Bonneville's Public Engagement for Establishing a Policy Direction on Potential Day Ahead Market Participation
Workshop 3

October 23, 2023

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Agenda

- Opening Remarks from BPA – Goals of the Meeting *(10 Min)*
- E3 Overview of Western Market Exploratory Group (WMEG) Cost Benefit Study (CBS) *(60 Min)*
- Initial takeaways from WMEG result
- Considerations for BPA's Day-Ahead Market (DAM) Business Case Analysis

} *(45 Min)*

- Next Steps and the November Workshop Q&A *(10 Min)*
- Closeout *(5 Min)*

Opening Remarks

Opening Remarks

- Bonneville views the results as evaluating the production cost benefit for BPA and the West
- The study is more illustrative of the impact of various market footprints than it is of specific market design elements
  - EDAM Bookend more properly characterized as benefits possible from a West-wide market footprint
  - Markets+/EDAM split describes how benefits change if there are two market footprints

Opening Remarks

- The WMEG Study Results will be one consideration in BPA's process for determining its policy direction or subsequent decisions regarding DAM participation in a rapidly changing external environment
  - Some utilities have announced day-ahead market participation, and others will make decisions about day-ahead market participation in the next few years.
  - BPA views these initial steps towards participation as an indication that there will be fewer opportunities for bilateral trading reflected in the BAU case.
  - New governance structures for markets are being proposed and implemented throughout the West
- Today's conversations represents one element of the business case that Bonneville will use in helping arrive at a leaning in 2024
- Bonneville has not made any proposals about a leaning in 2024

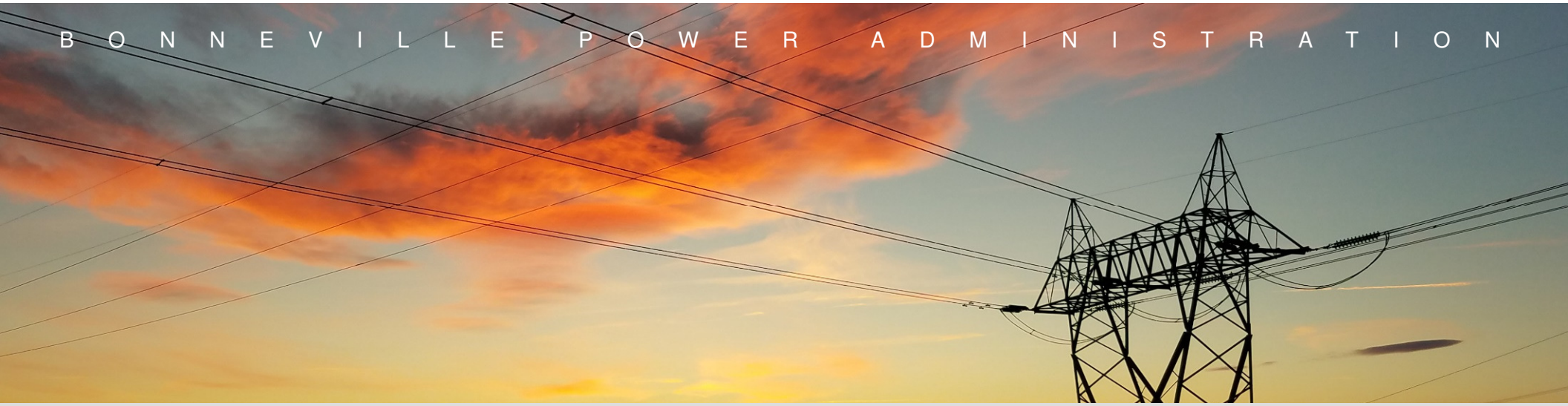
Opening Remarks

- Study Results
  - CBS narrative and quantitative materials produced are posted on the BPA website with meeting materials
- Conversations will focus on WMEG Cost Benefit Study (CBS) results
  - BPA will begin compare the California Independent System Operator (CAISO)'s EDAM and Southwest Power Pool (SPP)'s Markets+ against a non-market alternative during the November 29th workshop

E3 presentation on WMEG study

(They will present from a separate slide deck)

Their materials will be posted with materials for public record



Initial Takeaways from WMEG Study Results

Initial Takeaways from WMEG Results

- The WMEG results clearly show the potential for BPA to achieve financial benefits from DAM participation
- Footprint and transmission connectivity are significant drivers of monetary benefits and are two of the many considerations BPA is evaluating

Initial Takeaways from WMEG Results

- BPA is considering all elements of the benefits articulated in the WMEG study as well as tradeoffs that exist across the presented DAM footprint scenarios
- BPA's decision-making process will analyze DAM impacts on transmission revenue and will take into consideration E3's results

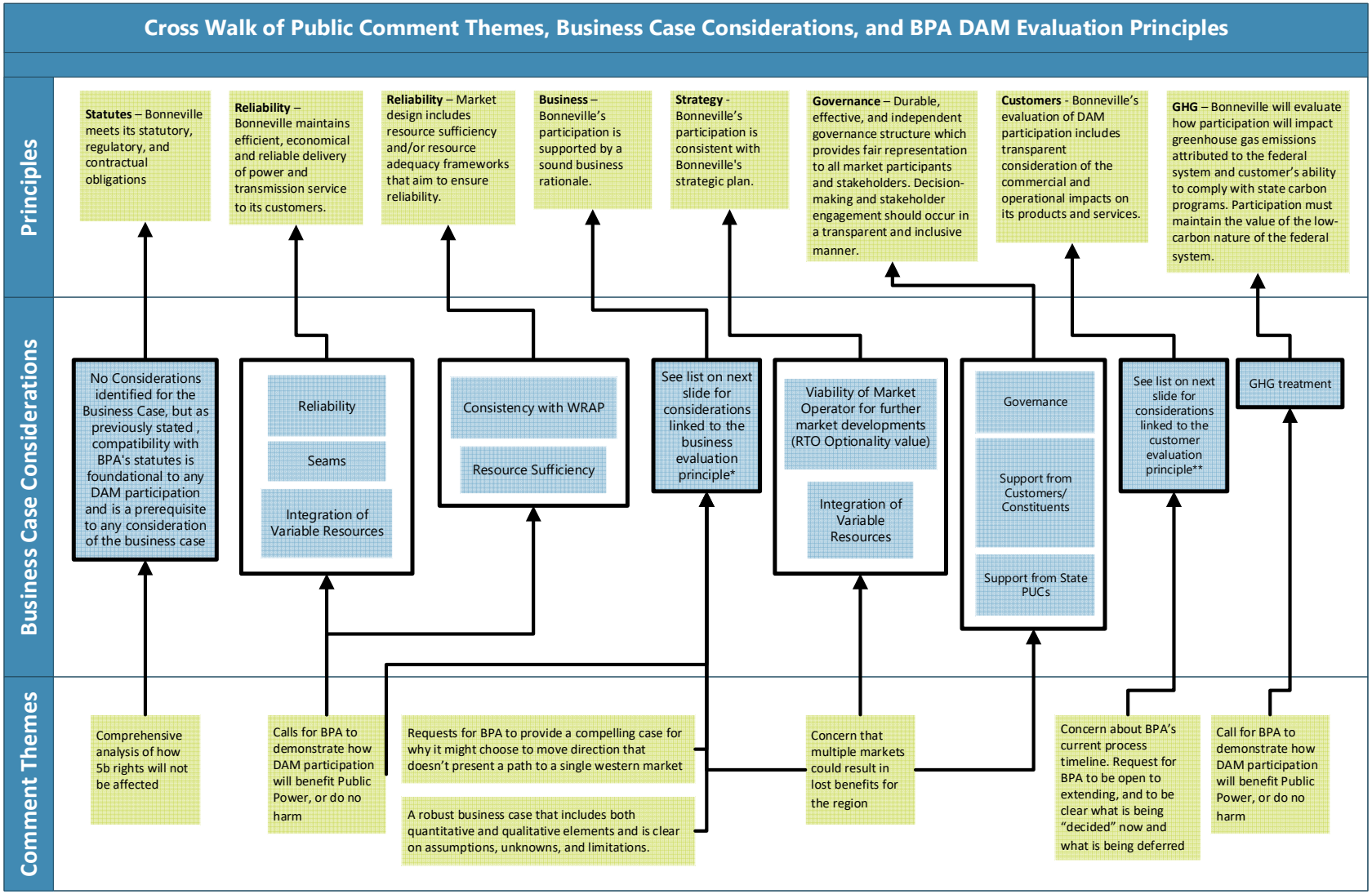
Thoughts on Single Market Benefits

- While the WMEG results suggests significant benefits from a West-wide market footprint, BPA recognizes:
  - The West has yet to agree on a governance model that works for the entire region, which has been a barrier to the development of a single West-wide market
  - A single market footprint is also influenced by the decision many entities are currently pursuing:
    - A few entities have made declarations of their intent to participate in EDAM
    - One entity has made a declaration of their intent to participate in M+
    - Other entities are exploring participation in RTO West
  - BPA will take all these factors into consideration when it evaluates DAM alternatives according to our decision-making principles.

How WMEG Results fit into BPA's Public Process

- BPA has developed a set of principles that will guide the evaluation of two market options through the remainder of Bonneville's stakeholder process
- Bonneville will utilize WMEG results where appropriate to provide quantitative values
- See appendix for a visual of how business case considerations tie to BPA's DAM evaluation principles as well as the public comment themes following the first workshop

Cross Walk of Public Comment Themes, Business Case Considerations, and BPA DAM Evaluation Principles



Considerations Linked to Evaluation Criteria

***Considerations linked to business evaluation criteria**

- Out of market actions (price suppression measures)
- Viability of Market Operator for further market developments (RTO Optionality value)
- Effective use of the Transmission system
- Compensation for Flexible Capacity
- Generation/Load benefit estimate (E3)
- Market Liquidity
- Transmission Cost Shifts
- BPA implementation costs
- Market funding
- Market price levels
- RC change cost

****Considerations linked to customers evaluation criteria**

- Out of market actions (price suppression measures)
- Effective use of the Transmission system
- Generation/Load benefit estimate (E3)
- Compensation for Flexible Capacity
- Market Liquidity
- Transmission Products and Services
- Market price levels

- Bonneville recognizes that the following assumptions are not addressed in the WMEG results:
  - Additional consideration of BAU case(s)
  - Revenue and cost volatility driven by Hydro variability
  - Hurdle rate impacts in the DAM case

Q&A and Closeout

Wrap Up

- Please submit comments on this workshop by November 20th
- The next public workshop will be November 29th (previously scheduled for-November 15th)
- Please send to techforum@bpa.gov (with "DAM Participation Evaluation" in the subject heading)
  - All formal feedback received will be posted to the BPA.gov page for BPA's DAM Participation Evaluation

Appendix

Wheeling Revenue – From E3 Executive Summary

- Revenue that transmission providers earn by selling transmission service
- Calculated in the model for each entity based on the product of
  - the amount of energy exported over transmission lines connected to that entity, times
  - the OATT rate or market wheeling rate applicable that BAA or transmission entity, plus an additional $/MWh charge for bilateral day ahead market friction
- Total wheeling revenue is first determined at a market-footprint level
  - Amount of energy flowing exported over transmission lines connected to each market footprint (multiplied by)
  - The load-weighted average of OATT rates of zones participating in that market, plus an additional $/MWh charge for transactional friction on seams between the markets
- This total market wheeling revenue is then distributed among market participants based on each participant's load-ratio share basis.
- The study approach did not attempt to capture existing transmission contracts in the BAU case, which may impact how these revenues would actually be distributed. Some entities may choose to discount the impact of wheeling revenues when analyzing their individual results

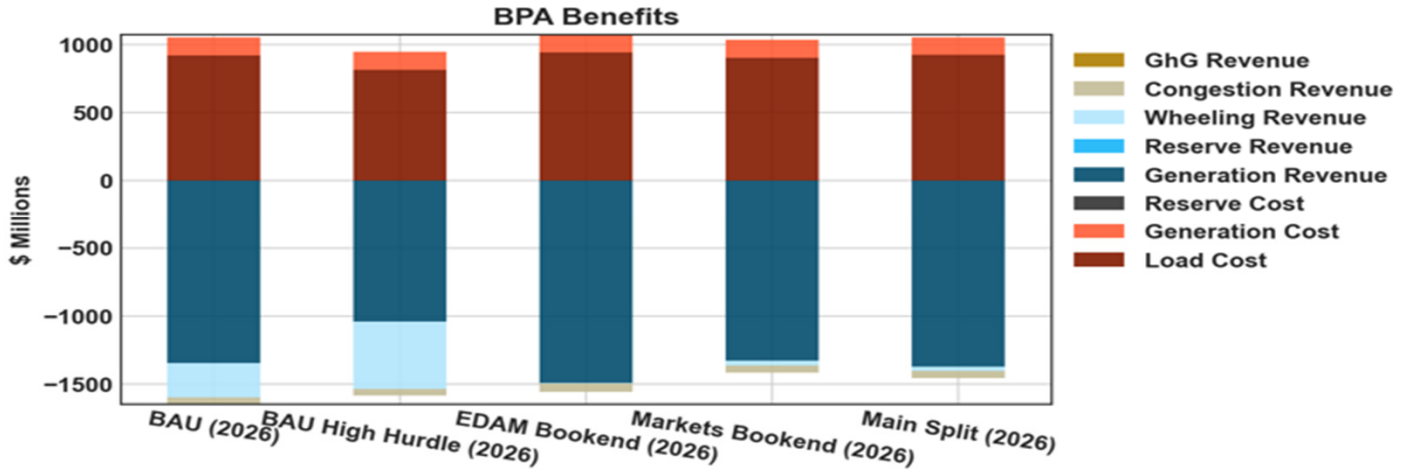
WRAP's Forward Showing Capacity Requirement of 75% firm transmission incents continued holding of long-term transmission.
WRAP's Forward Showing Capacity Requirement of 75% firm transmission incents continued holding of long-term transmission.

Wheeling Revenue in WMEG Study

- All footprints in the study reflect a significant decline in Wheeling Revenue for Bonneville
- Study assumed that no Wheeling Revenue would be collected for dispatches inside the modeled footprint
  - The study generally assumes a 1:1 revenue loss for market dispatches (a MW of market dispatch leads to a lost MW of transmission revenue)
- The potential reduction of Wheeling Revenue has been identified in each respective day-ahead market design
  - Rate mechanisms, as part of market design, are being explored to maintain existing short term transmission revenue for transmission providers
  - Long Term transmission revenue will need to continue to be monitored
    - Market design may incent continued holding of existing long-term transmission reservations
- Caution should be given to assuming that declines in Wheeling Revenue will materialize as depicted in the study
  - BPA is among many transmission providers with overwhelmingly long-term subscription of transmission and that assumption does not hold true (this was recognized in the WMEG report)
  - BPA is encouraged by the development of revenue streams for TSPs in both day-ahead markets
- Both EDAM and M+ recognize a reduction of STF and NT revenue for TSP and will have revenue recovery mechanisms for TSPs to recover costs.
- WRAP 75% forward showing of firm transmission capacity requirement incents continued holding of long-term transmission
- M+ proposed market design provides congestion revenue to transmission contract holders

BPA – 2026 Base Results

Member Cost & Benefit (2026)
All prices in $2021



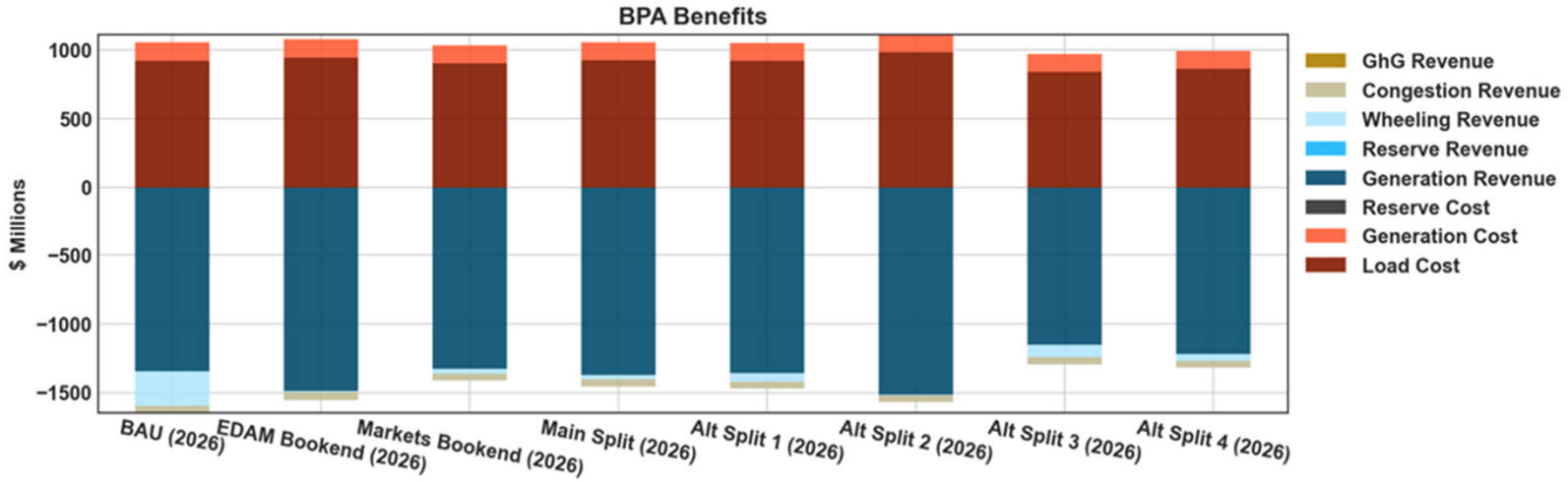
	Case				
Cost/Benefit ($ millions)	BAU (2026)	BAU High Hurdle (2026)	EDAM Bookend (2026)	Markets Bookend (2026)	Main Split (2026)
Load Cost	921.7	813.9	944.0	902.3	923.6
Generation Cost	131.3	131.3	131.3	131.3	131.3
Reserve Cost	0.0	0.0	0.0	0.1	0.2
Generation Revenue	-1343.1	-1040.5	-1489.6	-1328.6	-1370.3
Reserve Revenue	0.0	0.0	0.0	0.0	0.0
Wheeling Revenue	-251.4	-493.8	-5.5	-31.8	-31.8
Congestion Revenue	-49.9	-47.3	-60.1	-52.7	-52.7
GhG Revenue	0.0	0.0	-0.1	-0.8	-0.8
Net Cost	-591.3	-636.4	-480.1	-380.3	-400.5

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

BPA – 2026 APP Split Footprints

Member Cost & Benefit (2026)

All prices in $2021



	Case							
Cost/Benefit ($ millions)	BAU (2026)	EDAM Bookend (2026)	Markets Bookend (2026)	Main Split (2026)	Alt Split 1 (2026)	Alt Split 2 (2026)	Alt Split 3 (2026)	Alt Split 4 (2026)
Load Cost	921.7	944.0	902.3	923.6	919.2	982.0	840.4	860.9
Generation Cost	131.3	131.3	131.3	131.3	131.3	131.3	131.3	131.3
Reserve Cost	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0
Generation Revenue	-1343.1	-1489.6	-1328.6	-1370.3	-1359.5	-1514.7	-1151.6	-1220.0
Reserve Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wheeling Revenue	-251.4	-5.5	-31.8	-31.8	-63.3	-6.4	-92.1	-47.3
Congestion Revenue	-49.9	-60.1	-52.7	-52.7	-48.3	-49.1	-51.5	-48.3
GhG Revenue	0.0	-0.1	-0.8	-0.8	-0.7	-0.1	-0.6	-0.5
Net Cost	-591.3	-480.1	-380.3	-400.5	-421.3	-457.1	-324.0	-323.9

BPA Results

- E3 utilized positive numbers as costs and negative numbers as revenue in the WMEG CBS
  - This same sign scheme is continued within the following slides when showing the Δ for each category
  - Color coding icons accompany each Δ as an indicator of whether Δ is higher or lower than Business As Usual (e.g. a delta still represents revenue, and the color then indicates if the revenue is an increase or decrease compared to the BAU)
    - Cost Category (Positive Number)
      - = Cost Increase (relative to Business As Usual)
      - = Cost Decrease (relative to Business As Usual)
    - Revenue Category (Negative Number)
      - = Revenue Decrease (relative to Business As Usual)
      - = Revenue Increase (relative to Business As Usual)
    - "Net Cost" category
      - = Potential benefit decrease (relative to Business As Usual)
      - = Potential benefit increase (relative to Business As Usual)

BPA Result - Single Market Scenario – 2026 EDAM Results

[Negative Numbers = Revenue] [Positive Numbers = Costs]

BPA EDAM Table (W/O Wheeling Revenue)				
Cost/Benefit ($ millions)	BAU (2026)	EDAM Bookend (2026)	Δ Cost/Benefit Category	EDAM Bookend vs BAU
Load Cost	921.7	944.0	Δ Load Cost	22.2
Generation Cost	131.3	131.3	-	-
Reserve Cost	0.0	0.0	-	-
Generation Revenue	-1343.1	-1489.6	Δ Generation Revenue	-146.6
Reserve Revenue	0.0	0.0	-	-
Congestion Revenue	-49.9	-60.1	Δ Congestion Revenue	-10.2
GhG Revenue	0.0	-0.1	Δ GhG Revenue	-0.1
Net Cost	-339.9	-474.6	**Δ Net Cost**	-134.7

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Cost" = potential benefit to BPA ~$134 million
  - **Δ Net Cost** - [339.9 – 474.6] = -134.7
  - Load Costs increase by ~$22 million
  - Generation Revenue increases by ~$146 million

BPA Result - Multiple Market Scenarios – 2026 M+ Main Split

[Negative Numbers = Revenue] [Positive Numbers = Costs]

BPA M+ Main Split Table (W/O Wheeling Revenue)

Cost/Benefit ($ millions)	BAU (2026)	Main Split (2026)	Δ Cost/Benefit Category	Main Split vs BAU
Load Cost	921.7	923.6	Δ Load Cost	1.9
Generation Cost	131.3	131.3	-	-
Reserve Cost	0.0	0.2	-	-
Generation Revenue	-1343.1	-1370.3	Δ Generation Revenue	-27.2
Reserve Revenue	0.0	0.0	-	-
Congestion Revenue	-49.9	-52.7	Δ Congestion Revenue	-2.8
GhG Revenue	0.0	-0.8	Δ GhG Revenue	-0.8
Net Cost	-339.9	-368.7	**Δ Net Cost**	-28.9

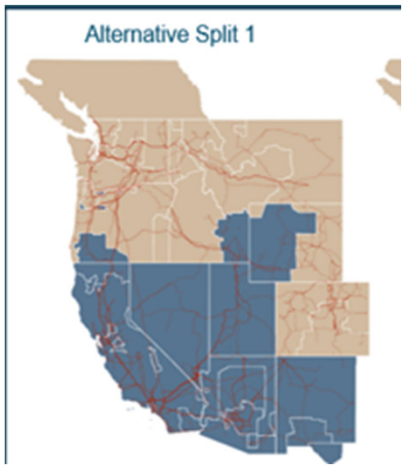
Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Cost" = potential benefit to BPA of ~$29 million
  - **Δ Net Cost** - [339.9 – 368.7] = -28.9
  - Load Costs increase by ~$2 million
  - Generation Revenue increases by ~$27 million

BPA Result - Multiple Market Scenario – 2026 M+ Alt Split 1

DSW = EDAM & PNW = M+

[Negative Numbers = Revenue] [Positive Numbers = Costs]



Footprint vs BAU				
Cost/Benefit ($ millions)	BAU (2026)	Alt Split 1 (2026) DSW EDAM PNW M+	Δ Cost/Benefit Category	Two Markets Alt Split 1 (2026) DSW EDAM PNW M+
Load Cost	921.7	919.2	Δ Load Cost	2.5
Generation Cost	131.3	131.3		-
Reserve Cost	0.0	0.1		-
Generation Revenu	-1343.1	-1359.5	Δ Generation Revenue	-16.5
Reserve Revenue	0.0	0.0		-
Congestion Reven	-49.9	-48.3	Δ Congestion Revenue	-1.6
GhG Revenue	0.0	-0.7	Δ GhG Revenue	-0.7
Net Cost	-339.9	-358.0	**Δ Net Cost**	-18.1

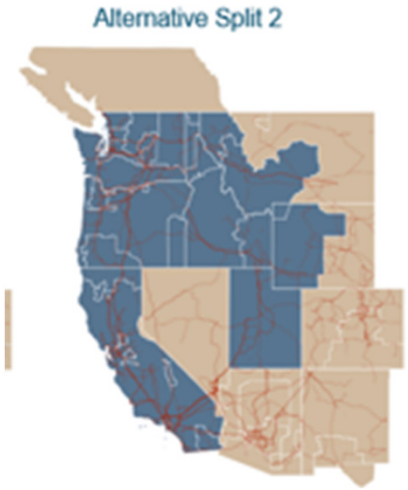
Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Costs" = potential benefit to Bonneville of ~$18 million
  - **Δ Net Cost** - [339.9 – 358.0] = -18.1
  - Load Costs decrease by ~$2.5 million
  - Generation Revenue increases by ~$16.5 million

BPA Result - Multiple Market Scenario – 2026 M+ Alt Split 2

PNW = EDAM DSW = M+

[Negative Numbers = Revenue] [Positive Numbers = Costs]



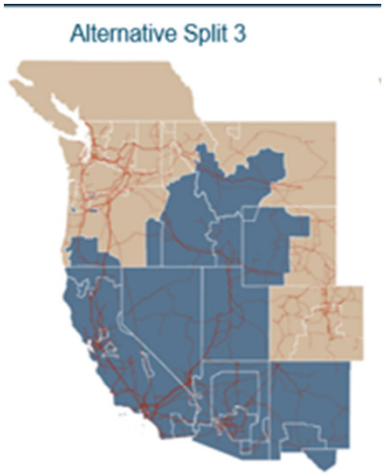
Footprint vs BAU				
Cost/Benefit ($ millions)	BAU (2026)	Alt Split 2 (2026) PNW EDAM DSW M+	Δ Cost/Benefit Category	Two Markets Alt Split 2 (2026) PNW EDAM DSW M+
Load Cost	921.7	982.0	Δ Load Cost	60.3
Generation Cost	131.3	131.3		-
Reserve Cost	0.0	0.0		-
Generation Revenu	-1343.1	-1514.7	Δ Generation Revenue	-171.7
Reserve Revenue	0.0	0.0		-
Congestion Reven	-49.9	-49.1	Δ Congestion Revenue	-0.8
GhG Revenue	0.0	-0.1	Δ GhG Revenue	-0.1
Net Cost	-339.9	-450.7	**Δ Net Cost**	-110.8

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Costs" = potential benefit to Bonneville of ~$110 million
  - **Δ Net Cost** - [339.9 – 450.7] = -110.8
  - Load Costs increase by ~$60 million
  - Generation Revenue increases by ~$171 million

BPA Result - Multiple Market Scenario – M+ Alt Split 3

DSW & IPCO = EDAM & PNW = M+



[Negative Numbers = Revenue] [Positive Numbers = Costs]

Footprint vs BAU				
Cost/Benefit ($ millions)	BAU (2026)	Alt Split 3 (2026) DSW & IPCO - EDAM PNW M+	Δ Cost/Benefit Category	Two Markets Alt Split 3 (2026) DSW & IPCO - EDAM PNW M+
Load Cost	921.7	840.4	Δ Load Cost	81.3
Generation Cost	131.3	131.3		-
Reserve Cost	0.0	0.0		-
Generation Revenu	-1343.1	-1151.6	Δ Generation Revenue	-191.5
Reserve Revenue	0.0	0.0		-
Congestion Reven	-49.9	-51.5	Δ Congestion Revenue	-1.6
GhG Revenue	0.0	-0.6	Δ GhG Revenue	-0.6
Net Cost	-339.9	-231.9	**Δ Net Cost**	-107.9

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Cost" = potential decreased benefit to Bonneville of ~$108 million
  - **Δ Net Cost** - [339.9 – 231.9] = 107.9
  - Load Costs decrease by ~$81 million
  - Generation Revenue decreases by ~$191 million

BPA Result - Multiple Market Scenario – M+ Alt Split 4

IPCO & NV = EDAM & PNW & DSW = M+

[Negative Numbers = Revenue] [Positive Numbers = Costs]

Footprint vs BAU				
Cost/Benefit ($ millions)	BAU (2026)	Alt Split 4 (2026) IPCO & NV EDAM PNW M+	Δ Cost/Benefit Category	Two Markets Alt Split 4 (2026) IPCO & NV EDAM PNW M+
Load Cost	921.7	860.9	Δ Load Cost	60.8
Generation Cost	131.3	131.3		-
Reserve Cost	0.0	0.0		-
Generation Revenu	-1343.1	-1220.0	Δ Generation Revenue	-123.0
Reserve Revenue	0.0	0.0		-
Congestion Reven	-49.9	-48.3	Δ Congestion Revenue	-1.6
GhG Revenue	0.0	-0.5	Δ GhG Revenue	-0.5
Net Cost	-339.9	-276.6	**Δ Net Cost**	-63.3

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- "Net Cost" = potential decreased benefit to BPA of ~$63 million
  - **Δ Net Cost** - [339.9 – 276.6] = 63.3
  - Load Costs decrease ~$60 million
  - Generation Revenue decreases by ~$123 million

BPA Results – 2026 Summary Table

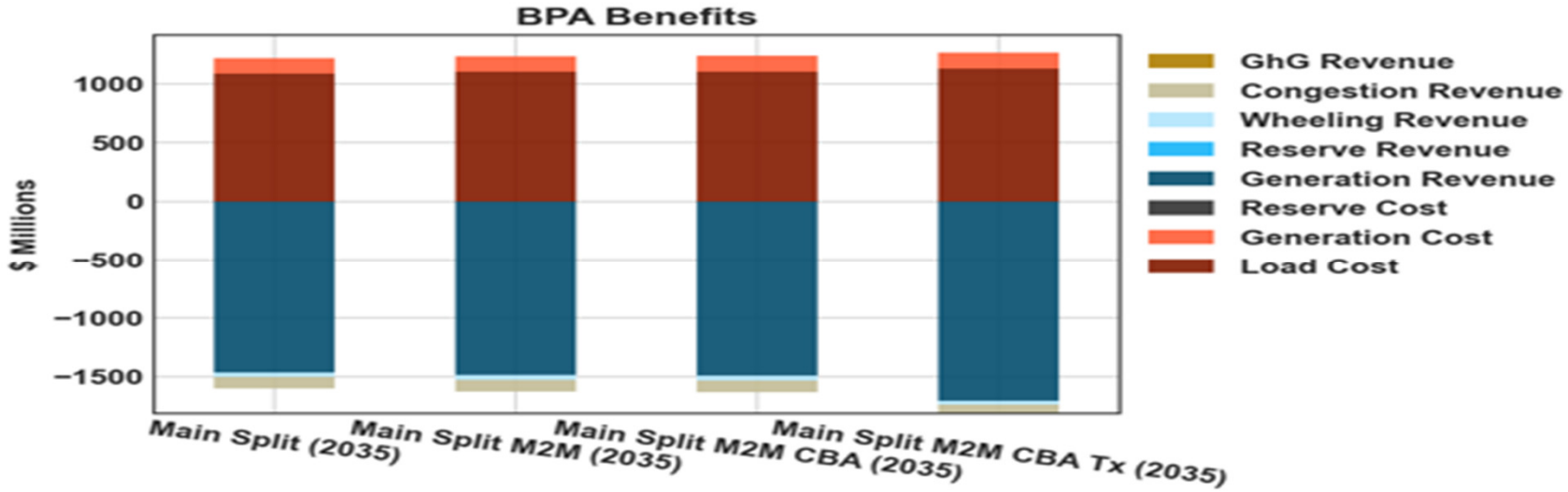
[Negative Numbers = Revenue] [Positive Numbers = Costs]

	Footprint vs BAU					
	Single Market EDAM Bookend	Two Markets Main Split	Two Markets Alt Split 1 (2026) DSW EDAM PNW M+	Two Markets Alt Split 2 (2026) PNW EDAM DSW M+	Two Markets Alt Split 3 (2026) DSW & IPCO - EDAM PNW M+	Two Markets Alt Split 4 (2026) IPCO & NV EDAM PNW M+
Δ Load Cost	22.2	1.9	2.5	60.3	81.3	60.8
Δ Generation Revenue	-146.6	-27.2	-16.5	-171.7	-191.5	-123.0
Δ Congestion Revenue	-10.2	-2.8	-1.6	-0.8	-1.6	-1.6
Δ GhG Revenue	-0.1	-0.8	-0.7	-0.1	-0.6	-0.5
Δ Net Cost	-134.7	-28.9	-18.1	-110.8	-107.9	-63.3

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*
Net Cost Category *– Green indicates Increase & Red indicates decrease*

- 4 of 6 scenarios reflect increased benefits for Bonneville greater than the BAU case
  - Significant difference between one market and two market footprints should not come as surprise to stakeholders
- A single market across the WECC interconnection is an unlikely outcome of day-ahead market developments
  - Caution should be taken in the acceptance of the benefit for Bonneville in a single market footprint as it is unlikely to materialize as depicted in the study due the likely establishment of two markets
- Benefits are influenced by make up of each footprint and along with the transmission connectivity accompanying each footprint

BPA Results – 2035 (Coordinated Balancing & Tx)



	Case			
Cost/Benefit ($ mill	Main Split (2035)	Main Split M2M (2035)	Main Split M2M CBA (2035)	Main Split M2M CBA Tx (2035)
Load Cost	1088.2	1102.9	1106.4	1132.6
Generation Cost	131.3	131.3	131.3	131.3
Reserve Cost	0.1	0.1	0.3	0.2
Generation Revenu	-1463.5	-1487.7	-1492.9	-1704.6
Reserve Revenue	0.0	0.0	-0.1	0.0
Wheeling Revenue	-38.3	-37.4	-37.4	-31.7
Congestion Revenu	-98.7	-102.4	-103.4	-74.9
GhG Revenue	0.0	0.0	0.0	0.0
Net Cost	-380.9	-393.1	-395.7	-547.1

BPA Results – Consolidated Table 2035 (Coordinated Balancing & Tx)

Study Result W/O "Wheeling Revenue"						
Cost/Benefit ($ millions)	2026 BAU	2026 Main Split	2026 EDAM Bookend	Main Split (2035) No Coordination	Main Split M2M CBA (2035)	Main Split M2M CBA Tx (2035)
Load Cost	921.7	923.6	943.98	1088.22	1106.44	1132.6
Generation Cost	131.3	131.3	131.31	131.31	131.31	131.3
Reserve Cost	0	0.2	0.00	0.14	0.25	0.2
Generation Revenue	-1343.1	-1370.3	-1489.63	-1463.51	-1492.87	-1704.6
Reserve Revenue	0	0.0	0.00	-0.02	-0.06	0.0
Congestion Revenue	-49.9	-52.7	-60.13	-98.72	-103.38	-74.9
GhG Revenue	0	-0.8	-0.13	-0.01	-0.01	0.0
Net Cost	-339.91	-368.67	-474.6	-342.6	-358.32	-515.5

BPA Results – Comparison Table 2035 (Coordinated Balancing & Tx)

Δ Comparisons												
Cost/Benefit ($ millions)	RTO vs 2026 BAU		RTO vs 2026 Main Split		RTO vs 2026 EDAM		RTO vs Main Split (2035) No Coordination		RTO vs Main Split CBA 2035	
Load Cost	210.9		209.0		188.6		44.4		26.2	
Generation Revenue	-361.6		-334.3		-215.0		-241.1		-211.7	
Congestion Revenue	-25.0		-22.2		-14.8		23.8		28.5	
GhG Revenue	0.0		0.8		0.1		0.0		0.0	
Δ Net Cost	-175.7		-146.7		-41.0		-172.9		-157.1	

Load Cost Category *- Green indicates decrease & Red indicates Increase* ***Category of Gen Revenue, Congestion Revenue & GhG Revenue*** *- Green indicates increase & Red indicates decrease*

- RTO participation is not part of the current process, however results showed benefits from an RTO that exceeded any DAM scenario. Therefore, it may be short sighted to not consider the viability of each market operator's path for potential future market opportunities
- Joining a DAM is not a short-term decision and participants in a DAM would not be able to simply change market operators in the without financial impact if their current market operator does not present a reasonable path to an RTO