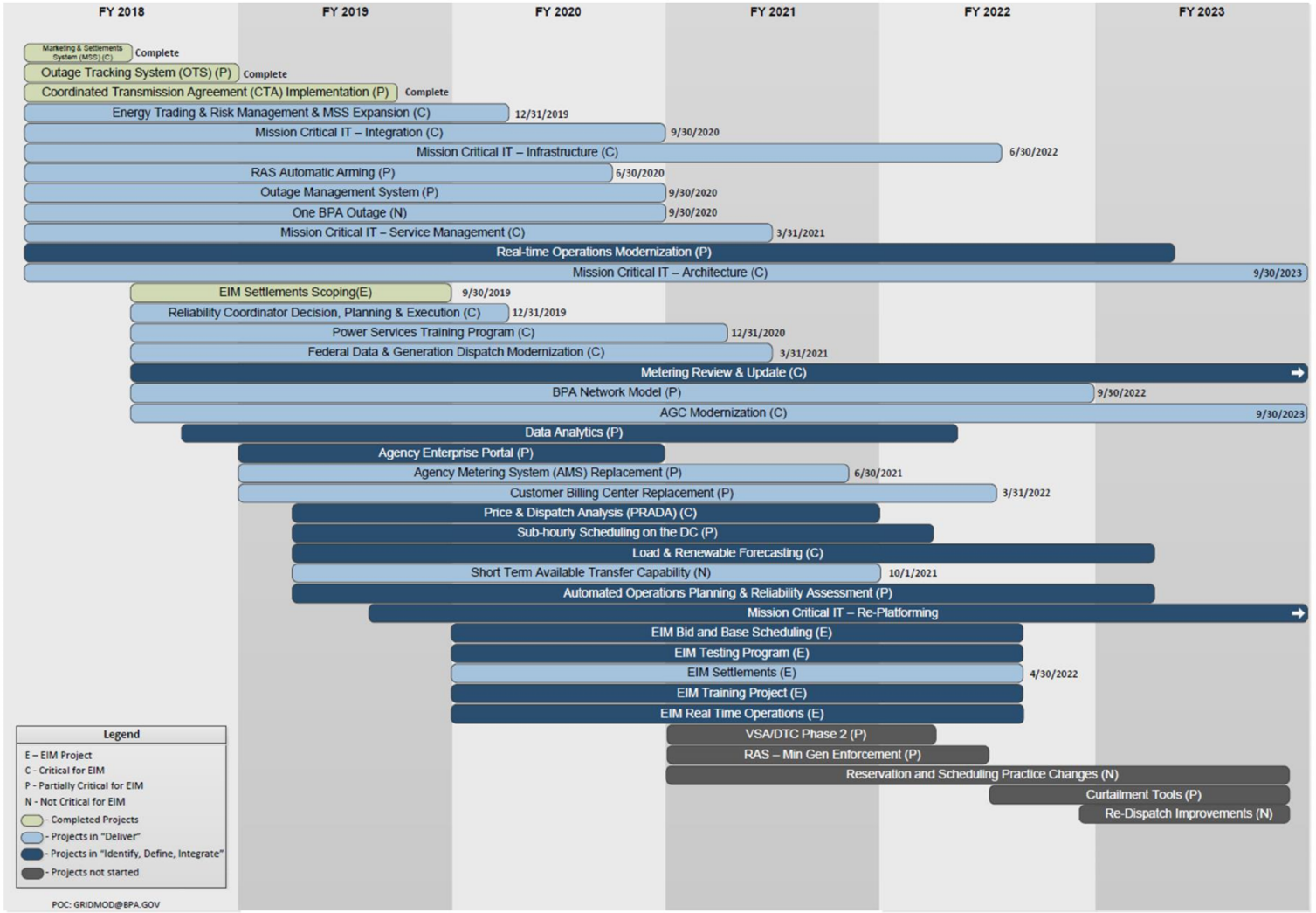
Grid Mod Program initiated 18 months ago

- Initiated by Roadmapping effort led by Utilicast
- Contains collection of 35+ commercial and operational improvement projects, that are in different phases of development
- Several of these include EIM-relevant scope (e.g. AGC Modernization – which includes integration of ADS into AGC)
- Some are explicit EIM projects
- EIM Implementation is included in Grid Mod Program

# Grid Modernization Roadmap

FY20 Q1

Updated as of 12/17/2019 – Subject To Change




Bonneville POWER ADMINISTRATION

# The Big Picture (Full Grid Modernization Portfolio)

←---------- **Grid Mod Program** ----------→

←---------- **EIM Program** ----------→

## Non EIM Projects

- Automated Ops
- BPA Network Model
- Energy Trading & Risk Mgt
- MCIT (Architecture Infrastructure, Integration Services Mgt and Re-Platforming)
- One BPA Outage
- Power Svcs Training Program
- RAS Automatic Arming
- Real Time Ops Modernization
- ST Available Transfer Capability
- Sub-Hourly Scheduling on the DC

## Partial EIM Projects

- Agency Enterprise Portal (AEP)
- Agency Metering Services (AMS) Replacement
- Automated Generation Control Modernization (AGC Mod)
- Customer Billing Center Replacement (CBC)
- Data Analytics
- Fed Data & Gen Dispatch Mod (Fed Data)
- Load & Renewable Forecasting (LRF)
- Metering Review & Update (MRU)
- Outage Management System (OMS)
- Price & Dispatch Analysis (PRADA)
- Reliability Coordinator (RC)

## 100% EIM Projects

- EIM Bids & Base Scheduling
- EIM Real Time Operations (RT Ops)
- EIM Settlements Implementation
- EIM Testing Program
- EIM Training Program

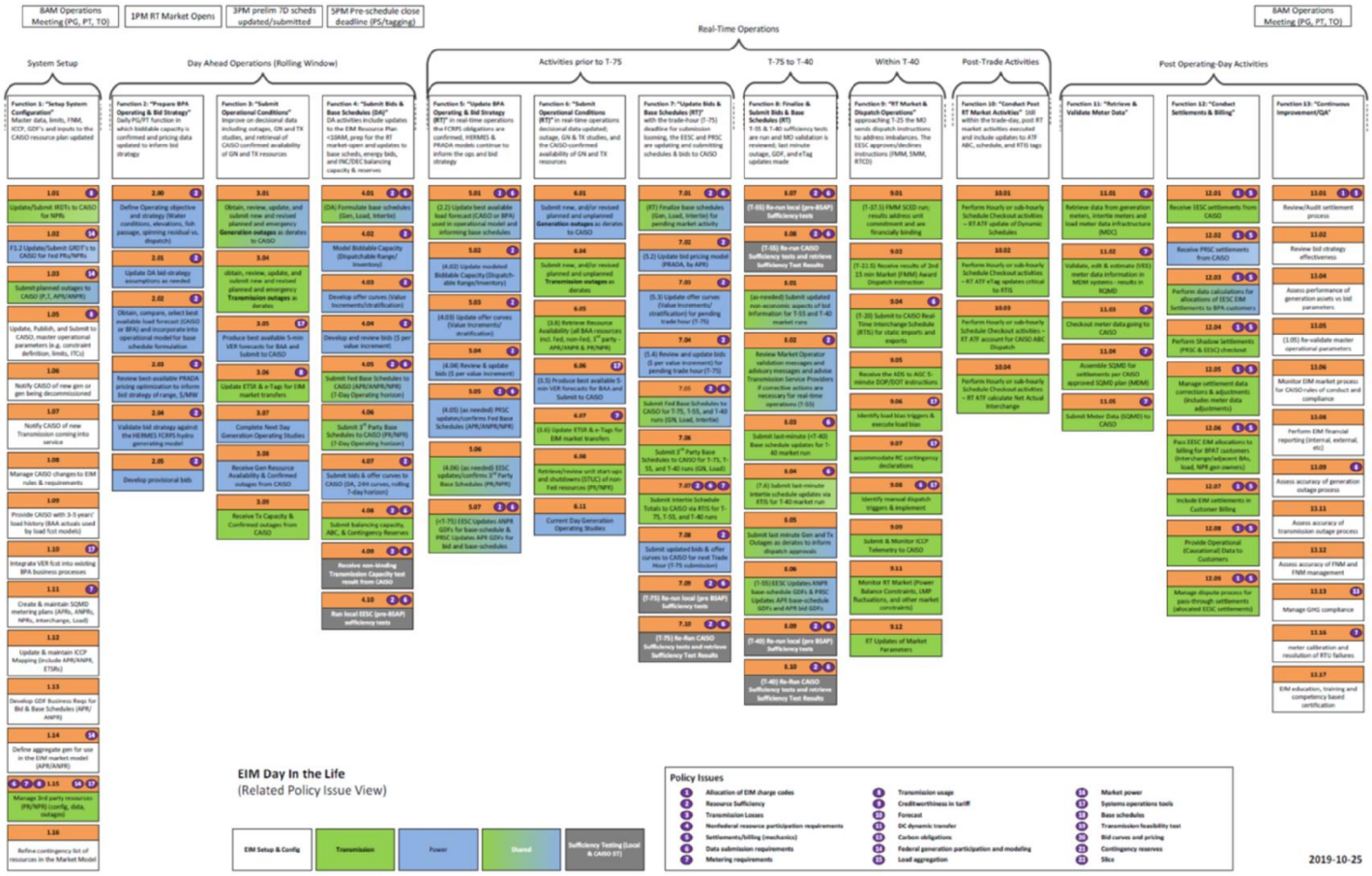
# Day-In-The-Life (DITL) Business Architecture

Identifies business and operational EIM activities/capabilities across time horizons creating a DITL perspective upon which to anchor EIM functional & process requirements.

EIM Implementation Core Team has mapped DITL activities to:

- Impacted Organization(s)
- Business Domain
- Existing or New Projects
- Policy Catalog
- IT Tenant Environments
- CAISO Tracks
- Initial estimate of complexity
- Maturity of activity required for Go-Live

# Day-In-The-Life (Policy View)



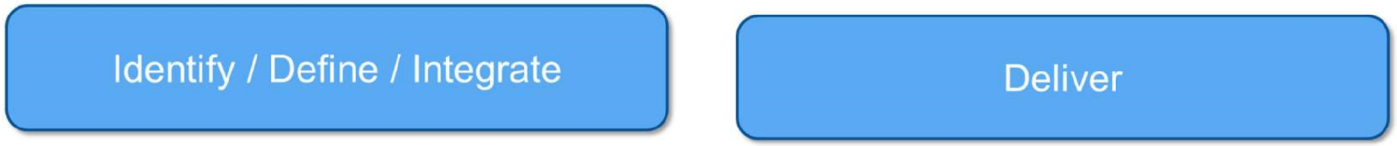
# GM/EIM Project Phases (IDID)

| | Identify | Define | Integrate | Deliver |
|---|---|---|---|---|
| **Description** | The purpose of **Identify** is to create a common understanding of a proposal designed to address a business opportunity or problem as it relates to BPA's strategy, and evaluate if there is enough potential value to invest further effort. | The purpose of **Define** is to establish the value to be delivered and recommend a business capability.<br>To accomplish this, there are three main activities:<br>• Establish desired value<br>• Analyze the impact of the proposed change on the business in terms of people, process, technology, and policy<br>• Begin to outline potential business capabilities that may close any existing gaps between the current state and desired future state. | The purpose of **Integrate** is to<br>• Plan and secure resourcing and sequencing of work to best deliver value<br>• Identify and validate epic and feature interdependencies across projects and organizations for the work identified and prioritized during Define<br>• For technology solution epics, complete IT System Life Cycle (SLC) requirements | The purpose of **Deliver** is to execute the defined work. Acceptance criteria ensure work delivered meets expectations. Success is measured in terms of value delivered to the business. |
| **Activities** | • Appoint initial project leadership<br>• Conduct Identify Workshop to complete Identify documentation<br>• Establish financial tracking | • Appoint project leadership roles<br>• Conduct Define Workshops to establish prioritized epics and list of features<br>• Establish weekly Dashboard reporting | • Assess, prioritize, and sequence epics and features across projects<br>• Complete SLC phases and identify candidate solutions to meet the business need<br>• Establish estimated project budget and secure funding | • Track project completion and business value delivery<br>• Identify and address changes to scope, schedule, and budget; manage issues and risks<br>• Complete SLC phases<br>• Complete change activities<br>• Establish O&M plan and budget<br>• Conduct project close out |

# IDID & IT System Lifecycle

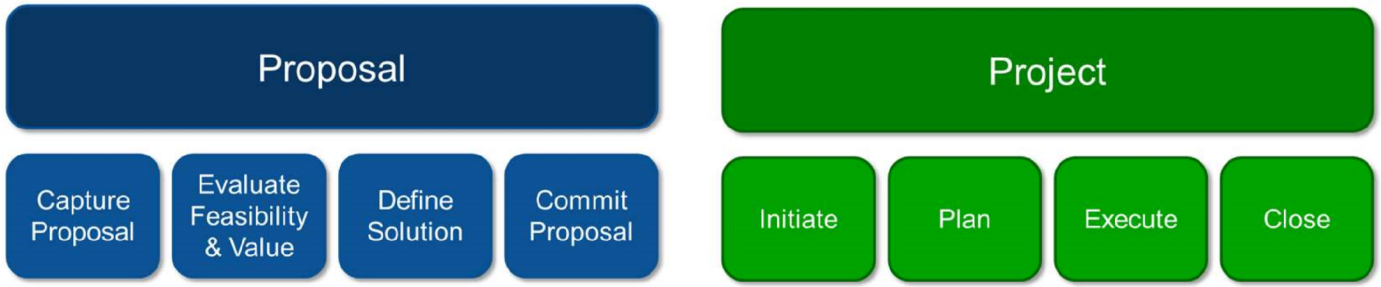
## IDID

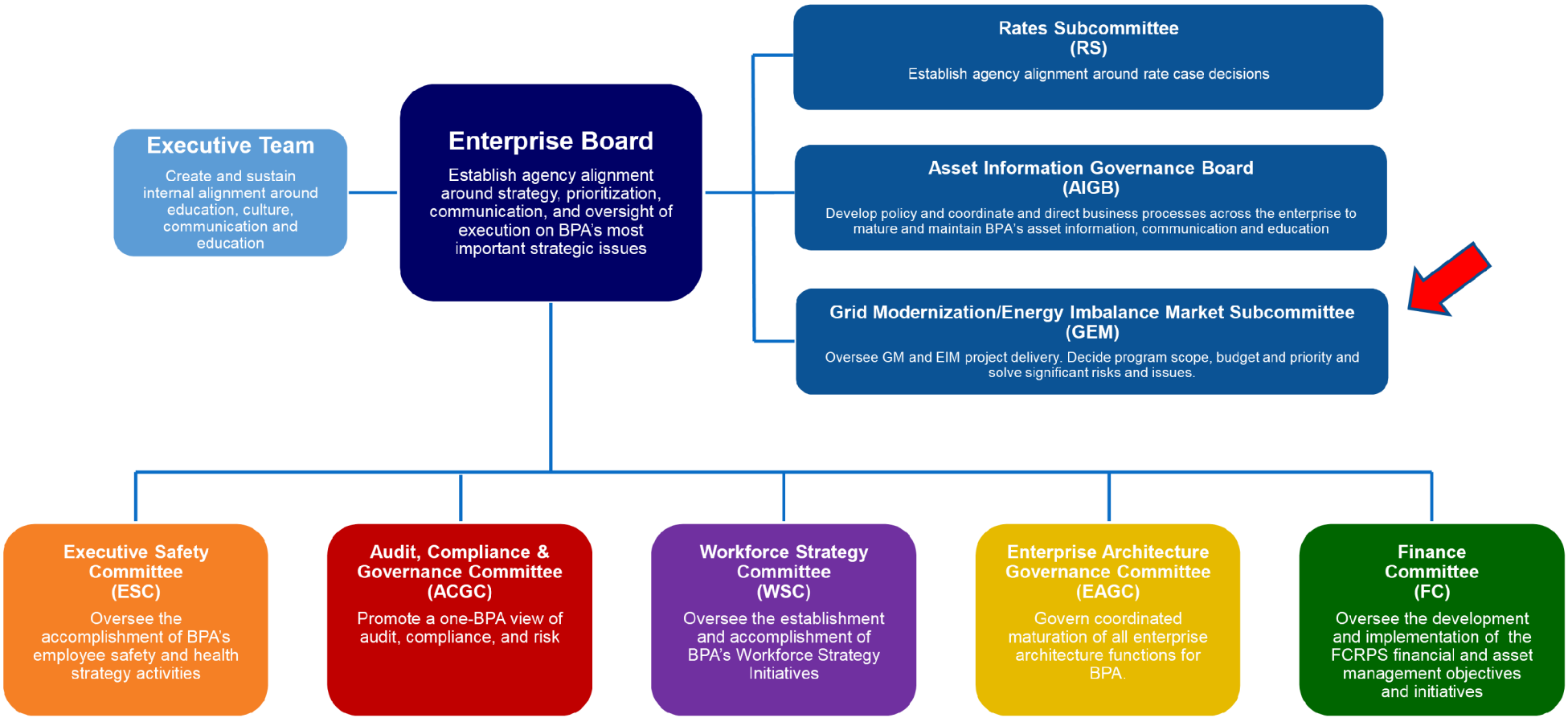
The IDID is the BTO's portfolio management framework. Its purpose is to move a portfolio of transformational projects through identifying the work to be done and defining business value, integrating and prioritizing work across organizations, processes and projects to maximize resources and minimize costs, and executing work to deliver value.

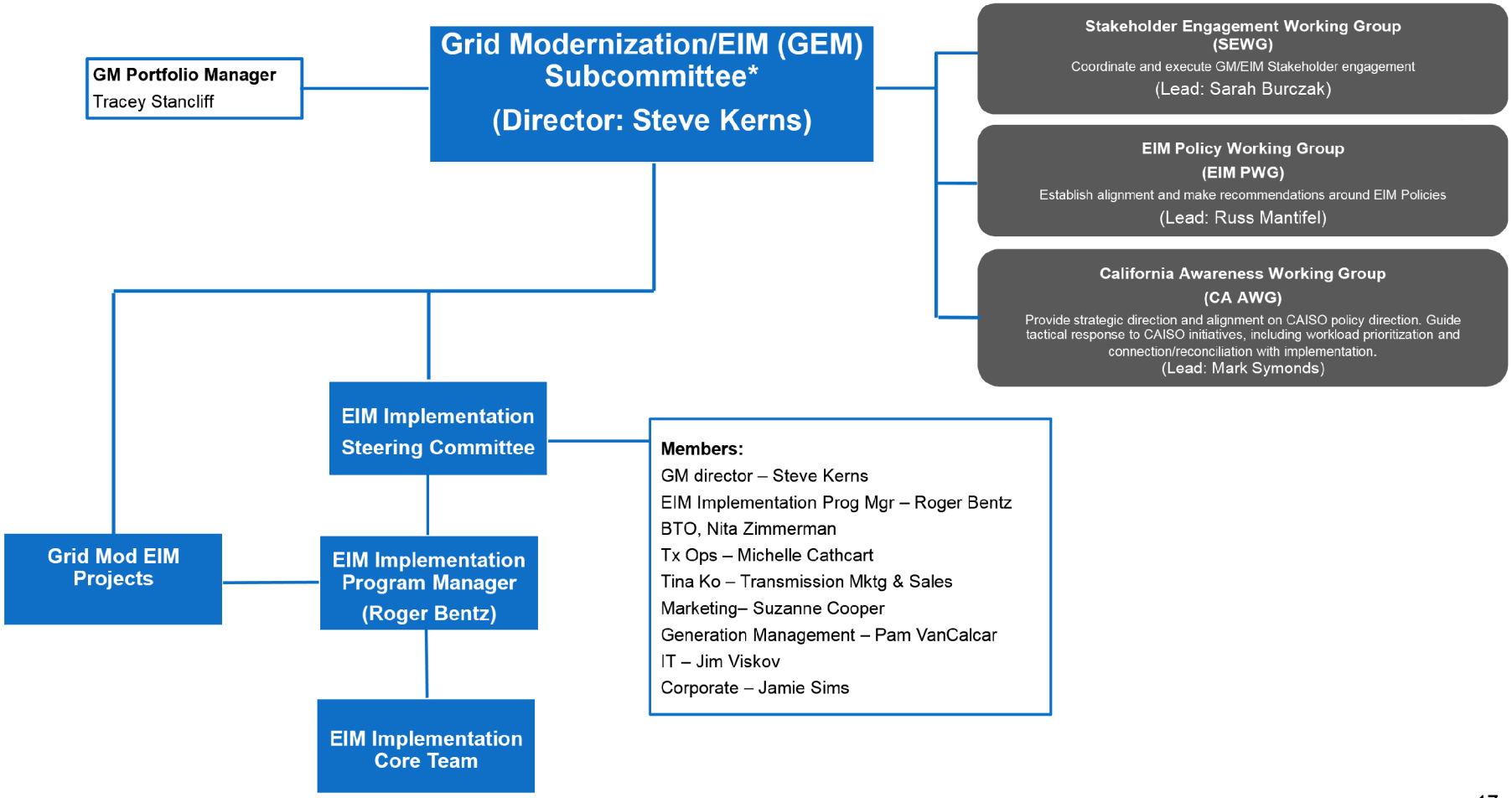



## SLC

The BPA SLC describes a set of repeatable processes for the delivery of IT solutions. The SLC helps ensure information system development, implementation, and operation processes and procedures are aligned with all applicable Federal and Regulatory requirements.




Executive Team
Create and sustain internal alignment around education, culture, communication and education
Enterprise Board
Establish agency alignment around strategy, prioritization, communication, and oversight of execution on BPA's most important strategic issues
Rates Subcommittee (RS)
Establish agency alignment around rate case decisions
Asset Information Governance Board (AIGB)
Develop policy and coordinate and direct business processes across the enterprise to mature and maintain BPA's asset information, communication and education
Grid Modernization/Energy Imbalance Market Subcommittee (GEM)
Oversee GM and EIM project delivery. Decide program scope, budget and priority and solve significant risks and issues.
Executive Safety Committee (ESC)
Oversee the accomplishment of BPA's employee safety and health strategy activities
Audit, Compliance & Governance Committee (ACGC)
Promote a one-BPA view of audit, compliance, and risk
Workforce Strategy Committee (WSC)
Oversee the establishment and accomplishment of BPA's Workforce Strategy Initiatives
Enterprise Architecture Governance Committee (EAGC)
Govern coordinated maturation of all enterprise architecture functions for BPA.
Finance Committee (FC)
Oversee the development and implementation of the FCRPS financial and asset management objectives and initiatives

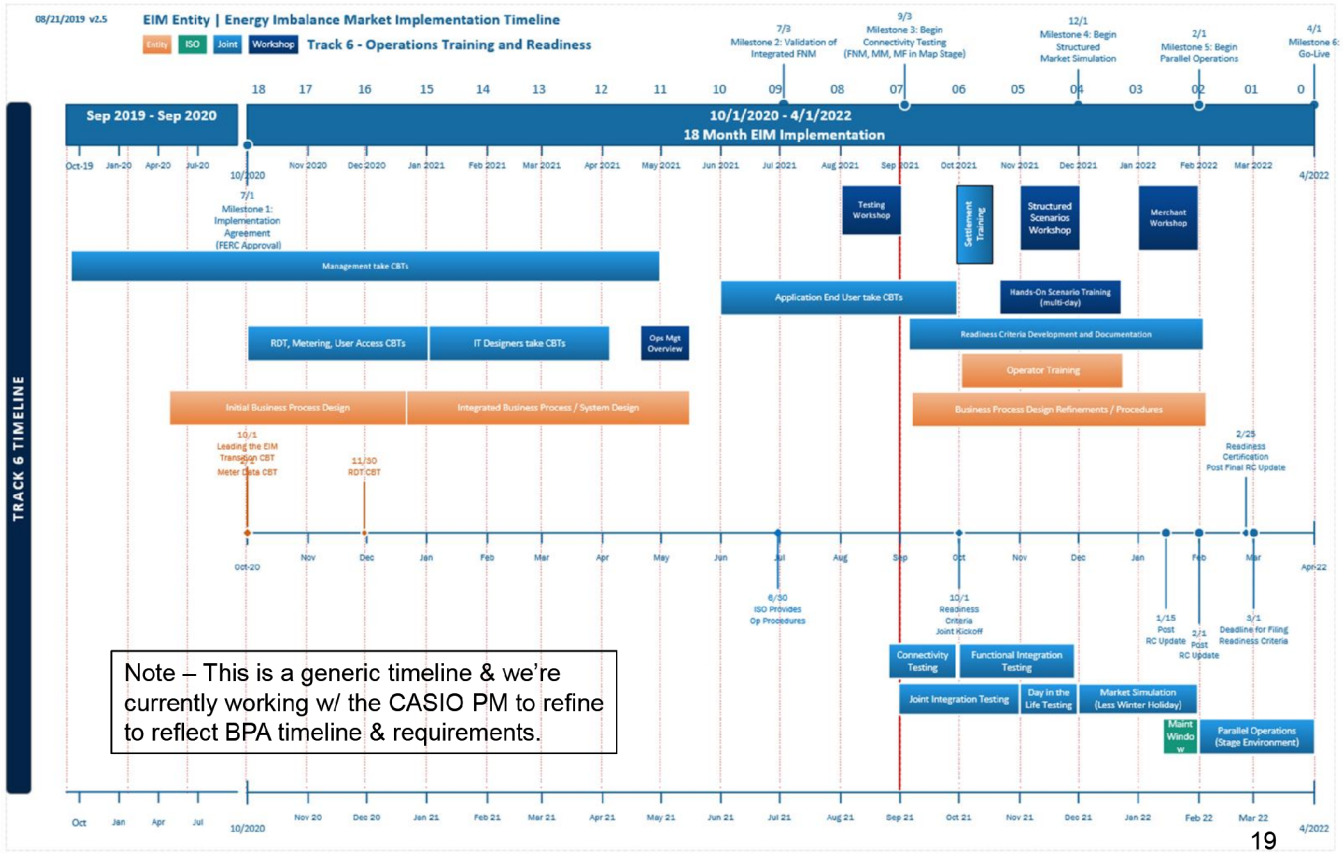

GM Portfolio Manager
Tracey Stancliff
Grid Modernization/EIM (GEM) Subcommittee*
(Director: Steve Kerns)
Stakeholder Engagement Working Group
(SEWG)
Coordinate and execute GM/EIM Stakeholder engagement
(Lead: Sarah Burczak)
EIM Policy Working Group
(EIM PWG)
Establish alignment and make recommendations around EIM Policies
(Lead: Russ Mantifel)
California Awareness Working Group
(CA AWG)
Provide strategic direction and alignment on CAISO policy direction. Guide tactical response to CAISO initiatives, including workload prioritization and connection/reconciliation with implementation.
(Lead: Mark Symonds)
EIM Implementation Steering Committee
Members:
GM director – Steve Kerns
EIM Implementation Prog Mgr – Roger Bentz
BTO, Nita Zimmerman
Tx Ops – Michelle Cathcart
Tina Ko – Transmission Mktg & Sales
Marketing– Suzanne Cooper
Generation Management – Pam VanCalcar
IT – Jim Viskov
Corporate – Jamie Sims
Grid Mod EIM Projects
EIM Implementation Program Manager
(Roger Bentz)
EIM Implementation Core Team

# BPA Implementation Core Team

| Name | Primary Role |
|---|---|
| Roger Bentz | EIM Implementation Program Manager |
| Russ Mantifel | EIM Policy Lead |
| Todd Kochheiser | EIM Technical Lead |
| Mark Simpson | Generation Operations SME |
| Dave Bicknell | SME for Back-Office Functions |
| Matt Germer | Power Trading SME |
| Troy Simpson | Transmission Operations SME |
| Scott Winner | Generation Operations SME |
| Nicki Hablutzel | Business Analyst |
| David Judson | Business Analyst |
| Andrew Goodwin | Business Analyst / Business Architect |
| Traci Loveland | Change Manager |
| Rick Schaal | EIM Integrator Program Lead |

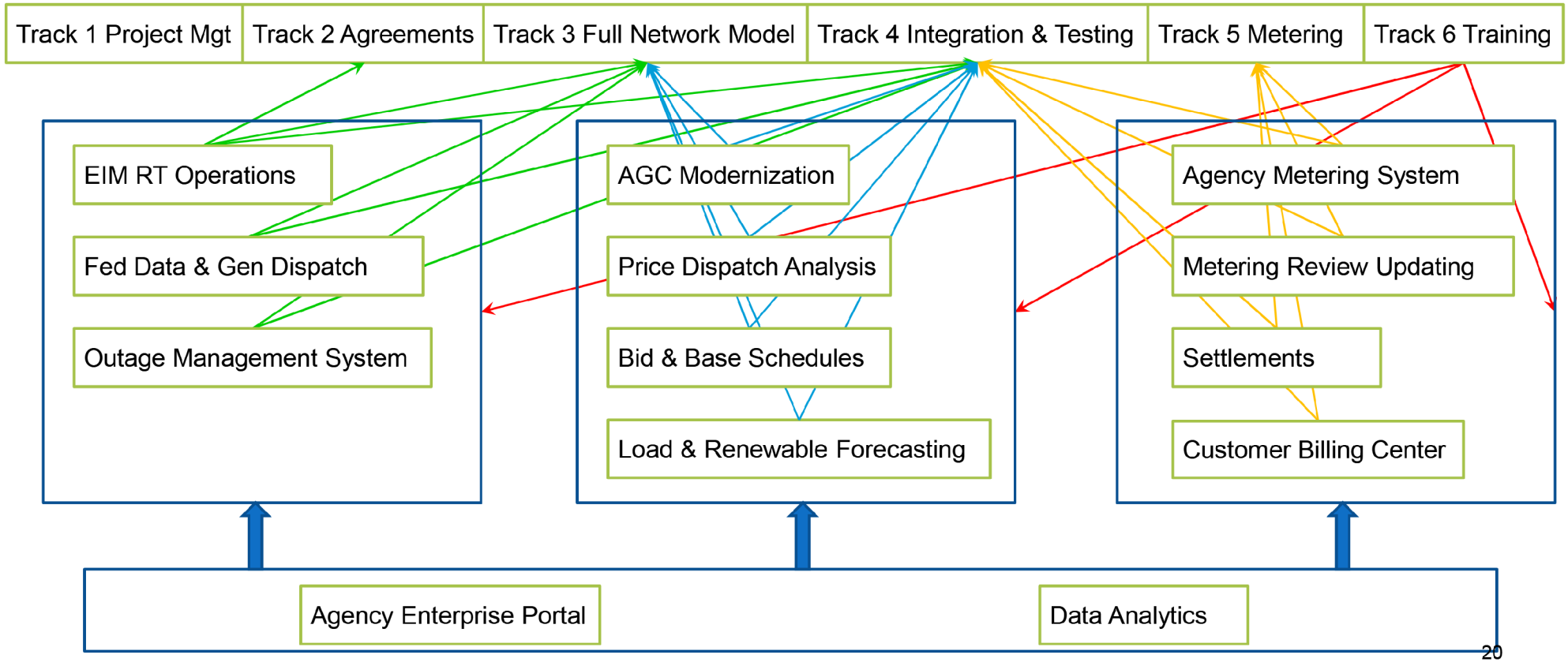
# CAISO Program Structure

| CAISO Tracks |
| --- |
| **Track 1:** Planning and Project Management |
| **Track 2:** Policy, Legal and Support |
| **Track 3:** EIM Network Model and EMS Changes |
| **Track 4:** System Integration and Testing |
| **Track 5:** Metering and Settlements |
| **Track 6:** Operations Training and Readiness |




Note – This is a generic timeline & we're currently working w/ the CASIO PM to refine to reflect BPA timeline & requirements.

# CAISO Tracks Map to BPA Work Streams



# Current CAISO Interaction Activities

| Work Stream | BPA Participants | CAISO Participants | Objective |
|---|---|---|---|
| **EIM Program Mgmt & Planning** | Roger Bentz, Todd Kochheiser, Rick Schaal | Joanne Alai | Weekly touchpoint to work on cordination and planning actions and activities |
| **Automation Development** | Todd Kochheiser, Roger Bentz, Rick Schaal, Nicki Habluetzel, Dave Brown, various T-Ops staff | Joanne Alai, Khaled Abdul-Rahman, Jamil Daouk, George Angeledis, Yu Wan, Juan | Develop additional automation capabilities to improve operational effectiveness of various EIM RT operations activities - as agreed to in the EIM Implementation Agreement |
| **GRDT & IRDT Development** | Todd Kochheiser, Roger Bentz, Rick Schaal, Scott Winner, Mark Simpson, Zach Gill-Sanford | Joanne Alai, Tong Jie | Develop GRDTs and IRDTs early & learn operational & participation dependencies on these configurations |
| **Load Forecasting** | Roger Bentz, Clarisse Messemer, Libby Kirby, Chuck Richter, Todd Kochheiser | Joanne Alai, Amber Motley, Michael Stewart | Get a head start on addressing Load Forecasting issues and visibility of CAISO's load forecasts for BPA's BAA |
| **Metering and SQMD Plans** | Todd Kochheiser, Kelly Gardner, Kevlyn Baker, Andrea Donald, Roger Bentz | Joanne Alai, Priyanka Namburi | Get a head start on development of SQMD plans & metering exceptions |
| **AGC ADS Integration** | Todd Kochheiser, Dave Brown, Dave Kirsch, Tom henning, Kris Womack, PG - TBD, Brian Ellison | Joanne Alai, ?? | Develop AGC integration capability of market ADS dispatches |
| **VER Forecasting** | Roger Bentz, Clarisse Messemer, Eric King, Eric Taylor, Danny Chen, Chuck Richter | Joanne Alai, Amber Motley, Jamil Daouk, Justin Wong | Address issues and options for VER forecasting |



BPA-2020-00700-F0371




# GM-EIM Project Presentations
## (10-15 min each)

# Project Presentation Objectives

1. Share Project Knowledge
   - Project Scope
   - Key Project Milestones
   - Known EIM Scope
   - Current Status of EIM Elements

2. Then, based on that, in today's work session:
   - Validate or Refine Project's EIM Scope
   - Discuss/Determine Utilicast/CAISO Support

# Project Presentation Schedule

| Time | Project | Time | Project |
|---|---|---|---|
| 9:00-9:15 | Agency Metering System (AMS) Replacement | 10:30-10:45 | Data Analytics |
| 9:15-9:30 | EIM Settlements Implementation | 10:45-11:00 | Outage Management System (OMS) |
| 9:30-9:45 | AGC Modernization | 11:00-11:15 | Price & Dispatch Analysis (PRADA) |
| 9:45-10:00 | Bid and Base Scheduling | 11:15-11:30 | Federal Data & Gen Dispatch Modernization (Fed Data) |
| 10:00-10:15 | Load & Renewable Forecasting (LRF) | 11:30-11:45 | Agency Enterprise Portal (AEP) |
| 10:15-10:30 | Metering Review & Update | 11:45-12:00 | Customer Billing Center (CBC) Replacement |
| 12:00-12:15 | EIM Real Time Operations (EIM RT Ops) | | |

# EIM Testing and Training Programs Update

- These are very important projects to the overall success of our EIM effort, but not included today
- The teams will be forming soon to start developing their Epics & Features along with the other new EIM projects
- For Training: Because broad EIM information/education is top of mind across BPA, there has been some initial planning work within the BTO that will continue as part of the Training project

**Approach for EIM Testing Program:**

1. Coordination with the CAISO regarding environments & access
2. Coordination with individual projects that are part of the end-to-end testing
3. Perform Connectivity, Market Simulation, Parallel Operations testing
4. Perform business capability testing

**Approach for EIM Training Program:**

1. Broad based Agency wide information
2. Specific, in-depth education for impacted groups
3. In-depth/Certifications for specified roles based on EIM related duties




# Agency Metering System (AMS) Replacement

Presented By:
Product Owner: Malerie Ray, KSM (Metering)
Lead Sponsor: Jeff Racicot, KSM (Metering)

January 10, 2020

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Revised 12/2/19

35+ GRID Modernization

# Agency Metering System (AMS) Replacement

*Install the most suitable platform to meet BPA's current and future meter data collection and management needs*

## WHY?

**Maximize efficiencies regarding data retrieval and validation** by increasing Revenue Quality Meter Data (RQMD) transparency, enhancing automation, and improving accuracy of RQMD processes for downstream users

**Replace extensive custom code with commercial off-the-shelf functionality** by assessing vendor options along with business and integration requirements for future KSM work and Mission Critical Architecture and Architecture Team recommendations

**Allow BPA to confidently enter the EIM market** by supporting customer billing, settlements and providing proof of physical meter accuracy, RQMD verification, and data display for downstream customer use

## PROJECT DESCRIPTION

The project implements a new Agency Metering System that will meet requirements for current and future business needs. The system will meet Metering Services (KSM) and BPA's short and long term meter data retrieval, meter data management, event tracking, and reporting platform requirements.

## CORE USER GROUPS

- ❑ KSM – Metering Services
- ❑ JCD – Critical Business System Development
- ❑ JLSC – Agency Commercial Systems
- ❑ KSB– Customer Billing Services

## BENEFITS

- **Expand metering services/ capabilities to meet current and future demand**
- **Improve business efficiency with detailed training for all KSM by selected vendor**
- **Support BPA's participation in the Western EIM and other Grid Modernization efforts**
- **Reduce revised bills and unmetered events using new automated validation routines**
- **Increase reliability and customer service from vendor**
- **Reduce IT costs by reducing amount of custom code in AMS**

## WHAT'S CHANGING?

| | |
|---|---|
| **Lack of vendor support, frequent defects, and functionality; not aligned with KSM needs** | **New vendor meets current and future requirements of KSM** |
| **KSM business processes requires large amount of software customizations** | **Aligned KSM business processes with commercial off-the-shelf software** |

| August 31, 2019 | December 31, 2019 | February 29, 2020 | April 30, 2020 | June 30,2020 | September 30, 2020 | March 31, 2021 | |
|---|---|---|---|---|---|---|---|
| Joint AMS (MDC* & MDM*)/CBC/EIM ASA Completed | AMS MDC RFO Vendor Evaluation and Selection | AMS MDC Implementation plan developed with Vendor | Joint AMS MDM/CBC/EIM RFO Vendor Evaluation and Selection | AMS MDM/CBC/EIM Implementation plan developed with Vendor | Begin using new AMS MDC solution | Begin using new AMS MDM solution | **Completion date June 30, 2021** |

**Executive Sponsor:** Jamie Sims
**Lead Sponsor:** Jeff Racicot
**IT PMO Sponsor:** Jim Viskov

**Product Owner**
Malerie Ray

**BTO Project Manager**
Heather Jespersen

***Terms to know:**

**Meter Data Collection (MDC):** The software required to setup meter configurations and retrieve data from physical meters and other sources of meter interval information.

**Meter Data Management (MDM):** The software required to validate, edit, and estimate meter interval amount to create RQMD.

## Questions

Malerie Ray - mrray@bpa.gov
Heather Jespersen- hljespersen@bpa.gov

# Project: Agency Metering System Replacement

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 10/01/18 | Jeff Racicot | Malerie Ray | Tommy Rodrigues, Jason Gamby, A'de Boileau, Renee Landers, Mo Al-Sheikhly, Megan Peters, Heather Jespersen, Traci Loveland, Jim Youngdahl, Neal Peterson | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Collect and/or manually import meter data from revenue quality meters and other sources. | On Target |
| 2. Automatically and visually validate meter data to ensure data accuracy and create revenue quality meter data (RQMD). | On Target |
| 3. Edit RQMD with final values to correct any data anomalies. KSM (Metering) does not estimate data. | On Target |
| | |

**Project Needs & EIM Questions:**

Needs:
- Gain alignment with Utilicast and internal BPA groups regarding KSM (Metering) roles and responsibilities. KSM does not currently include any Energy Accounting duties. In depth meeting with Utilicast, KSM, KSB (Billing), PTK (Scheduling Coordination), and TPC (Customer Service Engineering) to go over this information.
- Define CAISO vs. BPA terms. The terms validate, estimate, and edit for EIM meter information mean very different activities compared to what KSM processes RQMD for.

Questions:
1. Who from Utilicast should be at 1/22 RQMD deep dive meeting? Have Andrea currently.




# EIM Settlements (Implementation)

Presented By:

Product Owner: Rasa Keanini, KSB (Customer Support Services)

January 10, 2020

Revised 1/3/2020

35+ GRID Modernization

# EIM Settlements Implementation

*Maximizing the value by ensuring accurate settlement of CAISO market transactions for BPA and its customers*

## WHY?

- **Allow cost effective participation in the EIM** Contribute to BPA's successful participation in the Energy Imbalance Market (EIM)
- **Establish quality reporting of settlements** for efficient and effective EIM settlements and allocation capabilities
- **Continued Improvement to** provide EIM participation results as input to EIM marketing and operation optimization

## PROJECT DESCRIPTION

The project develops a centralized settlement function through a phased approach with capability to support successful processing of the California Independent System Operator market settlements.

## CORE USER GROUPS

- ❑ Settlements Analysts
- ❑ KSB – Customer Billing
- ❑ KSM – Metering Services
- ❑ PTF/R – Trading Floor
- ❑ F – Finance
- ❑ TO – Market Optimization

## BENEFITS

- Maximize the value of BPA's resources by participating in the EIM
- Improve settlements process efficiencies through a centralized settlements capability & system
- Enable holistic EIM analytics and settlement validations based on full understanding of data from EIM marketing & operations
- More accurate accounting of EIM charges and credits delivered to customers
- Enhance system capabilities to enable flexibility to meet future business demands including EIM participation

## WHAT'S CHANGING?

| | |
|---|---|
| Day-ahead and real-time settlements with CAISO | Add EIM Settlements to existing CAISO settlements |
| Pass through limited EIM charges and credits for transfer customers | Allocation of EIM costs to BPA balancing authority area customers |
| CAISO market settlements performed across multiple organizations | CAISO market settlements phased in to a centralized organization |

| January 25, 2020 | February 28, 2020 | September 30, 2020 | October 31, 2020 | February 28, 2021 | April 30, 2021 | March 31, 2022 | Completion date |
|---|---|---|---|---|---|---|---|
| Joint AMS MDM/CBC/EIM RFO Vendor Evaluation and Selection | Implementation plan developed with Vendor | Begin Testing | Stand up Settlements Org | Organization & Settlement Capabilities Developed | Begin Training | Go Live | June 30, 2022 |

**Executive Sponsors:** Jamie Sims (Lead), Tina Ko, Suzanne Cooper, Nadine Coseo
**Lead Sponsors:** Henry Tieu (Lead), Joe Chambers

**Product Owner**
Rasa Keanini

**BTO Program Manager**
Roger Bentz

**Questions**
Rasa Keanini – rkeanini@bpa.gov
Roger Bentz - rebentz@bpa.gov



BPA-2020-00700-F0380

# Project: EIM Settlements Software (Implementation)

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team | Project Status (insert X): |
|---|---|---|---|---|
| 10/01/19 | Henry Tieu, Joe Chambers | Rasa Keanini | Chris Gallas, Stacy Tanner, Derrick Pleger, Eric Taylor, Will Rector, Justin Steel, Daniel Lehman, Neal Peterson, David Judson, Roger Bentz, Traci Loveland | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1.Integrate with internal (metering, tagging, billing, accounting, etc.) and external systems (CAISO). | On Target |
| 2. Calculate Shadow Settlements (pre-settlements and validate CAISO settlements). Manage CAISO disputes. | On Target |
| 3. Settlements reporting and analytics. | On Target |
| 4. Allocate EIM settlements to BPA customers according to BPA policy. Implement system support for dispute process for BPA customers. | On Target |

**Project Needs & EIM Questions:**

Needs:
- Need to have SME help us determine what people do vs. what system does with respect to EIM-Settlements
- How to implement the aggregate generation (virtual) resource model (APR and ANPR) and match APR metered data to CAISO dispatch

Questions:
1. Best practices on creating and submitting Settlement Quality Meter Data (SQMD) to CAISO?
2. Best practices/lessons learned of what needs to be in place prior to vendor software testing.

# Project: EIM Settlements Org (Implementation)

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team | Project Status (insert X): |
|---|---|---|---|---|
| 10/01/19 | Henry Tieu, Joe Chambers | Rasa Keanini | Chris Gallas, Leslie Pompel, Derrick Pleger, Stacy Tanner, Eric Taylor, Will Rector, Ryan Josephson, David Judson, Roger Bentz,Traci Loveland | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Set up PRSC settlements function in Bulk Marketing merchant org (PT) | On Target |
| 2. Set up EESC settlements function in Transmission Marketing org (TS) | On Target |
| 3. Document detailed workflows and processes for PRSC and EESC settlements (create standardized processes across EESC/PRSC) | On Target |
| 4. Integrate PRSC and EESC functions with other departments (e.g., KSB (Billing) and Finance) | TBD |

**Project Needs & EIM Questions:**

Needs:
- We need a SME to help define detailed workflow of EESC settlements processes.
- Settlement Quality Meter Data (SQMD) plan - responsibilities for Energy Accounting & preparation of SQMD

Questions:
1. Does Utilicast have a defined process for EESC Settlements?
2. What critical coordination is needed between EESC and PRSC?




# Automatic Generation Control (AGC) Modernization

Presented By:
Program Manager: Dennis Petross, BD (Business Transformation Office)

January 10, 2020

Revised 11/27/2019

35+ GRID Modernization

# Automatic Generation Control (AGC) Modernization

*AGC is the heart beat of the grid. We need to upgrade AGC to have it beat with other markets.*

## WHY?

**Facilitate Capability** to ensure AGC is compatible with California Independent System Operator processes and systems and enable AGC to receive and respond to signals from the Market Operator on a 5 minute basis

**Implement AGC Dispatch Improvements** to enable high side control, high side dispatch aggregation and optimization of unit/plant control strategies for our customer's benefit

**Implement Reserves Enhancements** to enable BPA to optimize location, amount, type and priority of reserves help while avoiding fish spill violations and increasing market opportunities

## PROJECT DESCRIPTION

The project modernizes the Automatic Generation Control system to improve supportability, enable Power Services to Market new products and services, and improve communication within BPA as well as between BPA, neighboring Balancing Authorities and Federal Columbia River Power System generators.

## CORE USER GROUPS

- TO – System Operators
- PG – Power Generation
- PT – Bulk Marketing

## BENEFITS

- Improve how resources are operated
- Increase system flexibility for how BPA holds and deploys reserves
- Support marketing of new products and services
- Support BPA's ability to participate in the Western EIM, other energy markets and overall Grid Modernization efforts
- Improve communication within BPA and between BPA, neighboring Balancing Authorities and FCRPS generators

## WHAT'S CHANGING?

| | |
|---|---|
| Current AGC software version is outdated | Upgraded AGC system software |
| AGC cannot receive 5 min signal from CAISO | AGC compatible with CAISO on a 5 min basis |
| Limited flexibility with reserve management | Enhanced flexibility with reserve management |
| AGC Dispatch cannot disaggregate CAISO signals | AGC dispatch disaggregates CAISO signals |
| AGC visualizations result in slow decision making | Updated AGC visualizations for dispatchers, schedulers, generators will allow for faster decision making |
| Processes not optimized across the business lines | Optimized AGC processes and intra-business line operations |

| August 2, 2019 | October 31, 2020 | May 22, 2020 | June 12, 2020 | August 14, 2020 | January 15, 2021 | March 19, 2021 | July 2, 2021 | August 20, 2021 | August 27, 2021 | August 27, 2021 | September 3, 2021 | October 1, 2021 | October 1, 2021 | November 5, 2021 | December 31, 2021 | February 11, 2022 | Completion date September 30, 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Separate INC/DEC Reserve & Contingency Reserve resources by plant | Establish zero-reserve deployed basepoint | Reserve Display Enhancements /Modifications | Improved visibility for Hydro Duty Schedulers | Develop and communicate reserve inventory requirement by plant | Ability to set EIM participating and non-participating resources per aggregation | EIM issued instructions processed by plants | Continuous Plant Operations when not participating in EIM | Receive CAISO signals | Process EIM dispatch instructions via AGC | AGC transition to/from EIM enable/disable | FCRPS Control Strategy Changes | Disaggregate CAISO ADS signal and allocate to plants/project | Automatic CAISO notification when plant cannot respond to EIM dispatches | High-side unit control modifications | EIM Adaptations for Federal participation model | AGC Adaptations for EIM | |

**Executive Sponsor:** Michelle Cathcart
**Lead Sponsors:** Meg Albright, Suzanne Cooper, Jeff DiGenova, Pam Van Calcar, Clarisse Messemer, Chris Siewart
**Partner Sponsors:** Shawn Worthington, Joe Lapyere

**Product Owner**
Dave Brown

**BTO Program Manager**
Dennis Petross

**Questions**
Dave Brown – drbrown@bpa.gov
Dennis Petross – dwpetross@bpa.gov

# Project: AGC Modernization

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 04/01/18 | Meg Albright | Dave Brown | *Multiple core project team members from TOOC, TT, and PGS, Dennis Petross, Craig Thomas* | X |

| EIM Scope | Status |
|---|---|
| **Epic 2: AGC CAISO Compatibility** | Not Started |
| Feature 2.1: EIM Research/Analysis | Not Started |
| Feature 2.2: Document data flows and communication methods with CAISO (Design Specification) | Not Started |
| Feature 2.3: Receive CAISO signals | Not Started |
| Feature 2.4: Adaptations for Federal participation model | Not Started |
| Feature 2.5: Process EIM dispatch instructions via AGC | Not Started |
| Feature 2.6: EIM issued instructions processed by plants | Not Started |
| Feature 2.7: Ability to set EIM participating and non-participating resources per aggregation | Not Started |
| Feature 2.8: Continuous Plant Operations when not participating in EIM | Not Started |
| Feature 2.9: AGC transition to/from EIM enable/disable | Not Started |
| Feature 2.10: AGC Adaptations for EIM (Reserves Management) | Not Started |

**Project Needs & EIM Questions:**

Needs:

- Will likely need additional technical FTE support over next 12+ months to meet EIM implementation schedule
- Need to establish regular cadence of alignment and coordination check-ins with the BPA EIM program team and vendor/implementer

Questions:

1.
2.

Next Steps:

- Jan. 24 deeper-dive session with BPA EIM program team and Utilicast




# EIM Bid & Base Scheduling

Presented By:
Project Manager: Scott Winner, PGS (Generation Scheduling)
Product Owner: Elsa Chang, PGST (Generation Support)

January 10, 2020

# Project Scope (no One Pager yet)

- Bid and Base EIM Software
  - Software requirements
  - Vendor selection
  - Software integration
    - With the Western EIM and BPA systems
- Business Process Changes for PGS
  - Articulate how people's jobs are going to change
- Business Process Guidance for PGS
  - Management policy, strategy and guidance

# Project: EIM Bid & Base Scheduling

| Project Start Date | Lead Sponsor | Product Owner | Project Mgr | Core Project Team | Project Status (insert X): |
|---|---|---|---|---|---|
| October 1, 2019 | Pam Van Calcar | Elsa Chang | Scott Winner | Assembling from Utilicast, Power, Transmission, IT and BTO orgs | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Software **requirement** | On Target |
| 2. **Identify** data that already exists and data that does not | On Target |
| 3. **Identify** BPA systems and SMEs | On Target |
| 4. Integration Strategy | On Target |
| 5. Business process changes | On Target |
| 6. Policy, strategy and guidance | On Target |

**Project Needs & EIM Questions:**

Immediate Needs:
- Software requirements needs to start next week:
  - System Information Owner
  - FISMA and Cyber Security
  - Data and systems
  - Architecture
  - Options

PM Documents under development:
1. Define Document (epic and use case)
2. Project Implementation & Communication Plan
3. PGS Business Process Changes
   a) the What document




# Load & Renewable Forecasting (LRF)

Presented By:

Lead Sponsor: Clarisse Messemer, PGST (Generation Support)

January 10, 2020

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Revised 11/26/19

35+ GRID Modernization

# Load and Renewable Forecasting (LRF)

*Coordinated improvement to load forecasting across the agency and required inputs for Western EIM participation*

## WHY?

- **Reduce uncertain water management** caused by multiple, inconsistent forecasts used across operations
- **Reduce load uncertainty** decreases our ability to offer flexibility for marketing
- **Correct ineffective feedback loop for load forecasting improvements** caused by lack of standardized use of load forecasts across BPA
- **Help BPA decide which load and renewables forecasts to use** to participate in the Western Energy Imbalance Market

## PROJECT DESCRIPTION

The project identifies and maps load forecast business processes and data transfers across BPA, identifies missing data that can be collected to reduce load uncertainty, answers load and renewable forecast questions needed for EIM implementation, and identifies forecast improvements.

## CORE USER GROUPS

- ❑ PGSD - Duty Scheduling
- ❑ PGSP - Short Term Planning
- ❑ PGPO - Operations Planning
- ❑ PTF/R - Day Ahead and Real-time Marketing
- ❑ PTM - Market Analysis and Pricing
- ❑ TORD - Dispatchers
- ❑ KSL - Load Forecasting & Analysis
- ❑ Teams Implementing EIM

## BENEFITS

- **Increase marketing opportunities due to more precise water management**
- **Reduce load uncertainty to improve our ability to operate efficiently in the short-term and real-time horizons**
- **Improve forecasting facilitates EIM participation by reducing settlement charges**

## WHAT'S CHANGING?

| | |
|---|---|
| Uncertainty regarding needed forecast improvements | A comprehensive understanding of needed forecast improvements |
| Forecasts do not use all available data | Forecasts use data from available sources (load meters, weather, etc.) |
| Demand forecasts not aligned with CAISO's needs | Demand forecasts meets CAISO's needs allowing for EIM participation |
| Lack of comprehensive documentation around business processes and data flow for load forecasts | Comprehensive identification and mapping of business processes and data transfers |

## Timeline

- **June 30, 2020** — Business processes sufficiently mapped
- **December 31, 2020** — Decisions on load and renewables forecasts for WEIM participation are complete
- **October 31, 2021** — Recommended changes to business practices and suggested improvements for forecasting

**Completion date October 31, 2021**

**Executive Sponsor:** Suzanne Cooper
**Lead Sponsor:** Clarisse Messemer

**Product Owner**
Andrew Meyers - PT
Clarisse Messemer - PG
Elizabeth Kirby - TO

**BTO Program Manager**
Dennis Petross

**Questions**
Clarisse Messemer - cmmessemer@bpa.gov
Elizabeth Kirby - eakirby@bpa.gov
Andrew Meyers - apmeyers@bpa.gov
Dennis Petross - dwpetross@bpa.gov



BPA-2020-00700-F0390

# Project: Load & Renewable Forecasting (LRF)

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 01/01/19 | Clarisse Messemer | Andrew Meyers, Clarisse Messemer & Elizabeth Kirby | Andrew Meyers, Clarisse Messemer & Elizabeth Kirby, Dennis Petross, Craig Thomas | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Business processes sufficiently mapped | On Target |
| 2. Decisions on load and renewables forecasts for WEIM participation are complete | On Target |
| 3. Recommended changes to business practices and suggested improvements for forecasting | On Target |

**Project Needs & EIM Questions:**

Needs:
- We need SMEs from across the agency to confirm that documentation is complete and that all affected business process owners (from proposed changes) are sufficiently informed.
- Need support from KSL (Load Forecasting & Analysis) to enable forecast changes.

Questions:
1. What happens when we have two different forecast that require utilization
    1. We have BA forecast and a forecast of Power Services obligation Does one forecast (i.e forecast of PS's obligation) need to be a subset of the BA forecast (plus interchange).
2. How do we get to one BPA need/ask for load forecasts when there are different customer bases.
3. Load uncertainty extends beyond forecast uncertainty to contractual obligations that are poorly forecasted. How to best address this with a forecasting project.




# Metering Review & Update (MRU)

Presented By:
Business Owner: Kelly Johnson, TPC (Customer Service Engineering)
Product Owner: Kelly Gardner, TEP (Transmission Project Mgmt.)
Scrum Master/SME: Kevlyn Baker, TPCV (Western Engineering)

January 10, 2020

Revised 12/2/19

35+ GRID Modernization

# Metering Review and Update (MRU)

*Optimizing the Federal Columbia River Power System high-side metering, metering inventory review and analysis with an agency metering strategy for operations and maintenance*

## WHY?

- **Build certainty for Power and Transmission** to maximize system benefits for the region by minimizing reservation of generation capacity for operational uncertainty
- **Build certainty for BPA's metering asset management capabilities** by validating and updating our inventory, assessing current and future needs based on business requirements and operational standards
- **Support BPA's ability to participate in the Western Energy Imbalance Market (EIM)** or other markets with revenue quality metering to support billing, settlements, and market operations

## PROJECT DESCRIPTION

The project develops and implements an agency strategy to define metering requirements and improvements for generation, interchange and load sites. These requirements and recommended upgrades support participation in the Western EIM.

## CORE USER GROUPS

- ❑ KS – Customer Support Services
- ❑ TP – Planning and Asset Management
- ❑ TE – Engineering and Technical Services
- ❑ TF – Transmission Field Services
- ❑ TP – Planning and Asset Management
- ❑ TS – Transmission Marketing and Sales
- ❑ TO – System Operations
- ❑ PS – Northwest Requirements Marketing
- ❑ PG – Generation Asset Management
- ❑ PT – Bulk Marketing
- ❑ TT – Transmission Technology
- ❑ Transmission and Power customers
- ❑ Federal Partners (Reclamation/USACE)

## BENEFITS

- **Increase certainty of power to the transmission grid through energized high-side metering**
- **Supply revenue quality meter data for billing and settlements to support our customers**
- **Support BPA's ability to participate in the Western EIM, other energy market opportunities and overall Grid Modernization efforts**
- **Deliver agency-level communication, coordination and collaboration to enhance metering practices, procedures, policies and guidelines**

## WHAT'S CHANGING?

| | |
|---|---|
| **FCRPS uses low-side metering** | **Energizing high-side metering on the FCRPS – Grand Coulee, Chief Joseph, John Day, The Dalles, McNary, Lower Monumental, Lower Granite and Little Goose** |
| **BPA's processes and procedures for meter assets, systems, and organizations are inconsistent** | **Focusing on data governance and asset management across the agency in support of the agency metering strategy and the potential for Western EIM or other market participation** |



| April 30, 2019 | July 31, 2019 | September 30, 2019 | June 30, 2020 | April 30, 2021 | June 30, 2021 | June 30, 2022 |
|---|---|---|---|---|---|---|
| Interchange Meter Inventory Complete | HSM High-Side Metering Design Contract Awarded | MRU Start Non-Participating Fed Gen Meter Inventory | HSM Construction Starts at Grand Coulee | MRU SQMD Plans Submitted | HSM Construction Starts Chief Joseph | HSM/MRU Projected Go-Live Western EIM |

**Completion date September 27, 2024**



**Executive Sponsor:** Jeff Cook
**Lead Sponsor:** Kelly Johnson

**Product Owner/Project Manager**
Kelly Gardner

**Scrum Master/Lead SME**
Kevlyn Baker

**BTO Program Manager**
Dennis Petross



**Questions**
Kelly Gardner - kjgardner@bpa.gov
Dennis Petross - dwpetross@bpa.gov



BPA-2020-00700-F0393

# Project Scope: MRU Epics 1-4

1. High Side Metering (Big 10 Participating Gens)
2. Metering Inventory (Interchange, Generation, and Load)
3. EIM Implementation
4. Agency Metering Strategy

*For details see Appendix*

# Project: Metering Review & Update

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team | Project Status (insert X): |
|---|---|---|---|---|
| 04/01/18 | Kelly Johnson | Kelly Gardner | Kevlyn Baker, Rian Sackett, Ants Ranola, Ken Ballou, Diane Lozovoy, Alex Kay, Judy Schoenburg, Dennis Petross, Craig Thomas | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope – Epic 3 | Status |
|---|---|
| 1. Install high-side metering on Participating Generation<br>Priority 1a – GC, CHJ, TDA, JDA<br>Priority 1b – MCN, ICH, BON, Lower Snake | Priority 1a: **On Target 2021**<br>Priority 1b: **Delayed 2024** |
| 2. SQMD Plans (incl. one-lines to support SQMD) | **On Target** |
| 3. Data request to customers for shared interchange and generation | **On Target** |
| 4. Interchange inventory (BPA owned) | **Complete** |
| 5. Generation inventory | **On Target** |
| 6. Import of interchange into AMS | **On Target** |

**Project Needs & EIM Questions:**

Needs:
1. We need the strategy for aggregations finalized and resource IDs created to structure the SQMD plans (for non participating generation and interchange)
2. Capabilities of settlements system and connection to AMS
3. Business policy and procedure creation for metering in an EIM

Questions:
1. Who submits interchange data to CAISO – meter owner or both BAAs?
2. Loss adjustments: BPA policy is to not adjust internal to the meter, what are BPA's options – exemption, change?
3. What does an implementation plan include for participating gen use of low side meters until new meters are installed after BPA 2022 go-live date?
4. Interchange data: Shape, spread, or use energy accounts?

# APPENDIX



BPA-2020-00700-F0396

# EPIC 1 – High Side Metering

GRID Modernization

Feature 1 Overview: 10 Sites in progress

- GC, CHJO, JDAY, TDAL/BIGE, MCNY, LIGO, LOGT, LOMO in design or moving into design by January 2020
- Ice Harbor – BPA coordinated with USACE to evaluate three alternatives (High-side metering, New Low-side metering, or Upgrades to existing low-side metering)
- Bonneville: initiating high-side metering for 6 of 7 lines; initiated USACE simplified scoping for 7th

Feature 2 Overview: Three Sites in progress (Dworshak, Hungry Horse, Libby)

- High-Side Metering Scoping Initiated
- Stage Gate 3 Approval targeting August 2020

# EPIC 2 – Metering Inventory

GRID Modernization

- Interchange meter inventory complete
  - EIM solutions to 5 min intervals & cost estimates ($1.6M)
- Generation meter inventory in progress
  - Initial request to USACE/USBR for federal non-participating targeting end of January 2020
  - Approximately 100 non-federal generation plant in the BPA BAA
- Load meter inventory review post EIM
  - Meter Bill Revision Work is complete
  - Meter Strike Team work in progress

# EPIC 3 – EIM Implementation

GRID Modernization

- Interchange solutions identified, cost estimates identified, funding has been requested and pending approval
- SQMD Plan development for EESC and PRSC in progress
- TPC leading engagement with Federal Partners and Customers for non-BPA owned metering in support of SQMD plans
- Identify and develop support requirements for policy/procedure/process for EIM Implementation

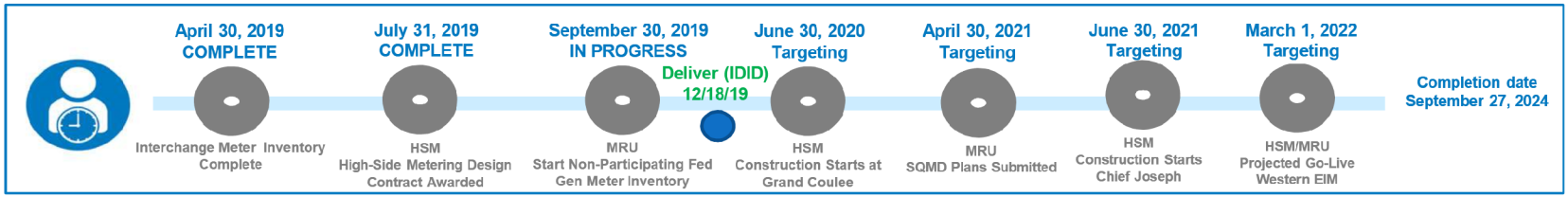
# EPIC 4 – Agency Metering Strategy

GRID Modernization

- Updates policy/process/procedure related to metering across the Agency, including EIM
- Update project deliverables from Meter Bill Revision Team and Meter Strike Team to incorporate all metering

# Key Milestones

GRID Modernization



# Next Steps and Timeline

GRID Modernization

Confirm availability of expense funding for interchange metering upgrades in Transmission budget
December 2019

***Initiate*** non-participating generation and load meter inventories, analysis and identification of options application as required.
December 2019 – June 2020

December | January | February | March | April

Create a work plan for interchange metering, outside of those already in execution with a Sustain bundle, to meet the December 2021 parallel operations and March 2022 go-live date for EIM

Agency Strategy – consume the work from the Agency Meter Bill Revision Team and the Agency Metering Strike Team and analyze for gaps for Grid Mod and EIM, update as required by the EIM go-live date of March 2022.




# Data Analytics

Presented By:
Lead Sponsor: Jamae Hilliard Creecy, PTK (Scheduling Coordination)
Product Owner: Dave Dernovsek, PTF (Trading Floor)

January 10, 2020

# Data Analytics Project

- The project was initiated last August to enable BPA subject matter experts to more efficiently and effectively access, correlate and analyze large amounts of data to foster data-driven insight and innovation and drive strategic decision making.
- The project scope is to create the environment and capabilities, including architecture, toolsets, platforms, integrations, data models, and datasets that are flexible and extensible to full enterprise level, using modern technology to deliver on key business use case categories and capabilities.
- EIM Scope is EIM Analysis, Visualization Tools and Optimization and Decision Support Use Cases (see attached Data Analytics Use Cases for full descriptions and the Project Roadmap on next slide for status).

# Data Analytics Project (*continued*)

BPA has selected a Hybrid On-Premise and Cloud Solution

- Best approach for implementing analytics components incrementally.
- Utilizes existing physical infrastructure.
- Adds new data feeds from prioritized operational systems.
- Standardizes/updates existing data integrations from operational systems for use in Analytics environment.
- Achieves enterprise wide data aggregation to allow for data analytics in the shortest possible time
- Delivers an early MVP which will be in place and operational prior to EIM participation.
- Operationalizes the existing cloud environment into a data analytics environment ensures that BPA will be prepared for an eventual full stack cloud migration.
- Sustains existing Microsoft Azure Cloud pilot, with the goal of dedicating resources to core sustain, enhance, and transfer of existing pilot applications to a more operational analytics environment.
- Allows BPA SMEs to gain cloud data analytics expertise, which is a necessary component of any eventual long term larger-scale cloud implementation.
- Supports Business line and IT education on management of cloud services and prepares for procurement and implementation of broader cloud analytics environment.

Revised 12/13/19

35+ GRID Modernization

# Data Analytics

*Enabling data driven insight and innovation*

## WHY?

**Enable subject matter experts** to more efficiently and effectively access, correlate, integrate and analyze increasing amounts of data

**Foster data-driven insight, innovation and informed strategic decision making** in a rapidly evolving energy industry

## PROJECT DESCRIPTION

The project creates the environment and capabilities, including architecture, toolsets, platforms, integrations, data models, and datasets that are flexible and extensible to full enterprise level, using modern technology to meet evolving business information and customer needs.

## CORE USER GROUPS

- ❑ KSL
- ❑ KSC
- ❑ PGPW
- ❑ PGST
- ❑ PGSP
- ❑ PGPO
- ❑ PTK
- ❑ PTF
- ❑ PTM
- ❑ TSQ
- ❑ TSQM
- ❑ TSQR
- ❑ TSIM
- ❑ TPL
- ❑ TPC
- ❑ TOO
- ❑ TOOP
- ❑ TOII

## BENEFITS

- Provide efficient access to broad array of data through robust suite of common tools
- Foster ground-level innovation with business line ownership of data management and the ability to leverage technical skills
- Provide environment, data structure, and integration components that are flexible and extensible to full enterprise level, using best-in-class technology
- Increase revenue and reduce costs as data analytics are used to drive strategic decisions

## WHAT'S CHANGING?

| | |
|---|---|
| Existing data analytic environments aren't scalable long–term solutions | New flexible and scalable enterprise-level data analytics capability |
| Inconsistent data sources create extra effort via manual workarounds | Single source of truth for data users reduces need for manual workarounds |
| Inconsistent models are used in the Seasonal and Real-Time Horizons | Consistent and accurate way of modeling the power system for all users |

| July 31, 2018 | October 31, 2019 | March 31, 2020 | Completion date |
|---|---|---|---|
| Project Planning | Develop use case catalogue and priorities | Develop business requirements, business case and alternatives analysis | December 31, 2022 |

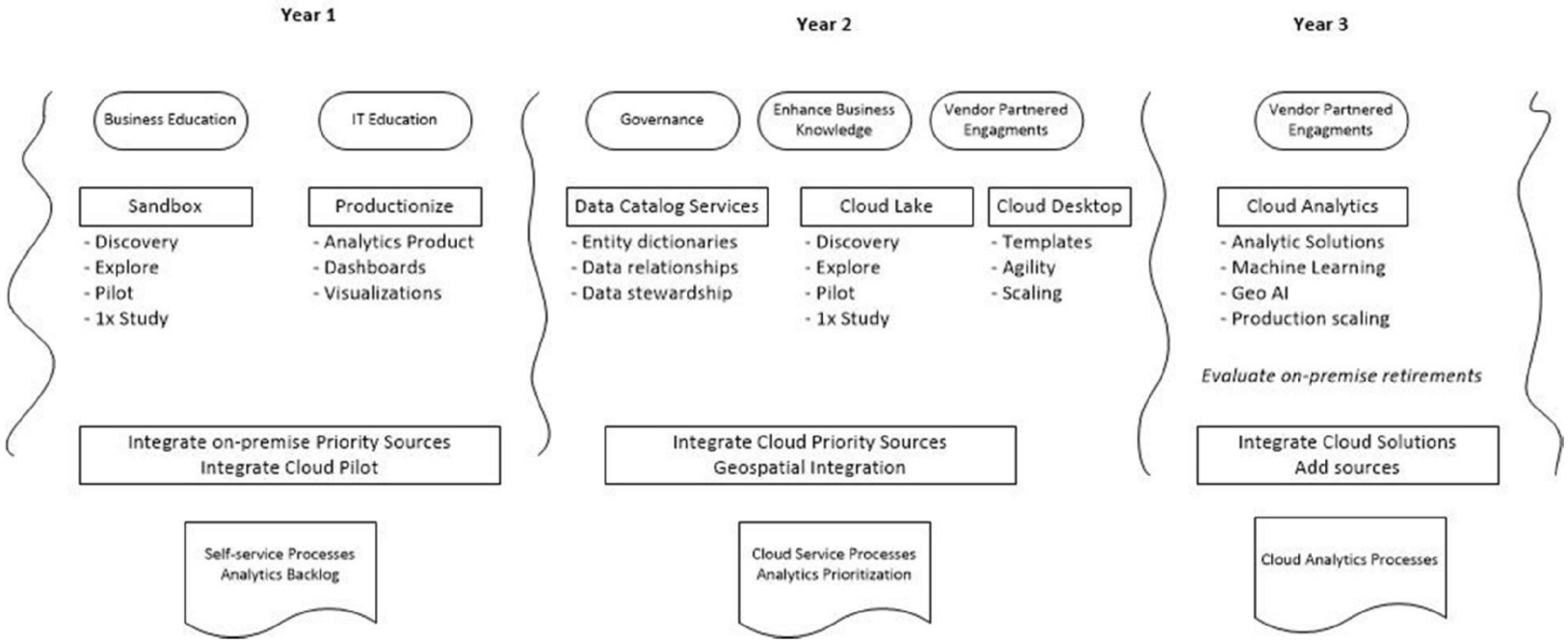
**Executive Sponsor:** Bill Leady
**Lead Sponsor:** Jamae Hilliard Creecy
**Sponsors:** Steve Kerns, Jim Viskov, Suzanne Cooper, Jeff DiGenova, Ben Berry, Michelle Manary, Yvette Gill, Michelle Cathcart

**Product Owner:** Dave Dernovsek
**BTO Program Manager:** Allie Mace

**Team Members:** Cameron Bracken, Pankaj Pabla, Tom Coatney, Trevor Laine, Kelii Haraguchi, Jason Martinez, Chris Barker, Mitch Green, Ben Agre, Sara Eaton, Jim Hodel, David Kerr, Alex Kay, Peter Williams, Garland Will, Todd Kochheiser and Rich Vantrease

**Questions**
Dave Dernovsek - dkdernovsek@bpa.gov

# Project Roadmap



# EPICs and Features (Year 1 – MVP)

- Estimated completion date: 12/31/2020 (assuming Deliver starts 1/1/2020)
- Design and deploy on-premise Analytics Sandbox environment
  - Prioritize data sources of existing BUD integrations
  - Implement integration tool and self-service BI/visualizations
- "Productionize" existing or new tool for Analytics consumption
  - Identify high fidelity, high governance data sets
  - Automate existing process/use case in Analytics environment
- Develop Data Science and Cloud Analytics infrastructure skillsets
  - R Studio / Python training
  - Collaboration on GIT/versioning, libraries, code repositories, toolset standardization
- Coordinate with ongoing agency efforts
  - Engage as needed in Azure ATO process
  - Sync with MCIT integration efforts

# EPICs and Features (Years 2-3)

- Enhance on-premise Analytics environment (CY2021 – CY2022)
  - Implement incremental data feeds
  - Procure/implement Data Catalog services for data stewardship/governance use cases (source system POs)
- Implement Cloud Infrastructure (CY2021)
  - Deploy Azure Cloud Lake and Virtual Machine
  - Draft governance and permissions/configurations for cost minimization
- Integrate cloud and on-premise environments (CY2022)
- Design and implement cloud-based use cases (machine learning/high performance computing) (CY2022)

# Dependencies

- MCIT Integration – Team will coordinate with MCIT integration project to communicate requirements and ensure project meets MCIT technical and security protocols
  - Example: Many Data Analytics use cases require operational system data in as close to real time as possible. Is there a minimum fixed latency or a tradeoff (e.g. possible to replicate X MB in Y seconds/minutes)?

- Azure ATO – Team will support this project as needed to ensure Microsoft Azure Cloud environment is granted an Authority to Operate (ATO) with appropriate security measures in place

- Other Grid Mod projects – Virtually all projects have potential use cases to leverage the Data Analytics environment. Team will continue to solicit feedback and coordinate with business stakeholders to identify priority dependencies and data needs with other Grid Mod/EIM projects
  - Fed Data Management – Coordination with FDGDM project indicates potential for storage of project data in Data Analytics environment, but not yet ready to define specific data integration, storage, or cataloging requirements

- Data Governance/EDGE/DSCWG – Project will utilize services to help ensure Data Quality at the source by coordinating with source system Information Owners (IO) and Product Owners/Data Stewards

# Project: Data Analytics

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 08/01/18 | Jamae Hilliard Creecy | Dave Dernovsek | Cameron Bracken, Tom Coatney, Kelii Haraguchi, Trevor Laine, Jason Martinez, Pankaj Pabla, Chris Barker, Jim Hodel, Mitch Green, Ben Agre, Sara Eaton, David Kerr, Alex Kay, Peter Williams, Garland Will, Libby Kirby, Todd Kochheiser and Rich Vantrease, Adrina Tarver | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. EIM Analysis | See project roadmap |
| 2. Visualization Tools | See project roadmap |
| 3. Optimization and Decision Support | See project roadmap |
| | |
| | |
| | |

**Project Needs & EIM Questions:**

Questions:
1. What are/were the highest priority data analytics use cases identified by other EIM entities that Utilicast has consulted with?
2. What types of visualization tools are essential/useful when participating in the EIM?
3. What data is needed and at what frequency to optimize an entities participation in the EIM market?




# Outage Management System (OMS)

Presented By:
Product Owner: Tim Loepker, TORO (Outage Office)
Project Manager: Jeff Gilmour, TTBP (Transmission Technology WPD

January 10, 2020

Revised 11/25/19

35+ GRID Modernization

# Outage Management System (OMS) Project

*Improve outage management operational efficiency, and effectiveness, take advantage of industry standardization and enable EIM compatibility*

## WHY?

- **Increase efficiency** through automation of manual processes and early outage request conflict resolution
- **Embrace industry standard** tools that are able to keep pace with market changes and updated compliance requirements
- **Improve functional capability** developed with industry experts coming together to share experience and challenges
- **Improve data accuracy** and speed to enhance BPA's real-time situational analysis as well as compliance reporting
- **Establish internal and external interfaces** that allow BPA to confidently enter the EIM market if desired as well as potentially simplify the BPA architecture through elimination of redundant systems

## PROJECT DESCRIPTION

Implement Sun-Net's iTOA, an industry leader in OMS. BPA seeks to improved process standardization and increased automation in outage submission, scheduling, coordination and reporting.

Additionally, BPA will be positioned to effectively transition to the EIM outage management coordination requirements

## CORE USER GROUPS

- ❑ TO - Operations
- ❑ TT - Technology
- ❑ TF - Field
- ❑ TE - Engineering
- ❑ TS - Marketing and Sales
- ❑ PG - Generation Scheduling

## BENEFITS

**Operational efficiency**
- Process automation will reduce redundant data entry and the potential of human error

**Business decisions**
- Additional outage management analysis and reporting capability. Common views by user role enhance internal controls

**Market Responsiveness**
- Partnership with vendor that can respond to market, reliability and safety changes to support over 60 utilities

## WHAT'S CHANGING?

| | |
|---|---|
| Business SMEs invest significant time translating reliability standards into system requirements | Partner with vendor to determine an effective approach to satisfy reliability standard changes |
| Internally developed, customized solution requires large resource investment to maintain | Embracing out-of-box solution will reduce operations and maintenance costs long-term |
| Many applications requiring upkeep with more complex user navigation | Potential to simplify the system architecture |

| January 7, 2020 | March 30, 2020 | July 13, 2020 | October 26, 2020 | January 19, 2021 | March 31, 2021 | November 30, 2021 |
|---|---|---|---|---|---|---|
| Execution Phase Contract Signed | End Sprint 4<br>Request Module Passed QA<br>Equipment API operating with DART | End Sprint 9<br>Switch & Tag passed QA<br>Request & Interruptions API operating with DART | End Sprint 14<br>Logging, Gen & Interruption passed QA<br>All APIs operating with DART/iTOA to RC West in DEMO | Start Sprint 19<br>Role based training initiated<br>District Training | Release 1 Go-Live | Release 2 Go-Live |

# Project: Outage Management System (OMS)

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team: |
|---|---|---|---|
| 11/01/17 | Chris Sanford | Tim Loepker | Jeff Gilmour, TTB/JC, PM; Lindsey Diercksen, TTB, PM, Linda Hofmann, TOII co-PO, Sandy Bell, TOII, CM, Brian Fisher, TOII, Process PM, Patrick Hurley, TTB, BA, Erin Seidell, TAS, BA; Michael Lippold, TTSD, SA; Dave Miller, TTSD, SA; Jerry Peirce, TTSD, QA, Jacki Neal, TTST, QA |

| Project Status (insert X): | | |
|---|---|---|
| X | | |

**Known EIM Scope & Status of Key Elements** (On Target, Delayed)

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Transmission outage requirements | On Target |
| 2. Generation outage requirements | On Target |
| 3. Element/equipment level requirements | On Target |
| | |
| | |
| | |

**Project Needs & EIM Questions:**

Needs:
- Transmission outage requirements defined by EIM team
- Generation outage requirements defined by EIM team
- Element/equipment level requirements defined by EIM team

Questions:

1. From the initial Utilicast requirements, it appears most Transmission requirements are being met for RC. What additional requirements remain? (Additional Nature of Work codes, ability to transition Actual In/Out of service-not Planned In/Out of service, Start/Stop date of energized equipment)
2. Generation outage requirements are met at a Unit level for RC. What additional requirements remain? (Additional Nature of Work, ability to send ramp rates, changes to pMin/pMax, availability curve, overlapping outages)
3. Element/equipment level requirements – what additional information is needed for EIM?




# Price & Dispatch Analysis (PRADA)

Presented By:
Product Owner: Kelii Haraguchi, PTM (Market Analysis & Pricing)

January 10, 2020

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Created 12/2/19

35+ GRID Modernization

# Price & Dispatch Analysis (PRADA)

*Driving revenue through data-centered decisions*

DRAFT

## WHY?

**Create a systematic, data-driven, and consistent application of economic signals for commercial and operational decisions** to promote objectivity, consistency and transparency around valuing hydro resources

**Improve baseline planned operations by removing default or legacy assumptions** to improve marketing for net secondary revenue

**Optimize modeling by updating historical assumptions** since economic patterns diverge from historical patterns and modeling based on historical assumptions will likely diverge from the optimum

## PROJECT DESCRIPTION

The project creates a systematic analytical process for quantifying opportunity costs that reflect appropriate economic signals in all power planning and marketing decisions, resulting in optimal dispatch and marketing strategy, and limited unrecorded decision making.

## BENEFITS

- **Improve the quality of BPA's planning models**
- **Increase net secondary revenue consistent with agency risk tolerances**
- **Create faster, more informed, and consistent decision-making**
- **Allow for greater participation in emerging energy markets**

## CORE USER GROUPS

- ❑ PTM – Market Analysis and Pricing
- ❑ PTF – Trading Floor
- ❑ PTFR – Real Time
- ❑ PGS – Generation Scheduling
- ❑ PGSD – Duty Scheduling
- ❑ PGSP – Short Term Planning
- ❑ PGP – Power & Operation Planning
- ❑ PTK – Scheduling Coordination
- ❑ JC – Critical Bus Sys Ops & Dev

## WHAT'S CHANGING?

| | |
|---|---|
| **Overriding model output relies increasingly on specialized/silo-ed knowledge** | **Better models leads to fewer overrides** |
| **Manual processes cannot support the granularity and speed needed for real-time decision making** | **Automated processes allow for faster and more precise decision making** |

| DATE | DATE | DATE | DATE | DATE | DATE |
|---|---|---|---|---|---|
| Target name | Target name | Target name | Target name | Target name | Target name |

**Completion date**
**October 1, 2021**

**Executive Sponsor:** Suzanne Cooper
**Lead Sponsor:** Eric Federovich

**Product Owner**
Kelii Haraguchi

**BTO Program Manager**
Theo. Taylor III

**Questions**
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Theo. Taylor III - tctaylor@bpa.gov



BPA-2020-00700-F0416

# Project: Price & Dispatch Analysis (PRADA)

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 01/01/19 | Eric Federovich | Kelii Haraguchi | Anna Stermer, Andy Meyers, Shane Mosier, Robert Hawkins, Chris Siewert, Phil Platter, Juergen Bermejo, Theo Taylor, Craig Thomas | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Incorporate price signals into hydro planning models | Not Started |
| 2. Develop within-day price forecast | Not Started |
| 3. Using 1 & 2, as well as other inputs to produce provisional bid curves for validation by real-time trader and submission to EIM | Not Started |
| | |
| | |

**Project Needs & EIM Questions:**

Needs:
- We need to finish scope definition to move into Integrate. Feb 13, 2020 on the GEM Agenda to move into Integrate.

Questions:
1. What are major lessons learned from IPCO experience participating with hydro resources? Are there recognized best practices? What are they?
2.
3.




# Federal Data & Generation Dispatch Modernization (FDGDM or Fed Data)

Presented By:

Scrum Master: Kari Hay, PGPL (Regional Coordination)

Program Manager: Dennis Petross, BTO (Business Transformation Office)

January 10, 2020

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Revised 11/18/2019

35+ GRID Modernization

# Federal Data & Generation Dispatch Modernization (FDGDM)

*Maximizing generation value through data integrity and strengthening partnerships*

## WHY?

**Data streams that arrive at BPA from multiple paths often don't match each other**, leading to inefficient decision tools creating more conservative operations

**Human error and intervention causes slow-downs,** so the goal is to remove duplicative work, and streamline systems among Federal Columbia River Power System (FCRPS) partners

**Visibility into current and future hour operational limits is inadequate** causing limited visibility into project-level parameters that impedes reliable operation of the FCRPS and creates uncertainty; resulting in difficult reserve management, conservative operations, less than optimal system flexibility, and less marketing capability

## PROJECT DESCRIPTION

The project optimizes hydro system coordination decisions made based on data from federal projects through improving the timeliness, accuracy, and dependability of project data shared between BPA, the Bureau of Reclamation (USBR) and the Corps of Army Engineers (USACE).

## CORE USER GROUPS

- ❑ PGSP - Short-Term Planning
- ❑ PGSD - Duty Scheduling
- ❑ PGB/EWP - Fish & Wildlife
- ❑ TORO - Outage Office
- ❑ BPAT - Generation Forecasting
- ❑ USACE - Plants/Projects
- ❑ USBR - Plants/Projects

## BENEFITS

- **Reduce station control error to improve grid reliability and system flexibility**
- **Support BPA's ability to participate in the Western EIM and other energy markets**
- **Improve accuracy and timeliness of data shared between federal projects and BPA**
- **Improve communications by standardizing scheduling processes with federal partners**

## WHAT'S CHANGING?

| | |
|---|---|
| Inefficient processes for creating/ updating schedules & project ramping | Efficient and timely processes exist for creating/updating schedules & project ramping |
| Varying schedule formats and units across projects | Standardized schedule formats and units across projects |
| Manual data entry can produce inaccurate data | Automated data transfers produce accurate data |

| June 30, 2019 | June 30, 2019 | June 1, 2020 | September 01, 2020 | December 1, 2020 | December 31, 2020 | December 01, 2021 | |
|---|---|---|---|---|---|---|---|
| Non-Big10 SCE Reduction DETROIT Pilot | Data Transfer CBT Enhancement | Non-Big 10 ISAAC Portal Scheduling Rollout Complete | Data Assessment: Station Service Standardized | Data Transfer Automation for GCL | Non-Big 10 SCE Reduction Rollout Complete | Generation Dispatch Optimization Pilot | Completion date June 1, 2022 |

**Executive Sponsor:** Kieran Connolly
**Lead Sponsor:** TBD
**BPA Sponsors:** Chris Siewert, Jim Viskov, Dave Brown, Clarisse Messemer
**Partner Sponsors:** Shawn Worthington (USACE) Cliff Foster (USBR)

**Product Owners**
Elsa Chang
Clarisse Messemer
Jim Alders
Kyle Cisco

**Scrum Master**
Kari Hay

**BTO Program Manager**
Dennis Petross

## Questions


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Clarisse Messemer - cmmessemer@bpa.gov
Jim Alders - jsalders@bpa.gov
Kyle Cisco - kacisco@BPA.gov
Dennis Petross - dwpetross@bpa.gov




BPA-2020-00700-F0419

# Project: Fed Data

| Project Start Date | Lead Sponsor | Product Owners | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 04/01/18 | Vacant | Kyle Cisco, Clarisse Messemer, Elsa Chang*, Jim Alders | Kari Hay, Dennis Petross, Craig Thomas | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Standardize & automate base scheduling process for non-participating federal projects | On Target |
| 2. Reduce generation deviation for non-participating federal projects | On Target |
| 3. Automate hourly data transfer from major projects that are still manual, via existing infrastructure | On Target |
| 4. Standardize data elements provided by operationally significant projects; improve quality of data | On Target |
| 5. Update/improve the turbine optimization system (T2) in the Generation Dispatch Automated Control System SCADA system at the Big-10 Hydro Projects | On Target |

**Project Needs & EIM Questions:**

Needs:
- Decision on prioritizations in Automated Controls and Cyber Security (ACCS) work queue (AGC, T2, CBT automation…)
- There is a follow up meeting scheduled for January 24th with AGC, MRU, Fed Data, LRF and Utilicast to discuss and collaborate more.

Questions:
- How can we optimize the usefulness of the T2 system with bid curves and operational uses in EIM?
- What are constraints on unit starts and stops and how do those requirements feed bid curves/bid range?
- Can Fed Data/T2 provide the communication regarding unit status in the time frame needed for bid curve production?
- Is it worth incorporating unit status into the bid range creation?




# Agency Enterprise Portal (AEP)

Presented By:

Lead Sponsor: Ryan Zimmerman, DKP (Media Relations & Policy)

January 10, 2020

Revised 1/2/20

35+ GRID Modernization

# Agency Enterprise Portal (AEP)

*Transforming BPA's web experience to meet the public's, the customers', and the agency's needs*

## WHY?

**Leverage BPA's online presence to deliver** a modern, seamless and consistent portal interface to improve customer service and satisfaction, improve information availability, information exchange and reduce transactional friction in doing business with BPA

**Align with needs as Enterprise Public Portal and Customer Portal are inefficient and no longer meet expectations of our customers and BPA's business** nor do they have the ability to meet the requirements of the 21st Century Integrated Digital Experience Act

**Align with IT Strategy** to reduce maintenance costs and IT complexities by replacing customized end-of-life applications with a Commercial Off The Shelf solution designed to meet both the agency's and the customers' needs

## PROJECT DESCRIPTION

The project modernizes BPA's online public and customer experience, delivering a supportable, flexible digital platform. It will host BPA-produced content, provide secure access to customer-specific information, and allow customer-BPA information exchange to administer BPA products and services for Power, Transmission, Energy Efficiency, and Environment, Fish & Wildlife.

## CORE USER GROUPS

- ❑ General Public
- ❑ BPA customers
- ❑ BPA content publishers
- ❑ KSB – Customer Billing
- ❑ KSM – Metering Services
- ❑ TS – TX Marketing & Sales
- ❑ PS - NW Requirements Marketing
- ❑ KSC - Customer Contract Support
- ❑ F - Finance

## BENEFITS

- Improve public and customer experience through a modernized and efficient website with one consistent experience
- Provide workflows that facilitate two-way communication and access to business information, allowing for more efficient deployment of BPA resources
- Improve reliability with new technology and vendor support
- Reduce IT costs and the risk of system loss resulting in customer concerns and delayed cash flow
- Enhance system capabilities to meet future demand including Western EIM participation

## WHAT'S CHANGING?

| | |
|---|---|
| Rigid taxonomy and search | Dynamically focused content to specific audiences |
| Manual processes delay response time to customers and cost BPA time and money | Automated workflows will allow customers to become self-managed users with faster response times |
| Unreliable, unsupported systems and environment | An integrated BPA approach with greater reliability |

| February 28, 2020 | March 31, 2020 | April 30, 2020 | June 28, 2020 | September 30, 2020 | February 28, 2021 | March 25, 2021 | Completion date |
|---|---|---|---|---|---|---|---|
| RFP out to Vendors | RFP due back from Vendors | Vendor Selection | Vendor Planning Phase | Testing & Customer Feedback | Training (internal & external) | Go-Live Phase 1 with On-Going phases | September 30, 2021 |

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# Project: Agency Enterprise Portal (AEP)

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 10/01/18 | Yvette Gill, Tara Mannhalter, Ryan Zimmerman | Maggie Rhodes, Ryan Zimmerman | Deborah Erickson, Tasha Kannal, Tanya Symes, Marvin Whitmore, Dan Lehmann, Heather Jespersen, Craig Thomas | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Ability to meet EIM requirements for submittals | TBD |
| 2. Facilitate access to EIM customer information | TBD |
| 3. Convey Settlement data | TBD |
| 4. Track disputes | TBD |
| | |
| | |

**Project Needs & EIM Questions:**

Needs:
- We need to understand what EIM requirements will be placed on AEP once the EIM scope is determined.
- We need to understand the new processes and system integrations needed between AEP and EIM settlements once scope is determined by EIM.

Questions:
1. EIM requirements and functionality needed in AEP are not known at this time so AEP has a generic EIM requirement placeholder in JAMA that will be fleshed out as EIM requirements become clear. The assumption to date is that displaying EIM settlements information and tracking disputes will be the scope for AEP, is this a correct assumption?




# Customer Billing Center (CBC) Replacement

Presented By:
Product Owner: Misty Meyer, KSB (Billing)

January 10, 2020

B O N N E V I L L E P O W E R A D M I N I S T R A T I O N

Revised 1/3/2020

35+ GRID Modernization

# Customer Billing Center (CBC) Replacement

*Ensuring billing function continues to operate and supports current and future growth*

## WHY?

**Optimize organizational effectiveness** by streamlining business processes between organizations to create operational efficiencies internally and better serve our customers

**Align with IT strategy** to reduce cost and IT complexities moving away from our current highly customized platform

**Prepare for ending system support in 2022** by upgrading or replacing CBC

## PROJECT DESCRIPTION

The project replaces the existing billing system that will no longer be supported in March 2022 and ensures BPA's ability to bill customers in support of BPA's participation in the Western Energy Imbalance Market.

## BENEFITS

- Reduce the risk of system down time which can result in delayed response to customers and cash flow
- Enable opportunities to consolidate systems and optimize business processes as well as keep up with evolving customer billing needs
- Support BPA's participation in the Western EIM and grid modernization efforts by looking for opportunities to consolidate business practices
- Reduce the IT costs associated with maintaining customizations

## CORE USER GROUPS

- ❑ KSBP - Customer Billing-Portland
- ❑ KSBV - Customer Billing – Vancouver
- ❑ KSM - Metering Services
- ❑ EIM Settlements (Future Org)
- ❑ F - Finance
- ❑ BPA Customers

## WHAT'S CHANGING?

| | |
|---|---|
| Manual processes are labor intensive and time consuming | Automated processes increase productivity and position us for EIM participation |
| Billing errors create manual rework and impact customer service | Improved rate, contract and billing determinant inputs improve billing accuracy |
| Current user configurability is limited and inefficient | Enhance user configurability to increase efficiencies |

| May 31, 2019 | September 18, 2019 | January 25, 2020 | February 28, 2020 | February 1, 2021 | October 1, 2021 | December 31, 2021 | March 31, 2022 |
|---|---|---|---|---|---|---|---|
| Exit Define Phase | Exit Integrate and enter Deliver | Joint AMS MDM/CBC/EIM RFO Vendor Evaluation and Selection | Implementation plan developed with Vendor | Begin Parallel Testing and develop Training | Go Live | Decommission Legacy System | CBC Oracle Support Ends |

**Completion date**
**March 31, 2022**

**Executive Sponsor:** Jamie Sims
**Lead Sponsor:** Henry Tieu

**Product Owner**
Misty Meyer

**BTO Project Manager**
Heather Jespersen

**Questions**
Misty Meyer - mnmeyer@bpa.gov
Heather Jespersen - hljespersen@bpa.gov

# Project: Customer Billing System (CBC) Replacement

| Project Start Date | Lead Sponsor | Project Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| 10/01/18 | Henry Tieu | Misty Meyer | Jason Boen, Pam Halbrook, Jason Collins, Laura Martinez, Jim Youngdahl, Neal Peterson, Heather Jespersen, Traci Loveland | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| 1. Charge allocations for inclusion on customer bill (EIM Settlements Invoice from CAISO) TBD | TBD |
| 2. Payment Allocations for inclusion on customer bill (EIM Settlements Payment Notices from CAISO) TBD | TBD |
| 3. Pass through from third party EIM participants TBD | TBD |
| | |
| | |

**Project Needs & EIM Questions:**

Needs:
- We need to know what a Revenue Analyst will receive to include on a customer's bill
- We need process and system integration between EIM Settlements and Billing

Questions:
1. How have you seen other clients integrate EIM Settlements with existing Customer Billing?
2. Do you recommend combining EIM Settlements billing with other customer bills or keeping them separate?
3. Should EIM billing be set on the same cycle as other customer bills (currently monthly) or aligned to the CAISO weekly schedule? What are the pros and cons of each?




# EIM Real Time Operations

Presented By:
Lead Sponsor: Chris Sanford, TOR (Real Time Operations)

January 10, 2020

# Project: EIM Real Time Operations

| Project Start Date | Lead Sponsor | Product Owner | Core Project Team: | Project Status (insert X): |
|---|---|---|---|---|
| October, 1 2019 | Chris Sanford | TBD | Representatives from Transmission Ops & Generation Scheduling & IT | X |

**Known EIM Scope & Status of Key Elements (On Target, Delayed)**

| EIM Scope | Status (copy 1 above) |
|---|---|
| Identification of EIM Real-Time Operations Minimum Viable Product (MVP) | Not Started |
| Clear definition of roles and responsibilities, including organizational structure, to meet operational requirements | Not Started |
| EIM Real-time operational requirements (functional and non-functional), processes, and procedures | Not Started |
| Determination of Energy Transfer System Resource configurations, setup, tagging, and limit management requirements | Not Started |
| Managing within hour outages, de-rates, and limit conformance (transmission or other) | Not Started |
| Identification of operational constraints (e.g., flowgates, limits, etc.) | Not Started |
| Testing of systems and process capabilities | Not Started |

**Project Needs & EIM Questions:**

Needs:
- Project Team Assignments
  - Product Owner
  - Project Manager/SCRUM Master
  - SMEs and core team

Questions:
1. Relationship to RS (Roles/Responsibilities)?
2. Relationship to Bid & Base Scheduling Project?
3. Processes and Workflow between PGSD/TOR?
4. Critical work flows (e.g., Contingencies, RAS events, etc.)?

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# Lunch Break – 45 Minutes



# Baselining Where We're At Today

- Engagement with existing GM Projects
  - 11 Grid Mod projects staffed underway
  - Coordinating definition of EIM scope and alignment with EIM timeline
- Status of new EIM projects
  - 5 EIM explicit projects initiated & in various stages
  - EIM Settlements in Deliver phase, staffed & currently evaluating vendor proposals
  - EIM Bid & Base Scheduling, EIM RT Ops, EIM Testing & EIM Training in define phase & in process of being staffed
- Solution Modeling
  - We have a base set of EIM vendor requirements provided by Utilicast)
  - Planning solution design/modeling activity for March-April. Outcomes will be:
    - RFP-ready system requirements
    - Business process change requirements sufficient to begin development of business process changes
    - Basis for developing test cases
- RFP target timeline is April-May

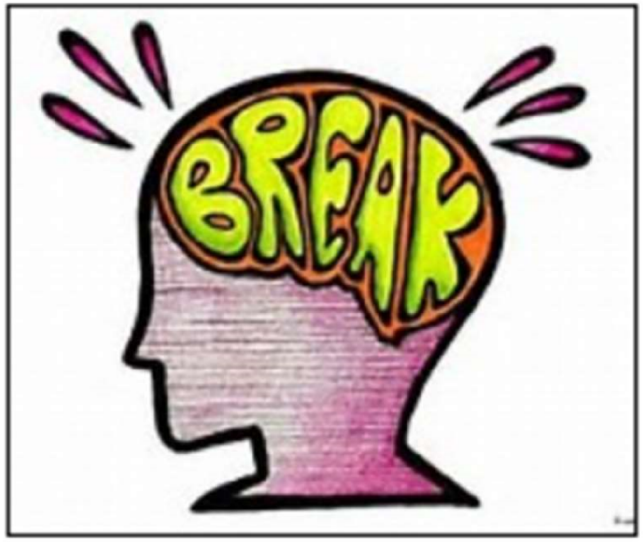
# Key Activities Next 3-6 Months

- Integrated Project Schedule Development
- Requirements Gathering
  - Establish and prioritize requisition list for s/w applications
  - Reconcile Gaps
  - Generate RFP worthy requirements
- Establish work plans with CAISO
- BPA's project workstreams – timeline feedback

# EIM Lessons Learned

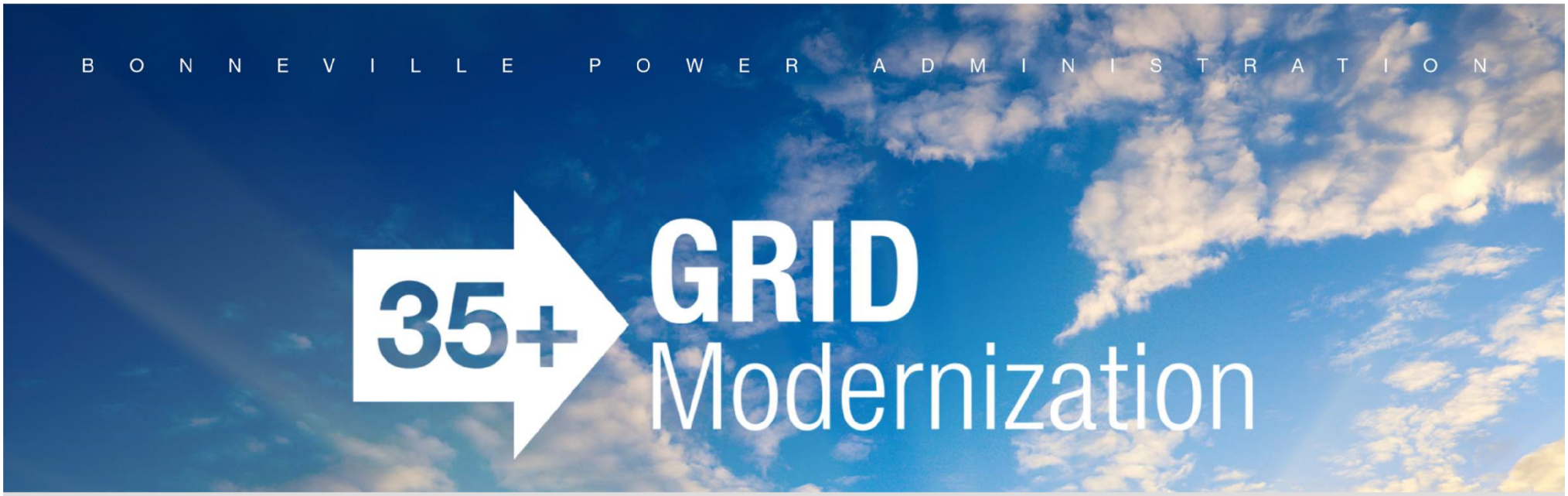
- Project Cadence - It's a Marathon, set and then keep the pace
- Vendor Technology Delivery Issues – delays happen
- Resource Management – change ups will occur for all
- Internal Policy Constraints – identify early
- Decisions – Need to occur quickly
- Change Management – proper socialization is key
- CAISO's Map Stage - environment is not reliable. Down time impacts training/testing
- Processes – Unexpected results may occur due to technical issues or a malformed business processes; this will force process changes

# Break – 15 Minutes



# Regional EIM Dialog & Interaction

- Dialog has been initiated with adjacent EIM entities
  - This engagement is being led at the EIM Implementation Program level
  - Next coordination meeting scheduled for 1/30
  - Intending to leverage and coordinate EIM implementation elements
  - Discuss alignment of Go-Live dates
  - Share configuration data, technical details and approaches
  - Share lessons learned




# EIM Policy Working Group (WG)




BPA-2020-00700-F0435

# Overview: EIM Policy Program and WG

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## The EIM Policy Program:

- Is intended to identify and prioritize policy decisions that are critical to a successful 2022 EIM Implementation
- Will use existing decision-making processes when possible (e.g. CBIT, Rate, etc.)

## The EIM Policy WG:

- Has been working since June of this year to this end and has developed and maintains a Policy Catalog of such items
- Prioritizes these items and ensures that they are staffed and moving forward as needed

BONNEVILLE POWER ADMINISTRATION

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# Five Phases to Western EIM Decision




**Exploration** July 2018–June 2019
**Implementation agreement** June–Sept. 2019
**Policy decisions** Oct. 2019–Aug. 2020
**BP-22 & TC-22** Nov. 2020–July 2021
**Close-out** Oct.–Dec. 2021

# EIM Policy Timeline

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| CY 2019 | CY 2020 | CY 2021 |
|---|---|---|

**Phase III – Post-ROD policy**
October 2019 – August 2020
Workshops to resolve remaining policy issues combined with BP-22 and TC-22 pre-workshops

**Phase IV – BP-22/TC-22**
November 2020 – July 2021
Rates and tariff proceedings policy decisions

**EIM Implementation and Stakeholder Engagement**
October 2019 – December 2021
Work on EIM implementation projects underway and ongoing stakeholder engagement meetings are held

# What is Not in Phase III Scope

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- EIM implementation projects
- Known issues in CAISO's Policy Initiative Catalog currently being evaluated
- Evaluation of other market opportunities like the extended day-ahead market

# Approach: Evaluation of Policy Topics

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- All current EIM Policy items will be evaluated against EIM Principles, and we may develop additional principles
- In many cases EIM Policy items will be addressed in BP and/or TC-22, in which case they will be evaluated against those principles as well
- Our team will continue coordinating closely with the BP/TC-22 teams

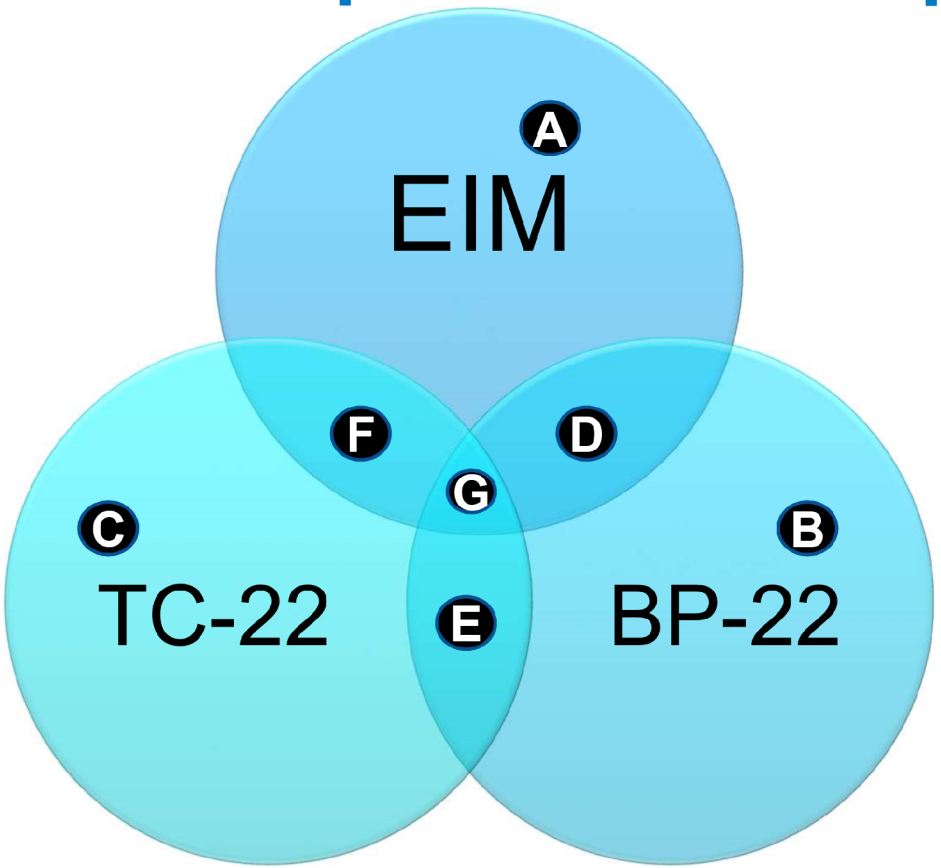
# 6 EIM Principles

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1. Bonneville's participation is consistent with its statutory, regulatory, and contractual obligations.
2. Bonneville will maintain reliable delivery of power and transmission to its customers.
3. Bonneville's participation is discretionary and Bonneville retains its ability to effectively exit the market in the event participation is no longer consistent with these principles.
4. Bonneville's participation is consistent with a sound business rationale.
5. Bonneville's participation is consistent with the objectives of Bonneville's Strategic Plan.
6. Bonneville's evaluation of EIM participation includes transparent consideration of the commercial and operational impacts on its products and services.

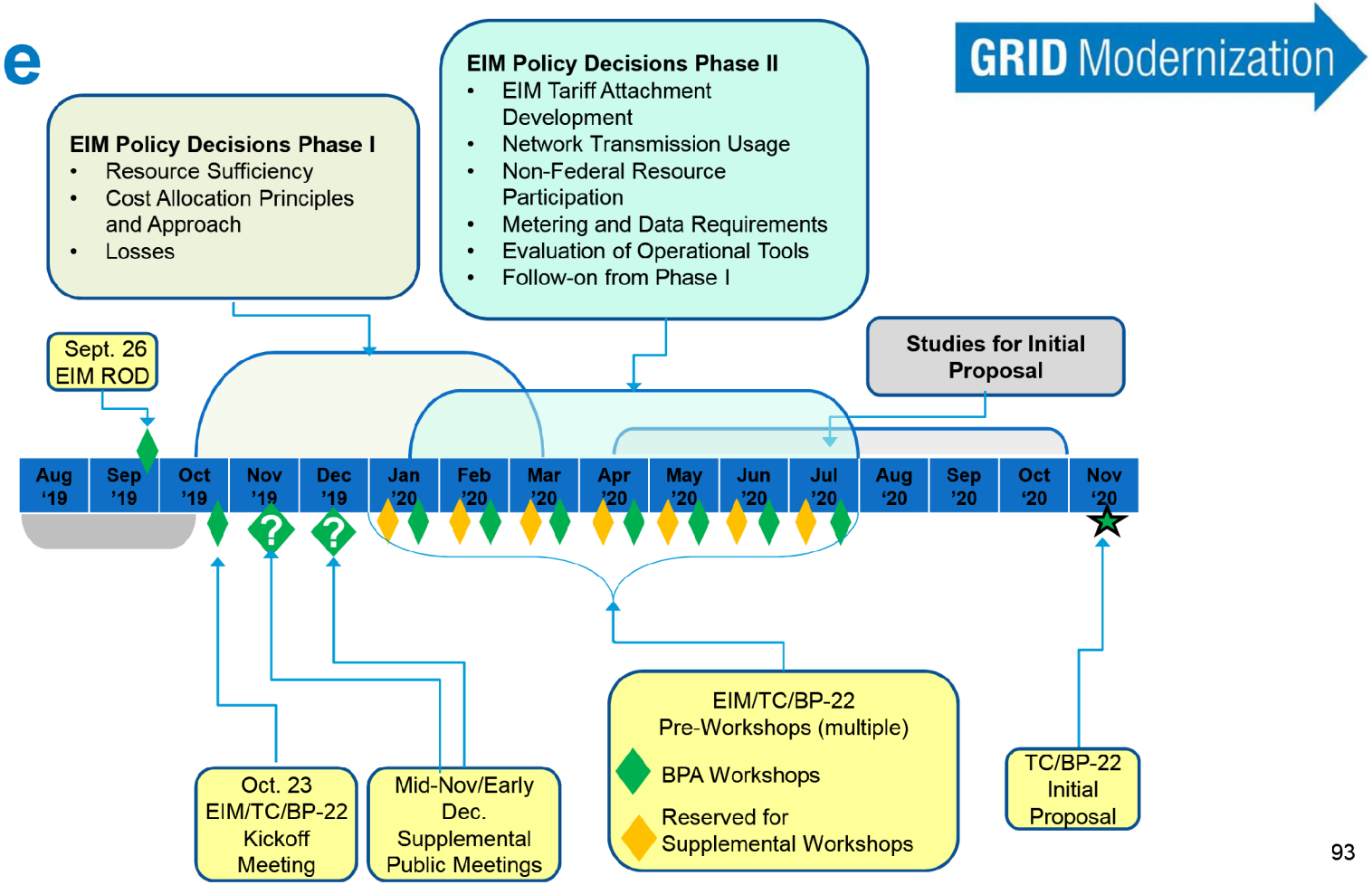
# EIM Principle Relationships

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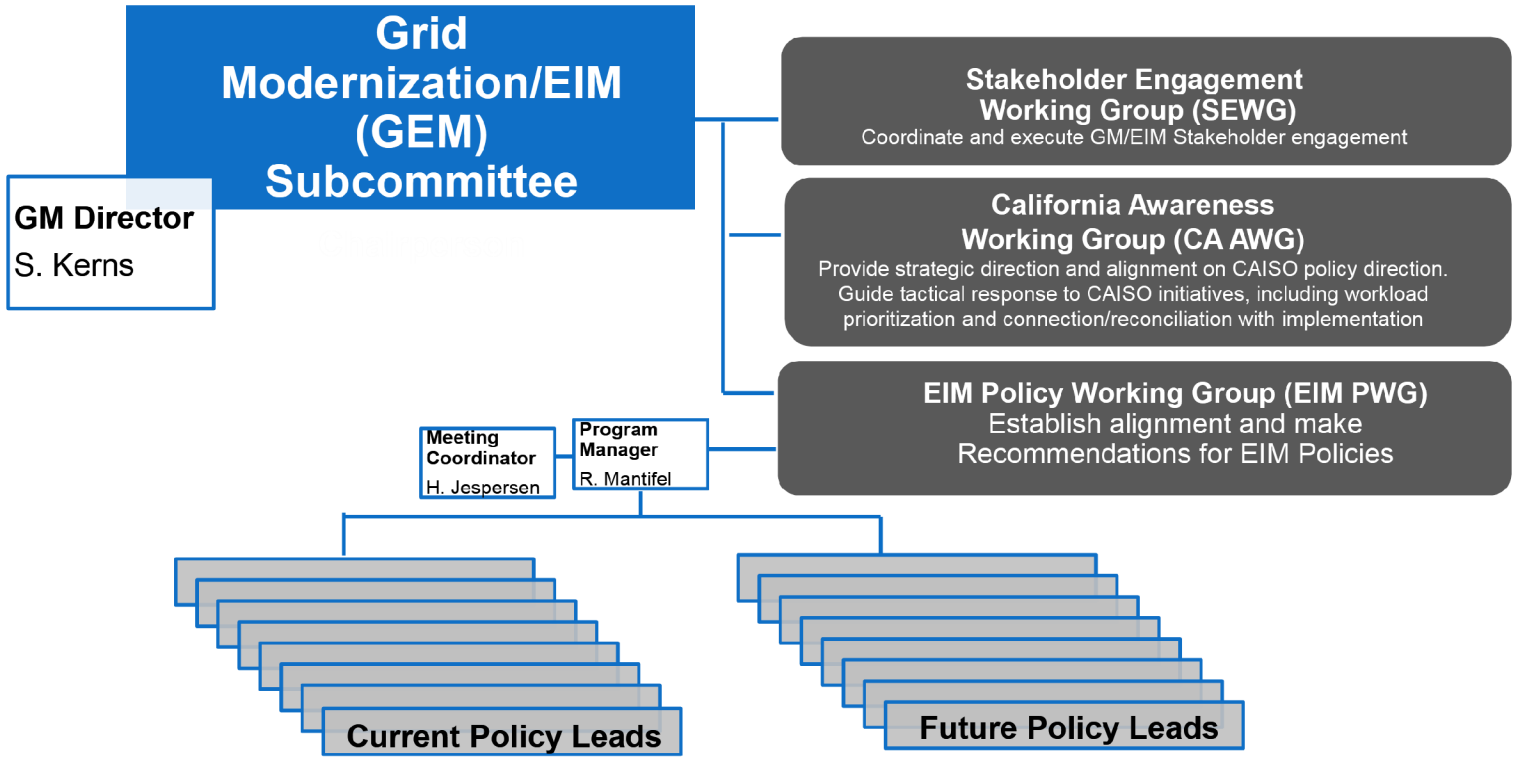

A. Evaluated only against EIM principles
B. Evaluated only against BP-22 Principles
C. Evaluated only against TC-22 Principles
D. Evaluated against EIM and BP-22 principles
E. Evaluated against BP-22 and TC-22 principles
F. Evaluated against EIM and TC-22 principles
G. Evaluated against EIM, TC-22 and BP-22 principles

# Timeline


GRID Modernization
EIM Policy Decisions Phase I
• Resource Sufficiency
• Cost Allocation Principles and Approach
• Losses
EIM Policy Decisions Phase II
• EIM Tariff Attachment Development
• Network Transmission Usage
• Non-Federal Resource Participation
• Metering and Data Requirements
• Evaluation of Operational Tools
• Follow-on from Phase I
Sept. 26 EIM ROD
Studies for Initial Proposal
Aug '19
Sep '19
Oct '19
Nov '19
Dec '19
Jan '20
Feb '20
Mar '20
Apr '20
May '20
Jun '20
Jul '20
Aug '20
Sep '20
Oct '20
Nov '20
Oct. 23 EIM/TC/BP-22 Kickoff Meeting
Mid-Nov/Early Dec. Supplemental Public Meetings
EIM/TC/BP-22 Pre-Workshops (multiple)
BPA Workshops
Reserved for Supplemental Workshops
TC/BP-22 Initial Proposal

# Policy WG Structure

GRID Modernization



# EIM Policy WG Roles

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- Working Group Lead, Russ Mantifel
- Working Group Members
- Policy Leads
- Established Decision Making Forums
  - CBIT
  - BP/TC 22
  - GEM
  - APSC (IT Policy Decisions)
  - MSPSC (Non-IT Decisions)

# EIM Policy WG Members*

GRID Modernization

**Power Services**

Daniel Fischer, PS: Power NW Requirements Marketing

Alex Spain, PT: Power Bulk Mktg

Pam Van Calcar, PG: Power Generation Asset Management

**Legal**

Rebekah Pettinger, LP: Power General Counsel

Ryan Sigurdson, LT: Transmission General Counsel

Todd Miller, LP: Power General Counsel

**Transmission**

Todd Kochheiser, TO: Transmission System Operations

Rachel Dibble, TS: Transmission Marketing and Sales

Rebecca Fredrickson, TS: Transmission Marketing and Sales

**BTO**

Steve Kerns, B: Director of Grid Mod

Sarah Burczak, B: EIM Stakeholder Engagement

Roger Bentz, B: Program Mgr, EIM Implementation

Mark Symonds, B: CA Awareness

Tom Davis, B: Negotiations Lead

*Other corporate organizations will be involved as needed (Finance, Customer Support Services, etc.)

GRID Modernization

# Major EIM Policy Topics

| Topic |
| --- |
| Resource Sufficiency |
| - Balancing Area Obligations |
| - LSE Performance & Obligations |
| - Gen Input Impacts |
| Cost Allocation Principles and Approach |
| Losses |
| EIM Tariff Attachment Development |
| Network Transmission Usage |
| Non-Federal Resource Participation |
| Metering and Data Requirements |
| Evaluation of Operational Tools |

GRID Modernization

# 1) EIM Charge Code Allocation

- BPA will need to determine methods of allocating EIM charge codes and any updates to BPA's existing rates.
- As an EIM Entity in 2022, BPA will begin settling with the EIM Market Operator on behalf of transmission and entities within BPA's Balancing Authority (BA). BPA will need to determine how to allocate those costs and credits.

GRID Modernization

# 2) EIM Losses

- The EIM automatically dispatches and prices incremental losses (above Bases Schedules, which are inclusive of losses prior to the market run).
- BPA plans to evaluate what, if any, changes are needed to our current Transmission Loss practices on account of the EIM.

GRID Modernization

# 3) EIM Resource Sufficiency

- The EIM has hourly Resource Sufficiency requirements in order for BPA and its BA to fully participate in the market. BPA needs to determine policies, products, and rules for BPA and entities within the BPA BA in regard to this test.
- BPA needs to determine how to approach passing the Resource Sufficiency tests and how that impacts entities within the BPA BA.

GRID Modernization

# 4) EIM Tariff Changes

- EIM participation will require BPA to articulate new rules and expectations for entities within the BPA BA and transmission customers. EIM Entities typically develop a separate EIM attachment to their OATT.
- EIM participation will require the development of certain tariff provisions.

GRID Modernization

# 5) EIM Transmission Usage for Network

- BPA has determined how it intends to allow transmission to be made available for EIM Transfers. This issue concerns what, if any, additional requirements are needed for the use of transmission within the BPA BA.

GRID Modernization

# 6) EIM Non-Federal Resource Participation

- EIM Entities provide for rules to allow resources to participate in the market. BPA has made certain determinations for FCRPS participation but needs to develop rules that can apply to all BA resources.
- These rules are a requirement of EIM Entities.

GRID Modernization

# 7) EIM Metering and Data Requirements

- A comprehensive metering plan is a requirement for EIM Entities.
- BPA must also determine how to use data that is essential for EIM operation from all entities within BPA's BA.
- BPA will work with all entities within BPA's BA to determine metering requirements and data submission requirements for effective EIM operation.

GRID Modernization

# 8) EIM Evaluation of Operational Controls

- BPA relies on a suite of operational controls and will continue to do so as the EIM does not displace our reliability obligations.
- BPA is evaluating what, if any, changes should be made on account of joining the EIM.

# EIM Meeting Cadence

- Weekly BPA/CAISO Program Management Meeting (existing)
- Core team weekly meeting (existing)
- Weekly EIM Standup for all EIM-related projects (coming soon)
  - 30 minute check-in
  - What was accomplished last week
  - What's in the plans for this week
  - Any issues that need to be addressed
- Bi-Weekly EIM Steering Committee Meeting (initiated & being formalized)
- Monthly EIM project alignment meeting (coming soon)




# Briefing on BPA's Evaluation of Joining the Western EIM

**Steve Kerns**
Director, Grid Modernization
Bonneville Power Administration

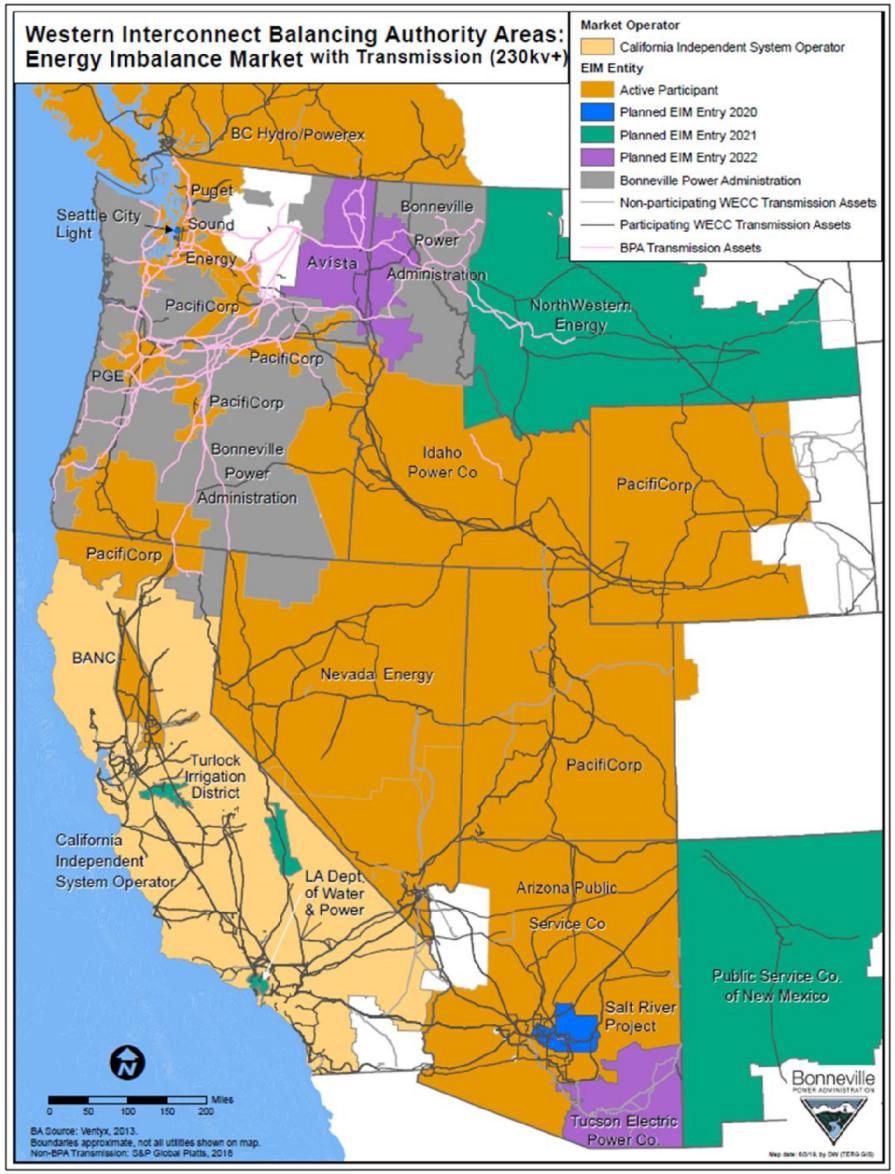
Jun 25, 2019

# Agenda

- Market Context
- Western EIM Evaluation
- Business Rationale
- Letter to the Region
- Next Steps

# Drivers for Market Changes

- Variable energy resources are increasing in the West
- Ability to realize the value of sub-hourly dispatch with flexible and low carbon hydro resources
- Transmission use and system operations are changing
- Western EIM footprint is growing
- Market evolution



# Market Context

- A well designed electricity market is built on a foundation of resource adequacy and has features that:
  - Provide for intra-hour energy balancing
  - Compensate explicitly for capacity resources that provide system reliability and flexibility

- BPA views the EIM as *one piece* of a well-designed market
  - Additional market functions are required to fully compensate BPA for the capacity value of the flexible and carbon-free federal power system

- BPA will continue to work with CAISO and stakeholders to enhance regional resource adequacy by ensuring that flexible resources are appropriately compensated for the services that they provide

# Western EIM Evaluation

- Bonneville initiated a formal Stakeholder process in July 2018
- Bonneville began discussion with CA-ISO in September 2018
- Four Key Principles
  - Consistent with statutory, regulatory, and contractual obligations.
  - Maintain reliability
  - Voluntary participation
  - Sound business rationale

# Business Rationale

- Modeling suggests that dispatch benefits from EIM participation will quickly pay for itself and result in ongoing annual net benefits of **$29-34M:**
  - Four sensitivities that were evaluated did not fundamentally change this conclusion
- Analysis has determined that EIM participation is a cost-effective non-wires solution and an effective intra-hour congestion management tool
- EIM participation will also:
  - Result in an efficient dispatch of generation to meet load across the entire EIM footprint
  - Provide increased visibility and discipline in the dispatch and marketing of Federal power and transmission assets
  - Create additional visibility of conditions across the grid which will enhance reliability
  - Allow BPA to effectively participate in the development of future markets which will appropriately compensate flexible resources for the services that they provide

# Evaluation Issues*

- Relationship of EIM to Other Emerging Markets
- BA Resource Sufficiency
- EIM Settlements
- Market Power
- Treatment of Transmission
- Generation Participation Model (FCRPS)
- Governance
- Carbon Obligation in EIM

* Additional information on these issues may be found in the Appendix

# Letter to the Region

- Provides notice to the public that Bonneville is considering signing an EIM Implementation Agreement and moving forward toward joining the EIM

- Includes:
  - Description of Bonneville's decision-making process for joining the EIM
  - Discussion of legal authority to join the EIM
  - Business case for joining the EIM
  - Proposed principles for joining the EIM
  - Draft EIM Implementation Agreement
  - Policy proposals on certain policy topics
  - Brief descriptions of additional policy decisions that will need to be made in the future

- Seeking input from stakeholders
  - Letter to the Region will be issued on June 20th with comments due on July 22nd

- Record of Decision planned for September 2019
  - Bonneville will address comments received and make final decision whether to sign Implementation Agreement and on other items covered in Letter to Region

# EIM Decision Process

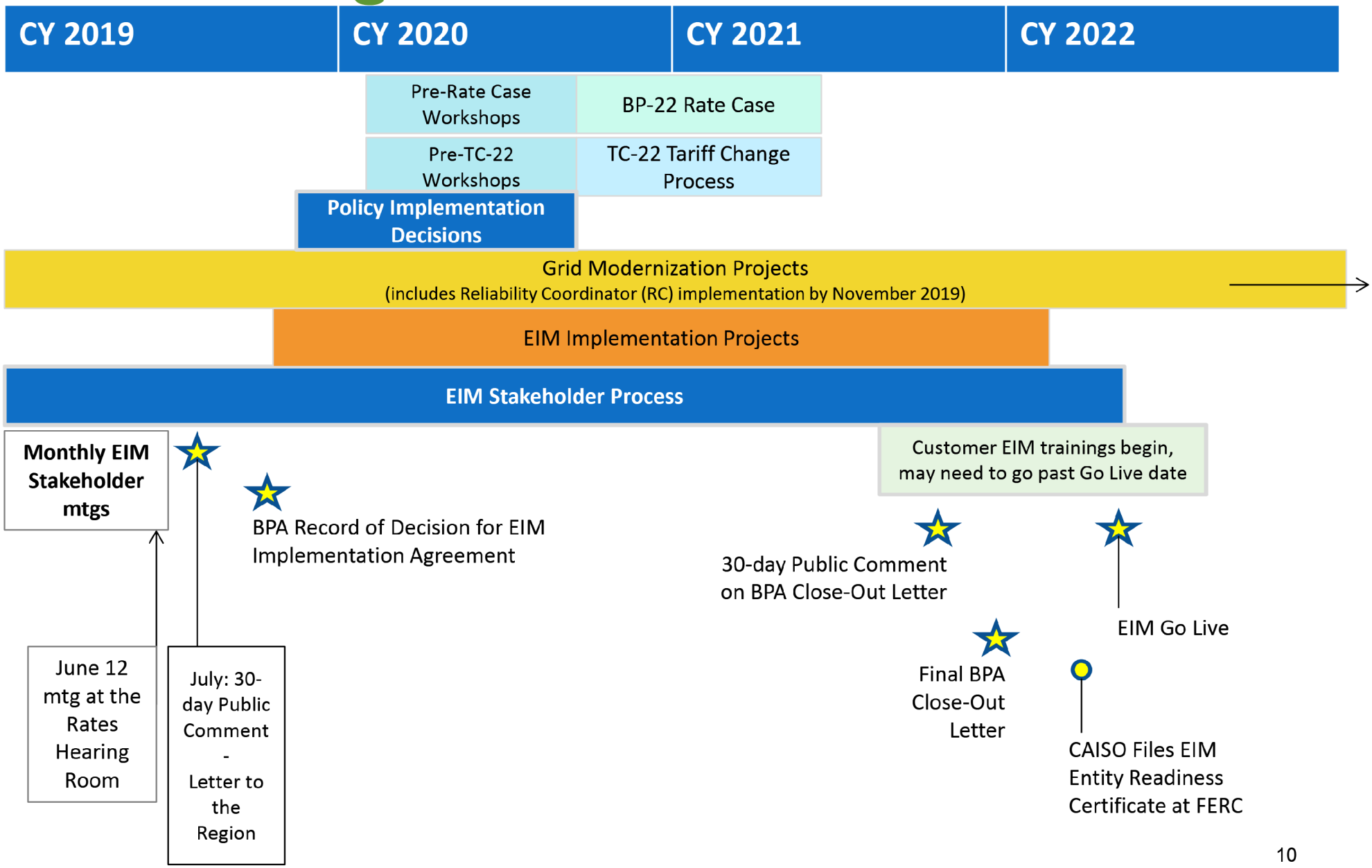
1. Letter to Region and Record of Decision — June 2019 – September 2019
   - Solicit stakeholder feedback on: Draft Implementation Agreement, Cost Benefit Analysis, Legal considerations, Roadmap of process/issues, Proposed Decisions on Certain Policy Issues, Principles for Joining
   - 30-day comment period
   - Final decision to sign Implementation Agreement, and on other items covered in Letter to Region

2. Policy Implementation Decisions — October 2019 – August 2020
   - Discuss all remaining policy issues with stakeholders.
   - Provide written proposal, solicit written stakeholder comment, and make final written decision(s) on policy issues
   - Final decisions on these policy issues

3. BP-22 and TC-22 Cases — October 2020 – July 2021
   - Settlement discussions August – October 2020
   - Follow 7(i) process and conclude with ROD / final decision

4. Draft and Final Close-Out Letters — October 2021 – December 2021
   - Draft Close-Out Letter addressing: principles for joining the EIM, any additional policy issues that have arisen, propose final decision whether to join the EIM, and incorporate final decisions made in steps 1 and 2 above.
   - 30-day comment period
   - Final Close-Out Letter: Address comments raised, Final Decision whether to join EIM, if decision is to join - move forward to sign relevant EIM Agreements

# BPA's High Level EIM Timeline






Previous EIM Stakeholder Meeting Materials are available here: www.bpa.gov/goto/EIM

# Next Steps

- Letter to the Region was issued on June 20th with comments due on July 22nd

- A meeting to answer clarifying questions about the Letter to the Region is scheduled for **Monday July 8th** at the Rates Hearing Room, 1-3pm.
  - WebEx and Phone participation will be available
  - A Tech Forum notice will be sent out as a reminder

- For more information on BPA's EIM Stakeholder process and meetings please visit:
  https://www.bpa.gov/Projects/Initiatives/EIM/Pages/Energy-Imbalance-Market.aspx

- For more information on BPA's Grid Modernization Initiative please visit:
  https://www.bpa.gov/goto/GridModernization

# Appendix

Additional information on Evaluation Issues

# Relationship of EIM to Other Emerging Markets

- While we are engaged in the development of market opportunities, Bonneville is focused on whether to sign the Implementation Agreement with CAISO and move forward toward joining the EIM.
- There are two examples of CAISO policy initiatives with potential implications for EIM:
  - **Day-Ahead Market Enhancements (DAME)**
    - High-level objective: Manage uncertainty that occurs between the day-ahead and real-time markets
    - Status: CAISO is focusing the scope on a day-ahead Flexible Ramping Product (FRP) and reforming IFM & RUC; June 20th workshop to re-launch
  - **Expansion of the Day-Ahead Market to EIM (EDAM)**
    - High-level objective: Enable EIM access to a broader pool of resources by extending the enhanced day-ahead market to some or all EIM Entity BAAs
    - Status: CAISO has not yet launched this policy initiative
- Bonneville will actively participate in the advancement of these stakeholder processes and Bonneville expects that the CAISO will complete the DAME policy initiative and implement the FRP before Bonneville goes live in the EIM.

# BA Resource Sufficiency

- Bonneville's preliminary analysis indicates that it would pass the RS evaluation a significant amount of the time using historical spinning availability
  - BPA has not yet determined how it will make flexibility available for the EIM
- This provides  Bonneville with a high level of confidence that it can achieve the benefits described in the business case
- The likelihood of passing the RS evaluation would increase if any additional bid flexibility is made available, whether from Federal or non-Federal Participating Resources

# EIM Settlements

- Bonneville will address settlements issues in the Post-ROD Policy process, subsequent Rate and Tariff Cases, and Business Practice development processes
- Bonneville staff gathered information on settlements via trainings, benchmarking with EIM Entities, reviewing CAISO materials, and internal staff who work with CAISO settlements.
- If Bonneville joins the EIM as an EIM Entity, Bonneville will need to decide whether and how to allocate the CAISO's charge and credits to Bonneville's transmission customers
- If Bonneville decides to allocate some or all of the EIM charge codes to its customers, Bonneville will need to decide how to bill its customers for these charges
- The billing and settlement mechanics policy process will be closely linked with the policy process on allocation of EIM charge codes

# Market Power

- Default Energy Bids
  - If determined to have market power, a market participant may have its EIM bid prices mitigated to a Default Energy Bid (DEB) by CAISO
  - Current construct does not adequately reflect the opportunity costs of use limited hydro resources
  - CAISO worked collaboratively with stakeholders to propose a new Hydro DEB option
  - Approval of this option and subsequent implementation is important for BPA's participation in the EIM

# Treatment of Transmission

- Bonneville is proposing to adopt the Interchange Rights Holder Methodology for making transmission available to the EIM
- Bonneville expects to be a significant “net wheeler” in the EIM
  - This may lead to cost shifts and free riders
- Bonneville believes the Interchange Rights Holder Methodology better balances the need to provide transmission to the EIM with collecting enough revenue to adequately and fairly recover the costs of the FCRTS

# Generation Participation Model (FCRPS)

- Bonneville will initially participate in the EIM with federal hydroelectric dams aggregated into three resource zones:
  - Upper Columbia dams (Grand Coulee, Chief Joseph)
  - Lower Columbia dams (McNary, John Day, The Dalles, Bonneville)
  - Lower Snake dams (Lower Granite, Little Goose, Lower Monumental, Ice Harbor).

- These resource groups will participate in the EIM as separate aggregated participating resources (APR)
  - The amount of generation produced by these resources not bid into the EIM will be treated as an aggregated non-participating resources (ANPR) for purposes of the EIM
  - All other federal resources in the Bonneville balancing authority area will initially be non-participating resources in the EIM

# Governance

- BPA has determined that the current EIM governance structure does not contain any “showstoppers” to joining the EIM.
- However, BPA would like to see some improvements to the current governance structure, including:
  - Expand the EIM Governing Body’s primary authority,
  - Improve the durability of the current EIM governance structure
  - Allow for ability to adapt to expanded market functions, and
  - A broader role for public power in the EIM governance structure.
- BPA is supporting these improvements in a current stakeholder process that the CAISO has initiated and continues to coordinate regularly with multiple parties.

# Carbon Obligation in the EIM

- Energy generated in or imported into California is subject to California's greenhouse gas (GHG) regulations.
- If BPA were to participate in the EIM, any carbon attributed to imports into California would incur a compliance obligation
- BPA currently cannot purchase carbon allowances
  - Carbon allowances are considered a state tax by the U.S. DOE, BPA, and other federal agencies.
  - Federal agencies have sovereign immunity from state taxes and cannot pay them unless Congress specifically authorizes it
- Absent Congressional authorization to purchase allowances, BPA would not be able to directly deliver EIM energy into California




# EIM Stakeholder Meeting

June 12, 2019
1pm – 4pm
Rates Hearing Room



BPA-2020-00700-F0477

# For our WebEx and phone participants:

- We have muted all calls on entry, if you have a question, you will need to unmute by using *6. Then please identify yourself by name and let us know who you represent.
- Please do not put this call on hold OR take other calls while you are dialed into this one.
- If we identify a noisy line, you may be disconnected from the meeting.

# Agenda

| | |
|---|---|
| 1:00-1:05 | • Welcome, Safety Moment, Introductions |
| 1:05 – 1:20 | • Review of BPAs EIM Principles, EIM Process, Timeline |
| 1:20- 2:30 | • Cost Benefit Analysis Update |
| 2:30 – 3:40 | • Letter to the Region: EIM Issues Review |
| 3:40 – 4pm | • Next Steps, Q&A |

# Statement of BPA's Principles:

1. Participation is consistent with statutory, regulatory, and contractual obligations.

2. Maintain reliable delivery of power and transmission to our customers.

3. Resource participation in the EIM is and always will be voluntary.

4. BPA's decision to participate in the EIM will be based on a sound business rationale.

If BPA signs the EIM Implementation Agreement it would obligate BPA to begin spending on EIM implementation projects with the CAISO and signals BPA's intent to join the EIM as long as BPA's EIM principles continue to be met. However, it does not bind BPA to join the EIM.

# Market Context

- A well designed electricity market is built on a foundation of resource adequacy and has features that:
  - Provide for intra-hour energy balancing
  - Compensate explicitly for capacity resources that provide system reliability and flexibility

- BPA views the EIM as *one piece* of a well-designed market
  - Additional market functions are required to fully compensate BPA for the capacity value of the flexible and carbon-free federal power system

- BPA will continue to work with CAISO and stakeholders to enhance regional resource adequacy by ensuring that flexible resources are appropriately compensated for the services that they provide

# Timeline Leading up to the ROD

Agendas for previous and future monthly EIM Stakeholder meetings:

| | |
|---|---|
| July 24 | •Grid Modernization Overview, Strategic Plan Connection, Intro to 8 Issues BPA is Reviewing, Initial Cost Benefit Analysis |
| September 13 | •EIM 101 |
| October 11 | •Process Plan, Transmission, Generation, Governance |
| November 14 | •Process Plan, Market Power |
| December 18 | •Settlements, Non-Federal Generation Participation |
| January 16 | •Resource Sufficiency, Emerging Markets |
| February 20 | •Base Case Structured Scenario, Market Mitigation |
| March 13 | •EIM Issues and Venues, Oversupply Management Protocol, Settlements, Structured Scenario |
| April 10 | •Carbon in the EIM, Cost Benefit Analysis Status Update, Structured Scenario |
| May 15 | •Cost Benefit Analysis |
| June 12 | •Cost Benefit Analysis Update, EIM Issues Summary Review |
| Week of June 17 | •Start of 30 day public comment period for Letter to the Region |
| July 8 | •Clarifying Question & Answer session on the Letter to the Region |
| August | •BPA drafts Record of Decision (ROD) |
| September | •Final ROD for signing the EIM Implementation Agreement |



Previous EIM Stakeholder Meeting Materials are available here: www.bpa.gov/goto/EIM

# EIM Decision Process

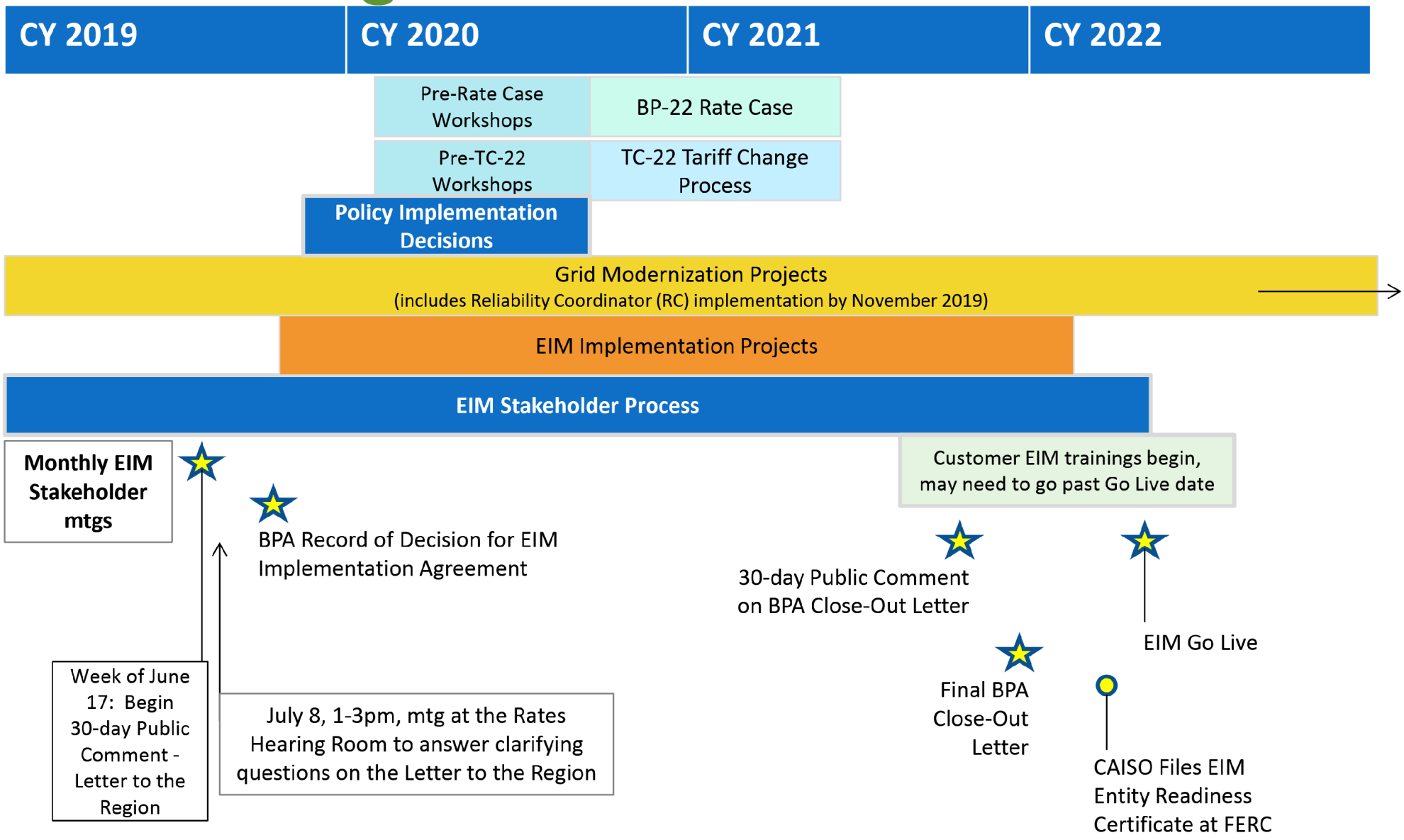
1. Letter to Region and Record of Decision — June 2019 – September 2019
   - Solicit stakeholder feedback on: Draft Implementation Agreement, Cost Benefit Analysis, Legal considerations, Roadmap of process/issues, Proposed Decisions on Certain Policy Issues, Principles for Joining
   - 30-day comment period
   - Final decision to sign Implementation Agreement, and on other items covered in Letter to Region

2. Policy Implementation Decisions — October 2019 – August 2020
   - Discuss all remaining policy issues with stakeholders.
   - Provide written proposal, solicit written stakeholder comment, and make final written decision(s) on policy issues
   - Final decisions on these policy issues

3. BP-22 and TC-22 Cases — October 2020 – July 2021
   - Settlement discussions August – October 2020
   - Follow 7(i) process and conclude with ROD / final decision

4. Draft and Final Close-Out Letters — October 2021 – December 2021
   - Draft Close-Out Letter addressing: principles for joining the EIM, any additional policy issues that have arisen, propose final decision whether to join the EIM, and incorporate final decisions made in steps 1 and 2 above.
   - 30-day comment period
   - Final Close-Out Letter: Address comments raised, Final Decision whether to join EIM, if decision is to join - move forward to sign relevant EIM Agreements

# BPA's High Level EIM Timeline





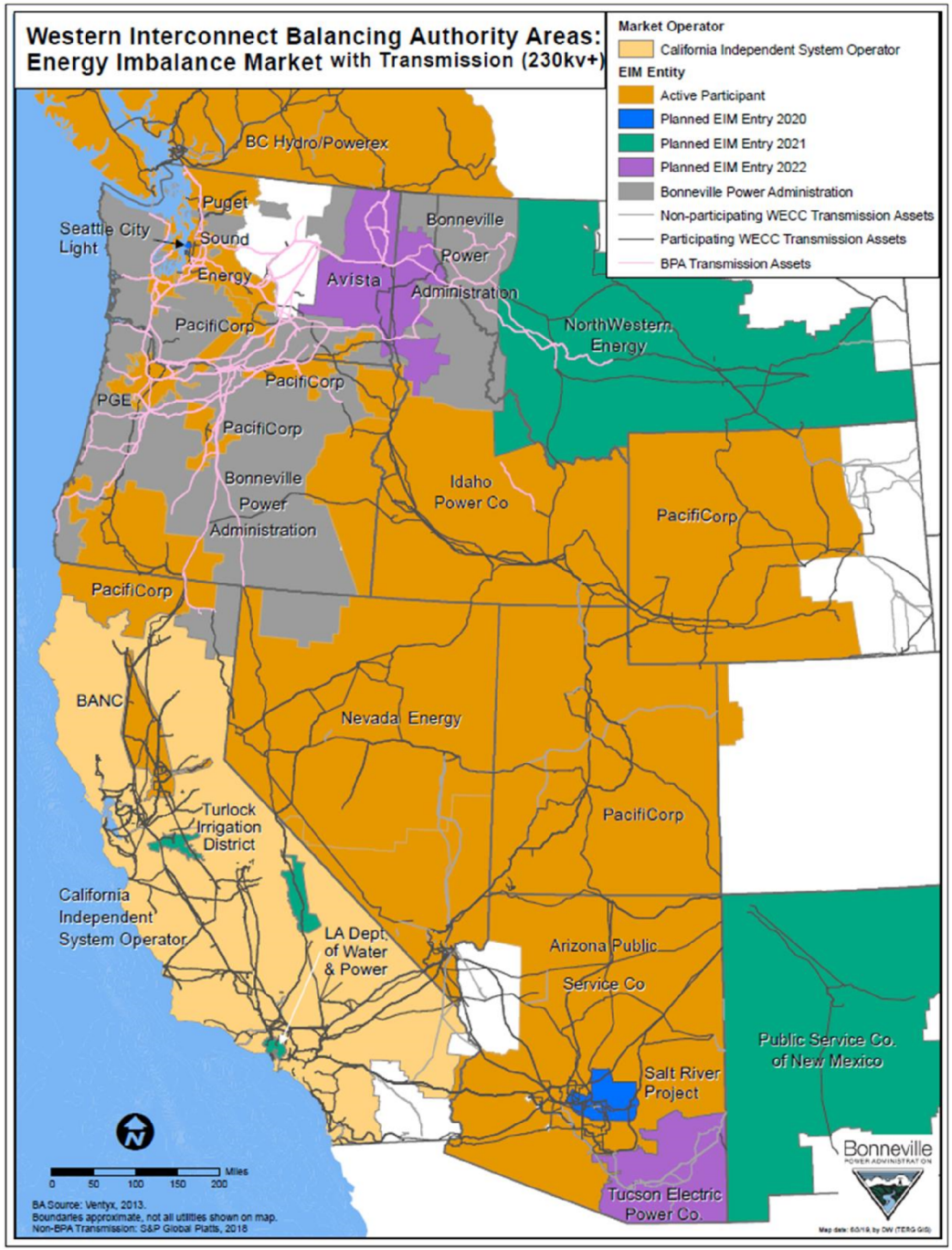

Previous EIM Stakeholder Meeting Materials are available here: www.bpa.gov/goto/EIM

# EIM Issues and Venues

*This shows BPA's current thinking but the matrix will evolve over time*

Legend:
F = Final Decision
I = Implementation

| Issue | Letter to Region / ROD (July 2019 – September 2019) | Policy Implementation Decisions (October 2019 – August 2020) | TC-22 Tariff Terms & Conditions Case (October 2020 – July 2021) | BP-22 Rate Case (October 2020 – July 2021) | Close-Out Letter (October 2021 – December 2021) |
|---|---|---|---|---|---|
| BPA's EIM Principles Development / Evaluation | F – Development | I | I | I | F – Evaluation of the issues against the principles |
| Statutory Authority for Joining the EIM | F | | | | Confirm consistency with the principles. |
| EIM Impacts on BPA Contractual Commitments | F | | | | |
| NEPA and Environmental Obligations | F | | | | |
| EIM Governance | F | | | | |
| Cost Benefit Analysis | F | | | | |
| Carbon Obligations | F | | | | |
| Market Power (LMPM, DEB) | F | | | | |
| Oversupply Management Protocol | F | | | | |
| OCBR and other Reliability Tools | F | | | | |
| Federal Generation Participation Plan | F | | | | |
| Load Zone (LAP) | F | | I | I | Final action regarding decision to join. |
| Resource Sufficiency — BAA Level | F | | | | |
| Transmission — Interchange | F | | I | I | |
| Transmission — Network | | F | I | I | |
| Allocation of EIM Charge Codes | | F | | I | |
| Resource Sufficiency — Sub-BAA Level | | F | I | I | |
| Transmission Losses | | F | I | I | |
| Nonfederal Resource Participation Requirements | | F | I | I | |
| Settlements/Billing (Mechanics) | | F | I | | |
| Data Submission Requirements | | F | I | | |
| Metering Requirements | | F | I | | |




# EIM Entity Map

- Active and planned EIM participants
- BPA shown in grey




# EIM
# Cost Benefit Analysis



BPA-2020-00700-F0487

# Agenda

- Stakeholder Comment Discussion
- EIM Start-up and Ongoing Cost Update
- Net Benefits Summary
- E3 Gross Benefits Sensitivities
- Wrap-Up

# Themes of Stakeholder Comments

- Assumptions
  - Reflect alternate NW price nodes
  - Further limit BPA flexibility
  - Alternative success rate
  - Limit BPA's access to EIM market

- Other comments
  - Tracking and forecasting EIM benefits
  - Continue updating EIM Business Case

# Stakeholder Questions

- Questions
  - How did the model handle negative prices?
    - The model assumed actual EIM clearing prices and simulated BPA DECs whenever prices were sufficiently low and sufficient BPA DEC flexibility existed, subject to energy neutrality.
  - Have benefits for other EIM entities led to rate reductions?
    - Benefits (and costs) are difficult to segregate from other operations so it is difficult to translate participation to rate reductions.
    - CAISO estimates gross benefits quarterly.
  - Impact of various water conditions?
    - Extreme water conditions could marginally decrease benefits by limiting flexibility
    - EIM benefits are subject to less uncertainty than Net Secondary Revenue (illustrated by consistent monthly benefits, despite various hydraulic conditions).
  - Does modeling comply with 1% restrictions that are applicable during fish ops?
    - Yes, all spinning capability and feasible min/max assumptions incorporate 1% restrictions during periods where it is a constraint.

# Startup Cost Update

- BPA reviewed (and updated) Utilicast startup cost estimates to incorporate increased EIM-related knowledge within BPA

- The range around startup costs reflects uncertainty in required metering investments
  - If interchange upgrades are ultimately determined to be discretionary, their cost will be excluded

## Startup Costs ($M)

| EIM Category | Cost* ($M) | Labor | Non-Labor |
|---|---|---|---|
| Infrastructure (Metering & AGC Modernization) | $7.9-$13.3 | $2.7-$8.1 | $5.3 |
| Operation (EIM Integrator, Schedule Submission, & Bid Curves) | $17.2 | $9.8 | $7.4 |
| After-the-Fact (Settlements) | $4.6 | $3.6 | $1.0 |
| **Total** | **$29.7-$35.1** | **$16.1-$21.5** | **$13.7** |

# Ongoing Cost Update

- BPA leveraged previous estimates of ongoing costs with an evolving understanding of EIM participation to estimate annual costs

- Ongoing cost estimated increased by $700k due to more granular estimation of EIM Administrative Charges paid to CAISO

## Ongoing Costs ($M/yr)

| EIM Category | Cost* ($M) |
|---|---|
| Infrastructure | $0.0 |
| Operation<br>(Resource Plans, EIM Desk, IT O&M, CAISO Fees) | $5.7 |
| After-the-Fact<br>(Settlements Staff) | $1.2 |
| **Total** | **$6.9** |

# Net Benefit Summary

- Based on stakeholder feedback, BPA requested that E3 complete additional simulations
  - Alternate NW price nodes (PSEI, PACW, PGE)
  - Further sensitivities based on the midpoint of results (PGE)
    - Reduced intra-hour volatility by 50%
    - GHG compliance
    - FRST-only participation
      - No BPA participation beyond what is required to meet resource sufficiency
    - Higher Success Rate (90%)

- **Net Benefits Range: $29-34M**

## Net EIM Benefits ($M/yr)

| | Estimated Net Revenue |
|---|---|
| **Initial Scenario (BPAT Price)** | **$42.0** |
| PSEI Price | $29.2 |
| PACW Price | $33.5 |
| **NW Midpoint/Base Scenario (PGE Price)** | **$32.3** |

## Net EIM Benefits Sensitivities ($M/yr)

| | Change in Net Revenue |
|---|---|
| Reduced Volatility | -$3.9 |
| GHG Compliance | -$4.6 |
| FRST-Only Participation | -$14.8 |
| Higher Success Rate | $7.9 |

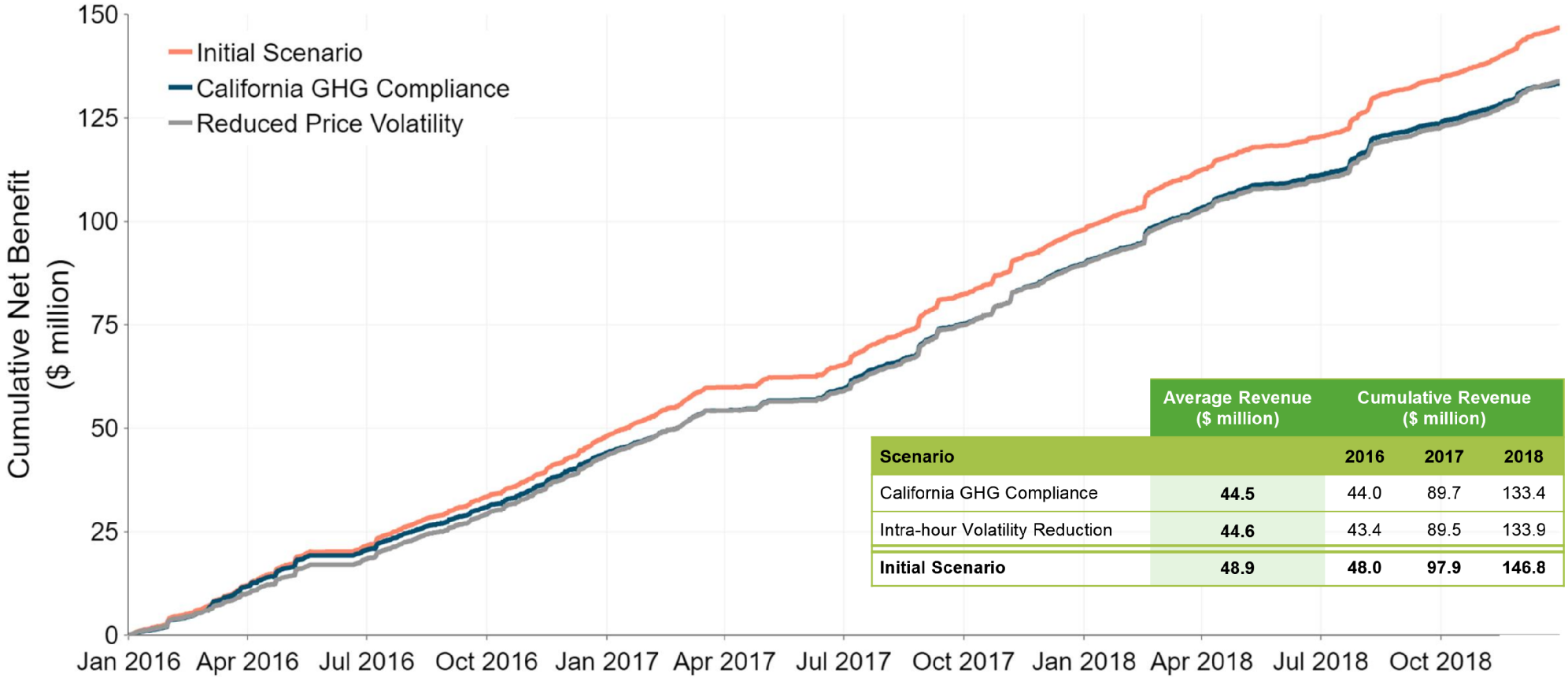
# Benefits Analysis

## Initial Modeling

# Initial Scenarios Presented

| Category | Scenario | Price | BPA Hydro Flexibility |
|---|---|---|---|
| **Initial** | May 15th Update | Actual 2016-2018 for DGAP_BPAT-APND<br><br>No marginal GHG applied | Actual 2016-2018 INC/DEC spinning capability with reserves held<br><br>Daily hydro energy balance |
| **EIM Price** | Reduced Intra-Hour Volatility | DGAP_BPAT-APND prices adjusted to be 50% less volatile within each operating hour | Actual 2016-2018 INC/DEC spinning capability with reserves held<br><br>Daily hydro energy balance |
| | California GHG Fee Compliance | Sales are penalized at cost of marginal GHG from historical 2016-2018 EIM prices | Actual 2016-2018 INC/DEC spinning capability with reserves held<br><br>Daily hydro energy balance |

# Initial Scenarios Presented at May Stakeholder Meeting

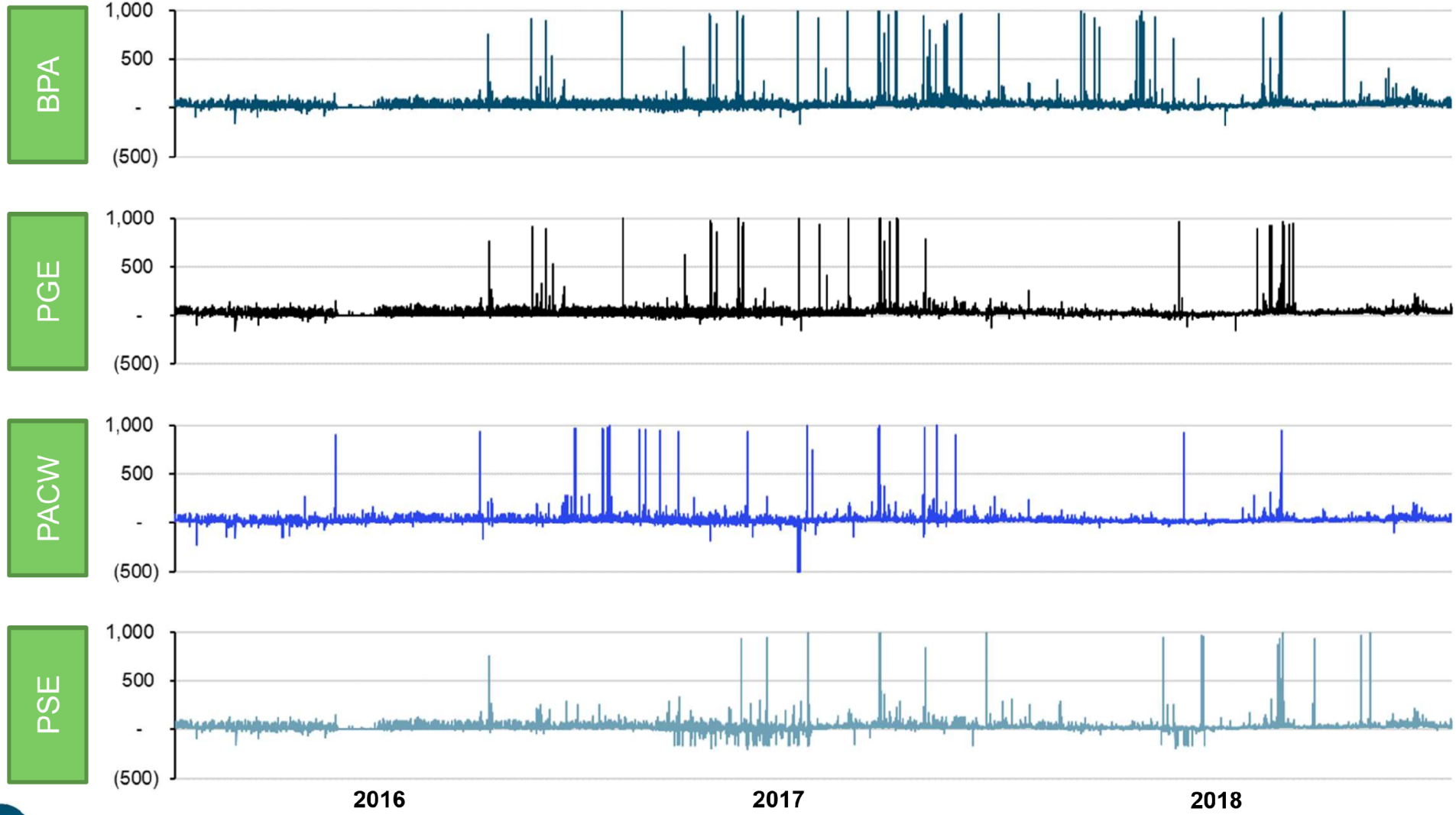



| Scenario | Average Revenue ($ million) | Cumulative Revenue ($ million) | | |
|---|---|---|---|---|
| | | 2016 | 2017 | 2018 |
| California GHG Compliance | **44.5** | 44.0 | 89.7 | 133.4 |
| Intra-hour Volatility Reduction | **44.6** | 43.4 | 89.5 | 133.9 |
| **Initial Scenario** | **48.9** | **48.0** | **97.9** | **146.8** |

# Benefits Analysis

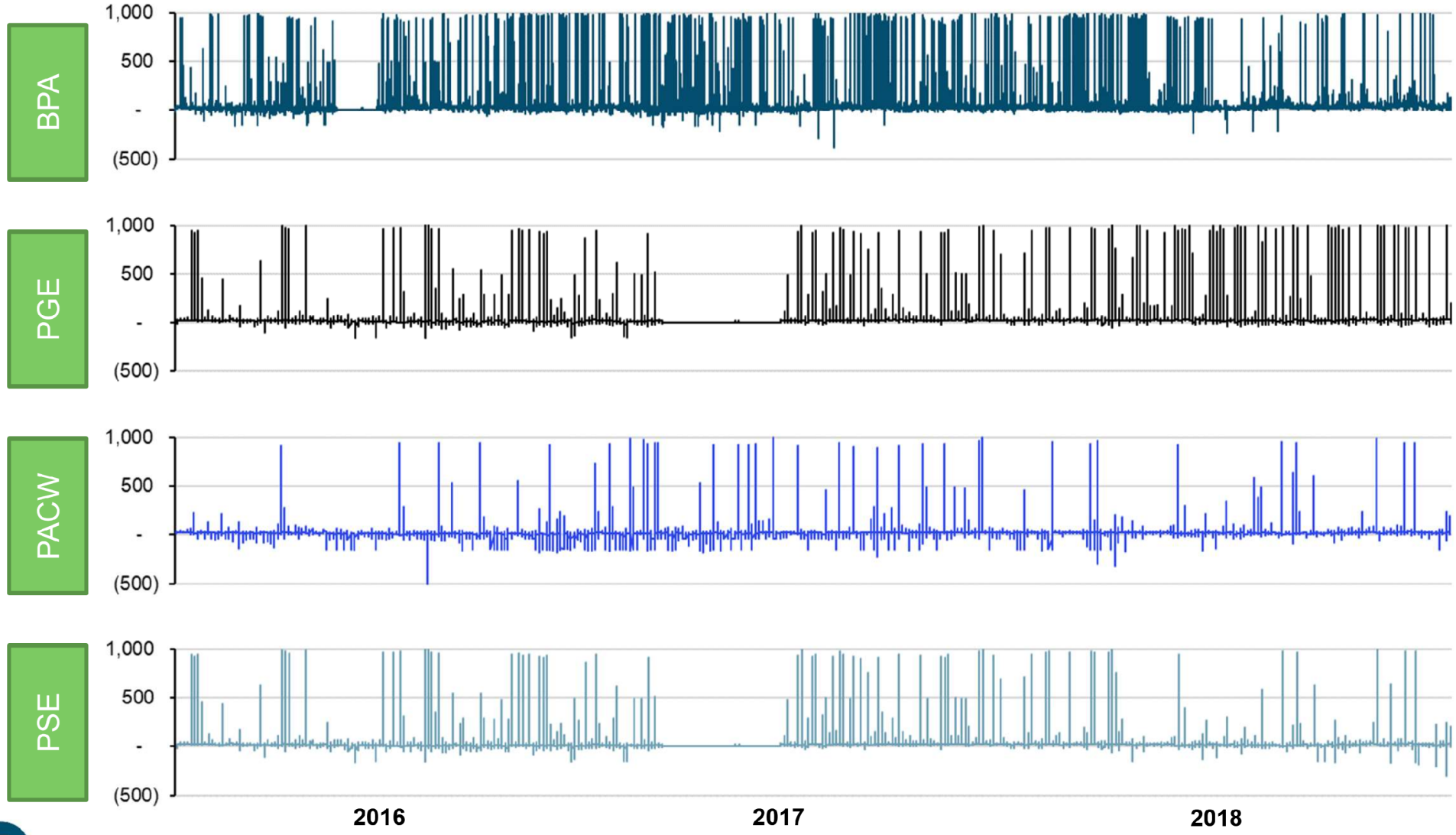
## Northwest Prices

# NW Historical 15-Minute EIM Prices*




*Adjusted to remove marginal GHG component

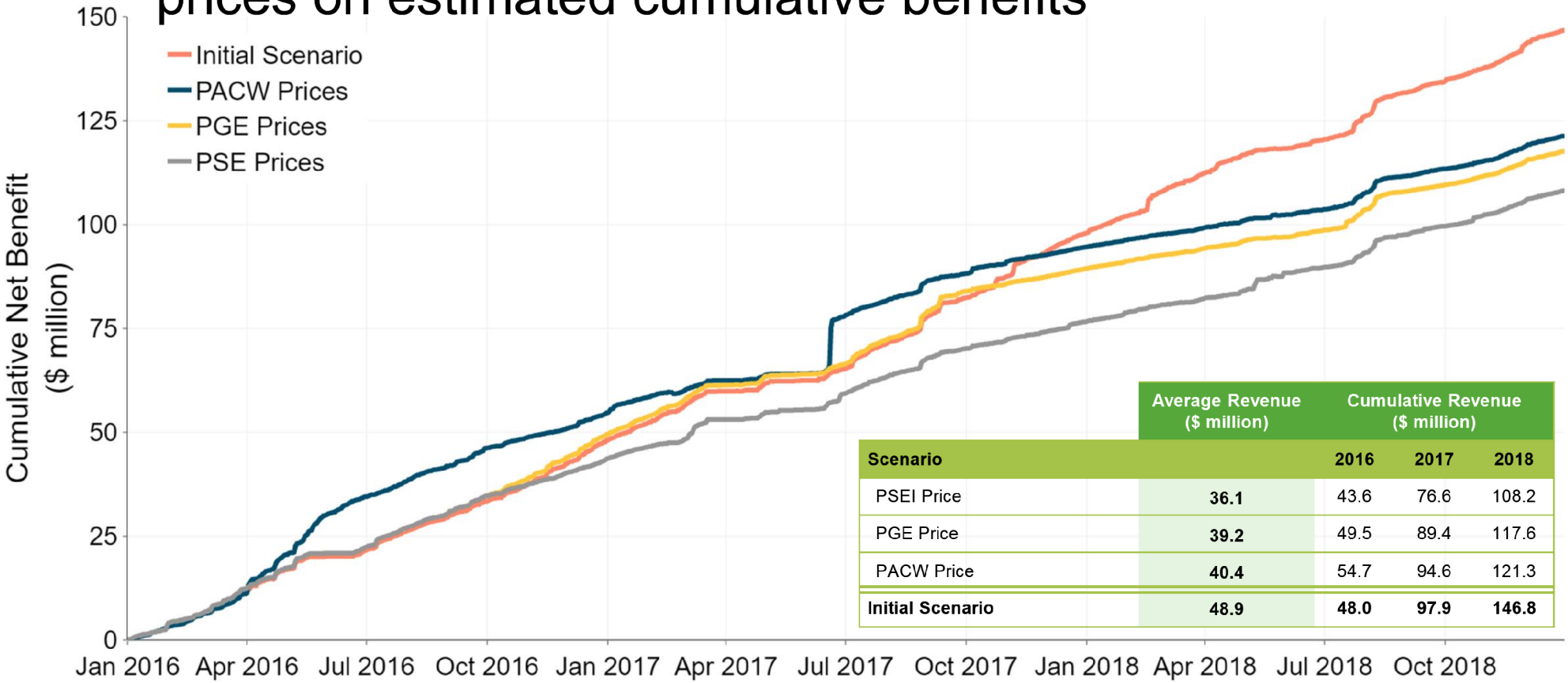
# NW Historical 5-Minute EIM Prices*




*Adjusted to remove marginal GHG component

# NW Price Scenarios

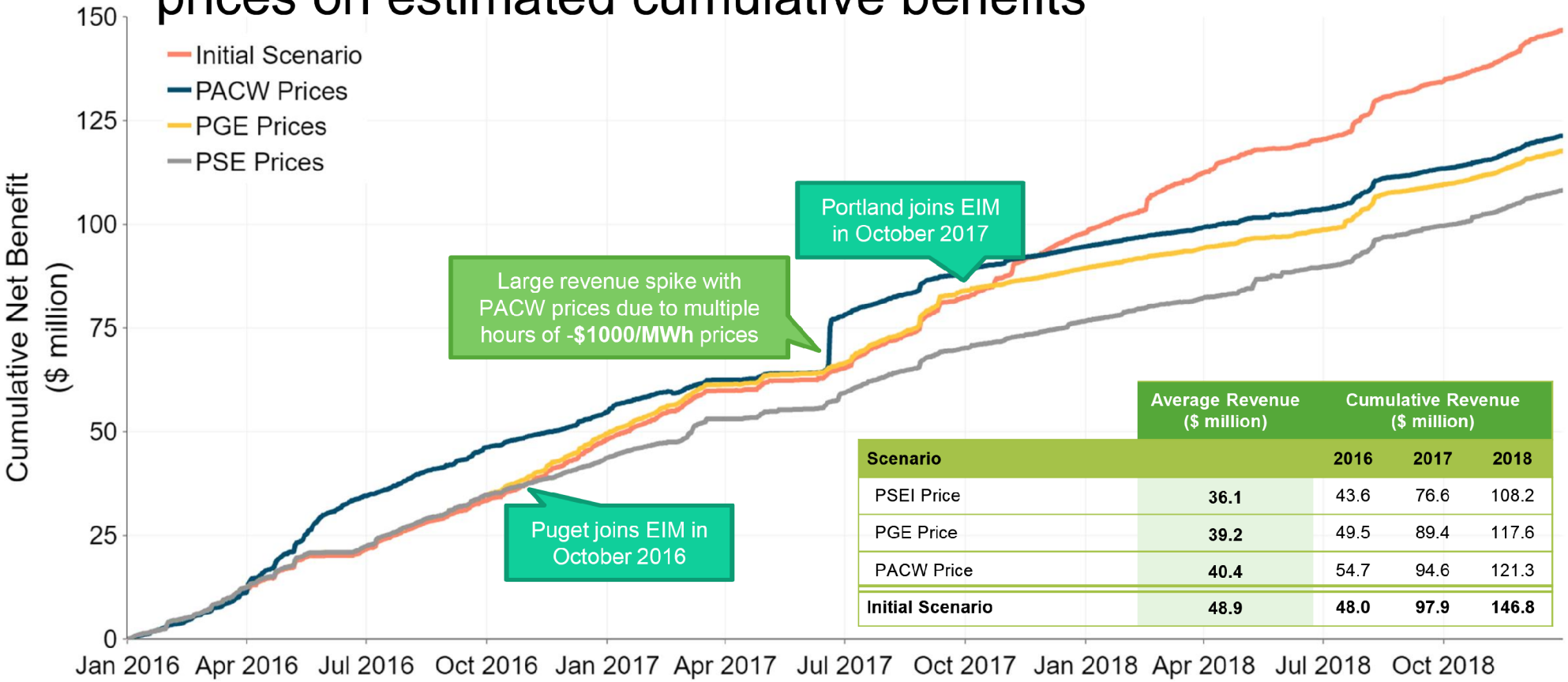
- Investigated impact of neighboring NW DGAP EIM prices on estimated cumulative benefits




| | Average Revenue ($ million) | Cumulative Revenue ($ million) | | |
|---|---|---|---|---|
| **Scenario** | | **2016** | **2017** | **2018** |
| PSEI Price | **36.1** | 43.6 | 76.6 | 108.2 |
| PGE Price | **39.2** | 49.5 | 89.4 | 117.6 |
| PACW Price | **40.4** | 54.7 | 94.6 | 121.3 |
| **Initial Scenario** | **48.9** | **48.0** | **97.9** | **146.8** |

# NW Price Scenarios

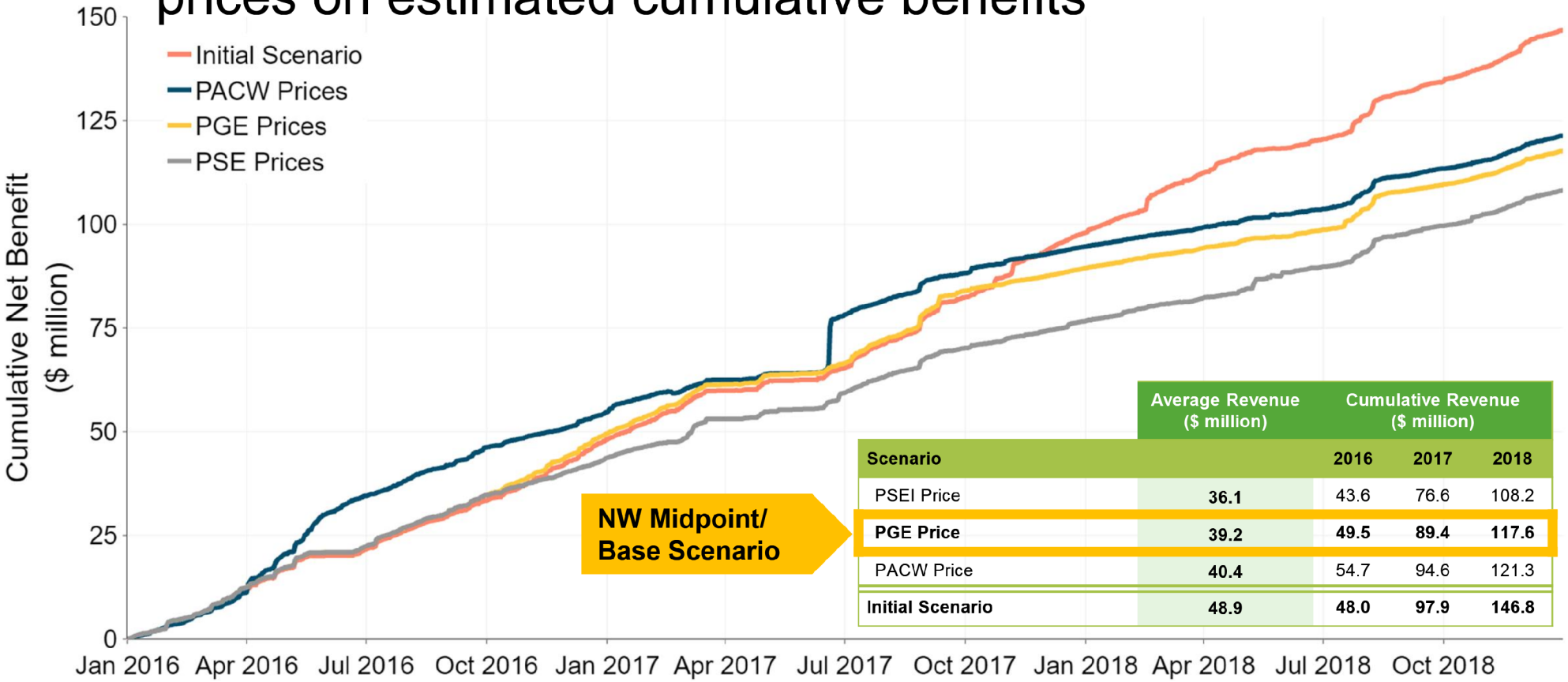
- Investigated impact of neighboring NW DGAP EIM prices on estimated cumulative benefits




| Scenario | Average Revenue ($ million) | Cumulative Revenue ($ million) | | |
|---|---|---|---|---|
| | | 2016 | 2017 | 2018 |
| PSEI Price | **36.1** | 43.6 | 76.6 | 108.2 |
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| PACW Price | **40.4** | 54.7 | 94.6 | 121.3 |
| **Initial Scenario** | **48.9** | **48.0** | **97.9** | **146.8** |

# NW Price Scenarios

- Investigated impact of neighboring NW DGAP EIM prices on estimated cumulative benefits




NW Midpoint/ Base Scenario

| Scenario | Average Revenue ($ million) | Cumulative Revenue ($ million) 2016 | 2017 | 2018 |
|---|---|---|---|---|
| PSEI Price | 36.1 | 43.6 | 76.6 | 108.2 |
| **PGE Price** | **39.2** | **49.5** | **89.4** | **117.6** |
| PACW Price | 40.4 | 54.7 | 94.6 | 121.3 |
| **Initial Scenario** | **48.9** | **48.0** | **97.9** | **146.8** |