

Considerations on the Evaluation of Order 1920 Benefits

Emmanuele Bobbio Principal Economist

TEAC special session – Order 1920 April 10, 2025



- Recap of seven required benefits (Order 1920 education slides in from August 27, 2024, special TEAC in appendix)
- Production cost related benefits
- Capacity/load shedding related benefits



Order 1920 Required Benefits

Re	quired Benefits	
1.	Avoided or deferred reliability transmission facilities and aging transmission infrastructure replacement	
2.	a) Reduced loss of load probability or b) Reduced planning reserve margin	Capacity
3.	Production Cost Savings	Energy
4.	Reduced Transmission Energy Losses	Energy
5.	Reduced Congestion Due to Transmission Outages	Energy
6.	Mitigation of Extreme Weather Events and Unexpected System Conditions	Energy/Capacity
7.	Capacity Cost Benefits from Reduced Peak Energy Losses	Capacity



Follow industry best practices

- 1. Avoided or deferred reliability transmission facilities and aging transmission infrastructure replacement (quantified as in MISO)
- 2. Production cost savings
- 3. Reduced transmission energy losses
- 4. Reduced congestion due to transmission outages

Quantification (as in MISO/ISO-NE):

- Augmented production cost simulation (benefit 2)
- ... with added transmission energy losses (3; by scaling load, as in MISO based on losses calculated in power flows, or post-processing, as in ISO-NE)
- ... and transmission outages



Benefits 2, 7 (and 6?): Existing Approach (e.g. MISO)

- 1. Calculate inter-zonal transfer capabilities with transmission upgrades (e.g., in TARA)
- 2. Run zonal resource adequacy tool (multiple weather years and inter-zonal transfer limits defined as in 1
 - Update planning margin
- 3. Run capacity expansion with new planning margin/inter-zonal transfer limits



Advantages of New Approach to Calculate Benefits 2, 6, 7

PJM proposes a new approach to calculate energy (3, 4, 5) and capacity related benefits (2, 6, 7) using a single, integrated production cost simulation that accounts for both normal conditions and extreme events

Advantages:

- Interpretability, calculate benefits using a coherent simulation of how the power system works, instead of devising different heuristics for different benefits
- No risk of double counting
- Automation and computation
 - One run with one tool for six benefits, instead of running multiple tools just to compute one benefit (as for example in the standard approach to calculate capacity cost savings)
 - More compatible with PJM sponsorship model which requires calculating benefits for many different projects and combinations of projects

pjm	n° <i>Normal Conditions</i> 8760 hours				Benefits 2, 6, 7: New Approach						
					Identification Of Critical Events (e.g. through PJM resource adequacy tool*)						
					<i>Extreme Weather Conditions</i> , e.g., 1000 hours, probability weight corresponding to 1-in-10 criteria						
Hour 1 Hour	2 Hour 3		Hour 8759	Hour 8760	Event 1, Hour 1	Event 1, Hour 2		Event 2, Hour 1	Event 2, Hour 2		

Benefits 3-5

- 3. Adjusted Production Cost Savings
- 4. Savings from reduced energy losses
- 5. Reduced congestion from transmission outages

Benefits 2-6-7

- 2. Reduced load shedding
- 6. Mitigation of extreme events
- 7. Capacity benefits of reduced energy losses
- * e.g., Event 1 load from PV2 (2/2015) and performance from PV1 (1/2014); Event 2 is load from PV1 and performance from Winter Storm Elliott



Appendix

pim Explanation of the Seven Enumerated Benefits (interpretation)

- 1. Avoided or deferred reliability transmission facilities and aging transmission infrastructure replacement
 - Avoided in-kind replacements; avoided or deferred lower kV investments; avoided or deferred future transmission investments; reduced re-builds
- 2. a) Reduced loss of load probability OR b) Reduced planning margins
 - a) Keep same capacity expansion and calculate economic value of reduced unserved energy with more robust transmission
 - b) Re-calculate capacity expansion with more robust transmission and quantify the reduction in generation/storage investments needed for 1-in-10
- 3. Standard measure of production cost savings from more robust transmission

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Explanation of the Seven Enumerated Benefits (continued)

- 4. Reduced Transmission Energy Losses
 - More robust transmission reduces losses which can be quantified and valued using the avoided cost of producing that energy
- 5. Reduced Congestion Due to Transmission Outages
 - Production cost impacts from transmission outages with and without the project/plan/portfolio

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Explanation of the Seven Enumerated Benefits (continued)

- 6. Mitigation of Extreme Weather Events and Unexpected System Conditions
 - Calculate change in production cost savings and the value of reduced unserved energy associated with increased transfers during system events
 - Extreme weather
 - Fuel availability or high fuel costs
 - Forecast errors
 - Account for increased interregional transfer capability LT RT facilities
 - (Note, the difference with benefit 2a is that traditionally resource adequacy assessments do not account for correlation across supply/demand variables)
- 7. Capacity Cost Benefits from Reduced Peak Energy Losses
 - Less capacity needed for 1-in-10 with reduced losses (pairs with Benefit 4)



Requirements About Seven Enumerated Benefits

- Provide general description of measurement method in planning protocol
- Calculate benefits for at least 20 years from expected in-service date
- May not discount benefits based on certainty
- Can use both a project-by-project and portfolio approach within the same cycle
 - But should specify in planning protocol that portfolio approach can be used





Presenter: Emmanuele Bobbio Emmanuele.Bobbio@pjm.com

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Member Hotline (610) 666-8980 (866) 400-8980 custsvc@pjm.com

