

EDAM Transfer Reliability

Day-Ahead and Real-Time impacts

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Overview

- The following examples are intended to show how firm transfers from EDAM might resolve in Real-Time
- These examples are constructed to highlight reliability, and ARE NOT structured to identify economics of reliability
- All examples are structured with three balancing areas to highlight how wheel-through and other transfers across a balancing area affect each other
 - Not intended to be commentary on other wheel-through issues
- Does not address role of reserve sharing groups

Examples to be Reviewed

- EDAM Transfers w/ Real-Time loss of Generation
- EDAM Transfers w/ Real-Time loss of Generation
 - Resulting in Insufficient footprint capacity
- EDAM Transfers w/ Real-Time loss of Generation
 - Decommitted long-lead resources
 - Resulting in insufficient footprint capacity

Basic Footprint Setup for Examples



EDAM Participating Capacity:
1,000 MW



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1,000 MW



EDAM Participating Capacity:
1,000 MW

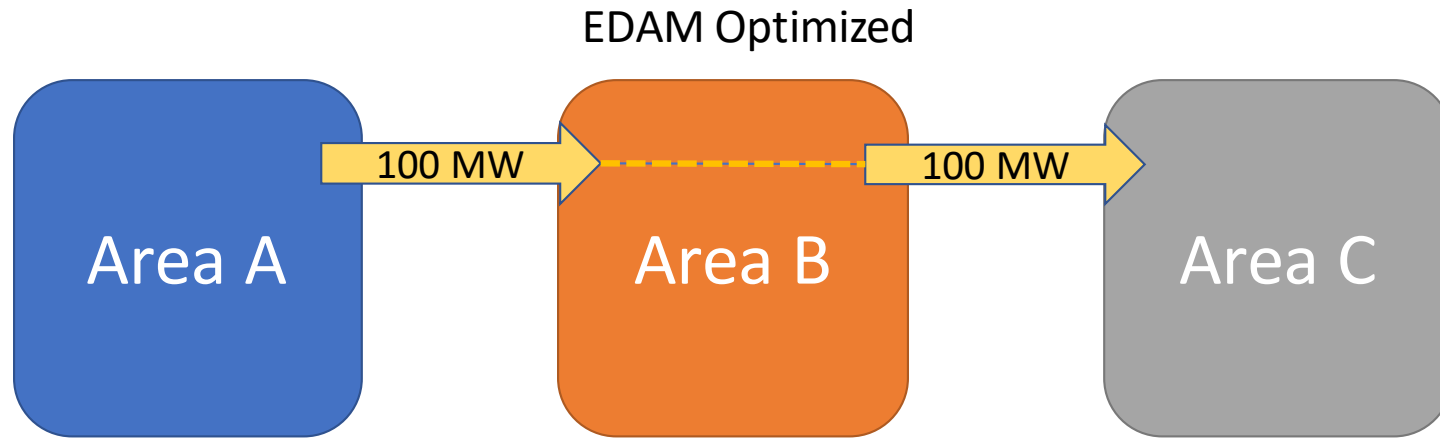
Example 1: Real-Time Loss of Generation

Pre-EDAM Plan



Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	5 MW	225 MW

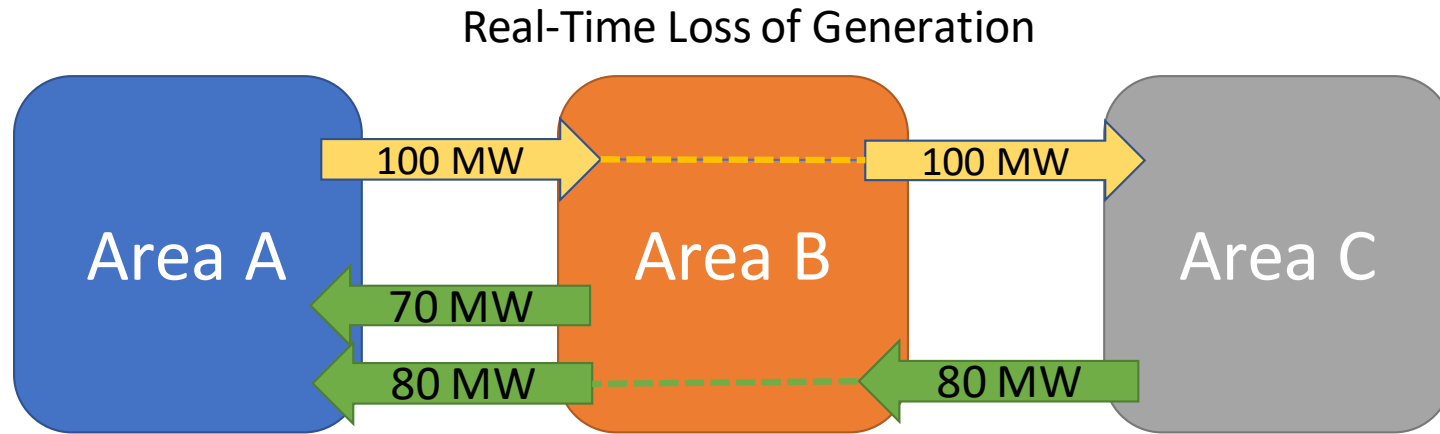
Example 1: Real-Time Loss of Generation (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	850 950 MW	930 MW	995 895 MW	2,775 MW
Remaining	50 MW	70 MW	105 MW	225 MW

Example 1: Real-Time Loss of Generation (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW → 800	1,000 MW	1,000 MW	2,800 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
<i>EDAM Transfer</i>	<i>+100 MW</i>	<i>+100/-100 MW</i>	<i>-100 MW</i>	
Requirements	950 MW	930 MW	895 MW	2,775 MW
RT Dispatch	+50 MW	+70 MW	+80 MW	25 MW
RT Market Xfer	+150 MW	-150/+80 MW	-80 MW	
Remaining	0 MW	0 MW	25 MW	25 MW

Example 1: Key Takeaways

- Firm transfers have implications in real-time to both buyers and sellers

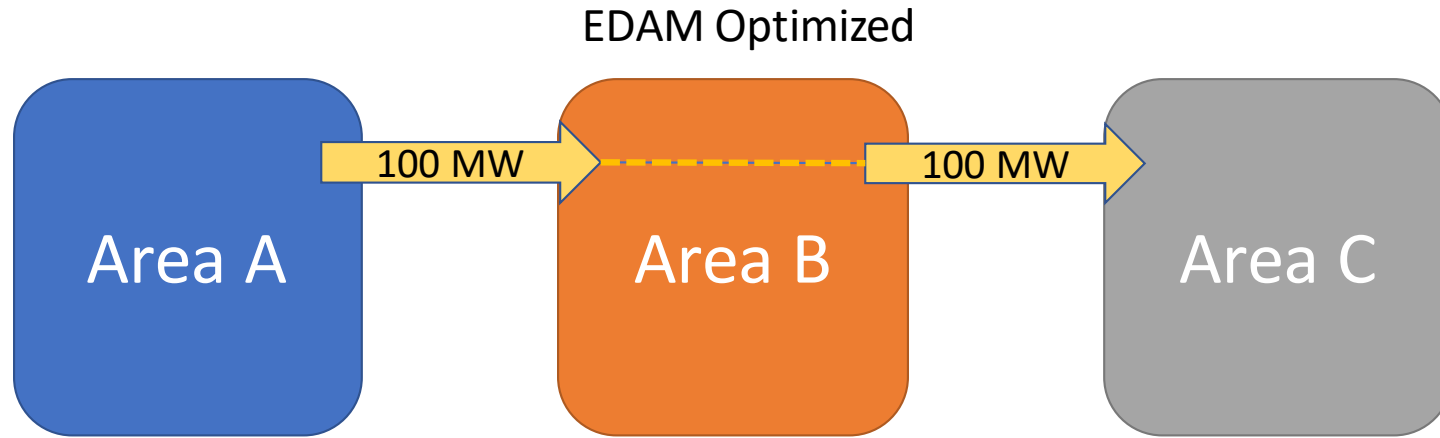
Example 2: Real-Time Loss of Generation – Insufficient Capacity across Footprint

Pre-EDAM Plan



	Area A	Area B	Area C	Footprint Summary
Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	5 MW	225 MW

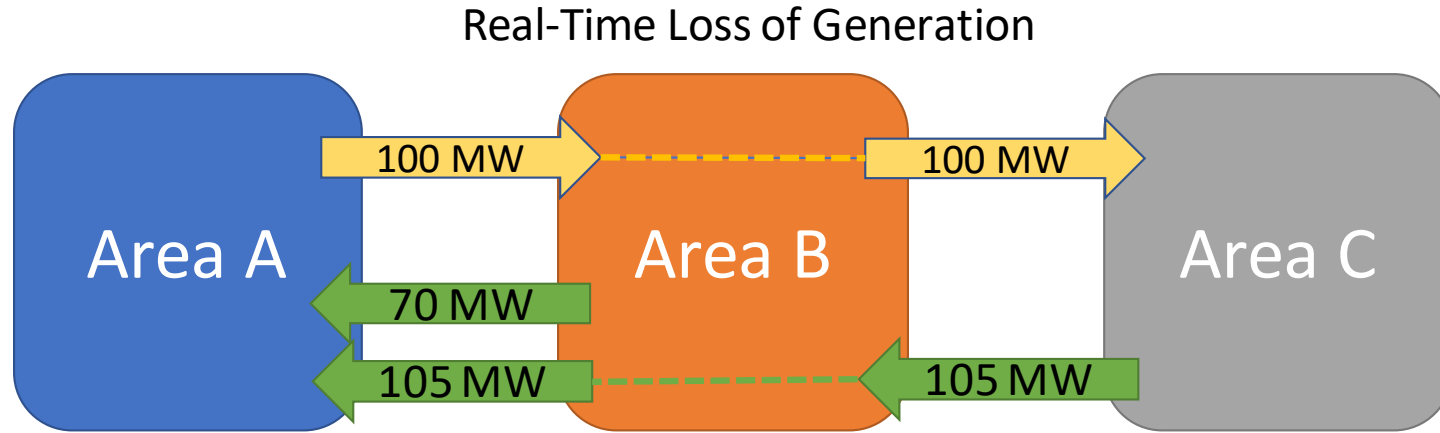
Example 2: Real-Time Loss of Generation – Insufficient Capacity across Footprint (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	850 950 MW	930 MW	995 895 MW	2,775 MW
Remaining	50 MW	70 MW	105 MW	225 MW

Example 2: Real-Time Loss of Generation – Insufficient Capacity across Footprint (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW → 750	1,000 MW	1,000 MW	2,750 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	950 MW	930 MW	895 MW	2,775 MW
RT Dispatch	+50 MW	+70 MW	+80 MW	-25 MW
RT Market Xfer	+175 MW	-150/+80 MW	-80 MW	
Remaining	-25 MW	0 MW	0 MW	-25 MW

Example 2: Key Takeaways

- EDAM transfers remain firm to Balancing Area B and Balancing Area C
- To support, RT (EIM) transfers must flow available capacity from Balancing Areas B and C back to Balancing Area A
- Balancing Area A
 - Retains consequences of failure of resource bid into EDAM
 - Maintained firm transfers
- Balancing Areas B & C
 - Responded with available capacity to minimize curtailed load

Example 3: Long-Lead Decommit by EDAM, Real-Time Loss of Generation – Insufficient Capacity across Footprint

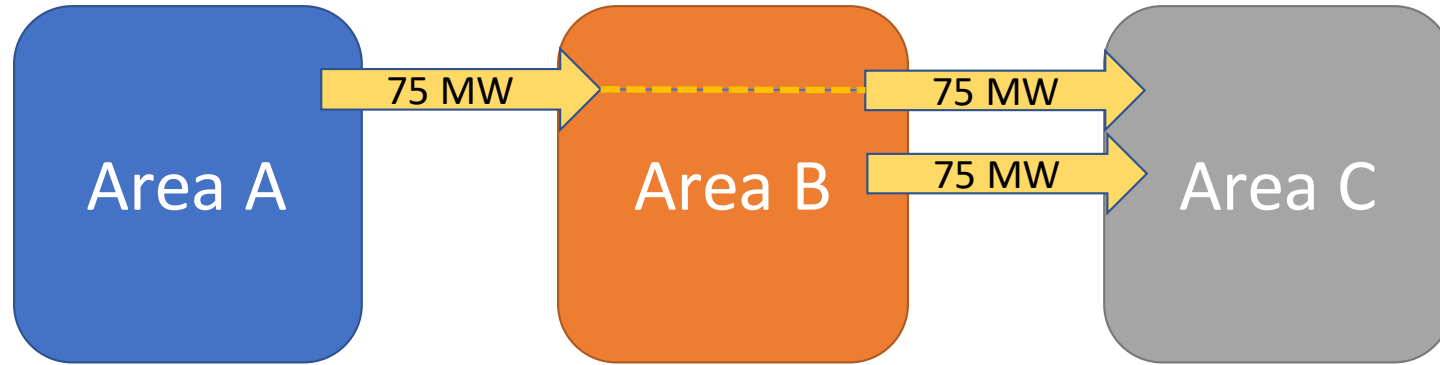
Pre-EDAM Plan



Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
Remaining	150 MW	100 MW	100 MW	350 MW

Example 3: Long-Lead Decommit by EDAM, Real-Time Loss of Generation – Insufficient Capacity across Footprint (Cont'd)

EDAM Optimized

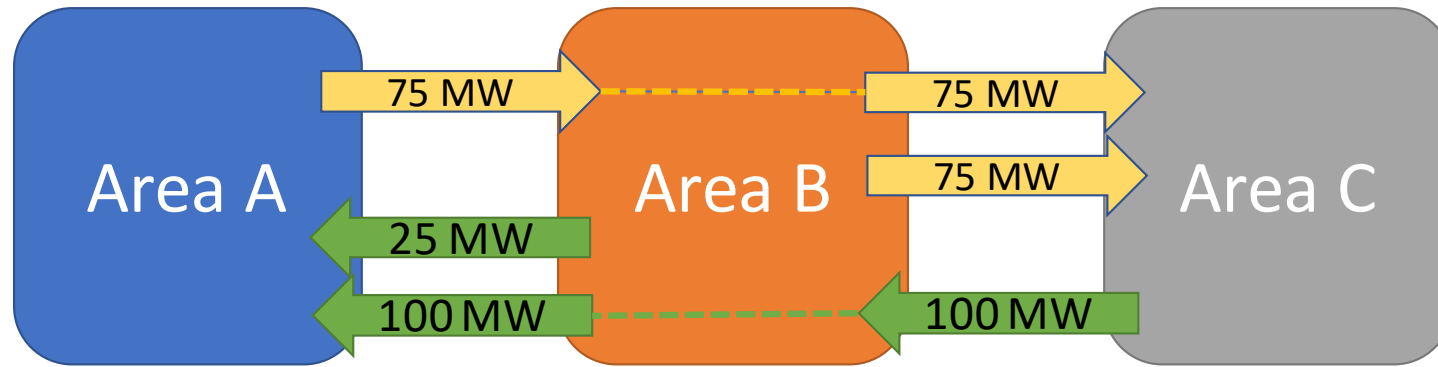


Footprint
Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW → 850 MW	2,850 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
EDAM Transfer	+75 MW	-75/+150 MW	-150 MW	
Requirements	850 925 MW	900 975 MW	900 750 MW	2,650 MW
Remaining	75 MW	25 MW	100 MW	200 MW

Example 3: Long-Lead Decommit by EDAM, Real-Time Loss of Generation – Insufficient Capacity across Footprint (Cont'd)

Real-Time Loss of Generation



Footprint Summary

Avail. Capacity	1,000 MW → 750	1,000 MW	1,000 MW → 850 MW	2,600 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
EDAM Transfer	+75 MW	-75/+150 MW	-150 MW	
Requirements	850 925 MW	900 975 MW	900 750 MW	2,650 MW
RT Dispatch	0 MW	+25 MW	+100 MW	-50 MW
RT Market Xfer	+125 MW	+125/-100 MW	-100 MW	
Remaining	-50 MW	0 MW	0 MW	-50 MW

Example 3: Key Takeaways

- EDAM transfers remain firm to Balancing Area B and Balancing Area C
- To support, RT (EIM) transfers must flow available capacity from Balancing Areas B and C back to Balancing Area A
- Balancing Area A
 - Retains consequences of failure of resource bid into EDAM
 - Maintained firm transfers
- Balancing Areas B & C
 - Responded with available capacity to minimize curtailed load
- Balancing Area C
 - Held harmless for long-lead resource decommitment

What happens in bilateral market?

Example 4 (2a): Real-Time Loss of Generation – Insufficient Capacity across Footprint – Bilateral in DA and RT

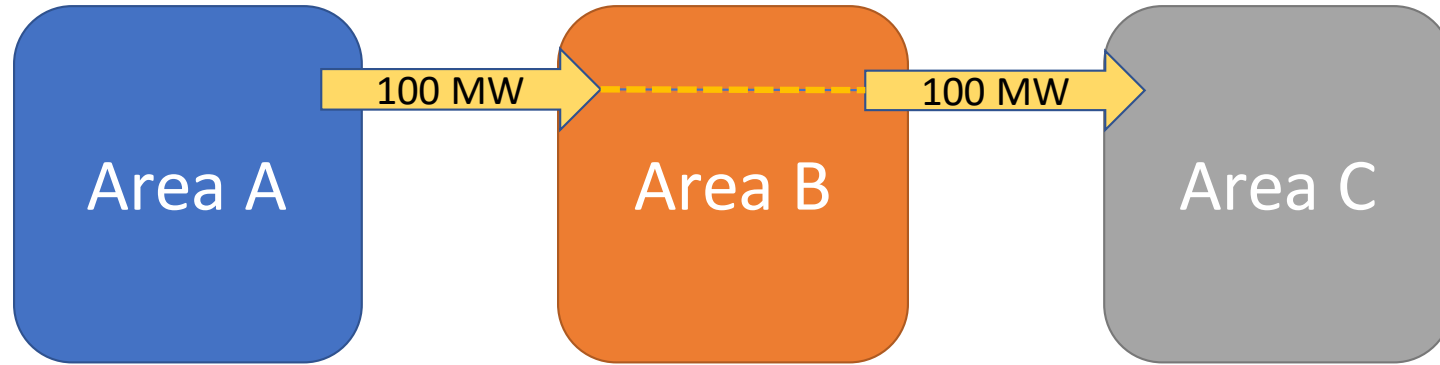
Pre-Bilateral Plan



Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	5 MW	225 MW

Example 4 (2a): Real-Time Loss of Generation – Insufficient Capacity across Footprint – Bilateral in DA and RT (Cont'd)

Bilateral Plan

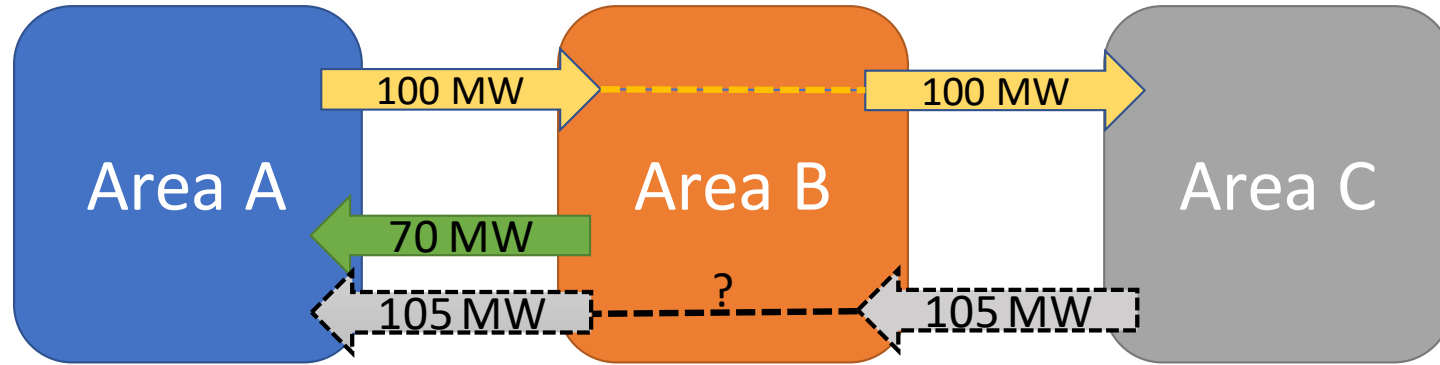


Footprint
Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Bilateral Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	850 950 MW	930 MW	995 895 MW	2,775 MW
Remaining	50 MW	70 MW	105 MW	225 MW

Example 4 (2a): Real-Time Loss of Generation – Insufficient Capacity across Footprint – Bilateral in DA and RT (Cont'd)

Real-Time Loss of Generation



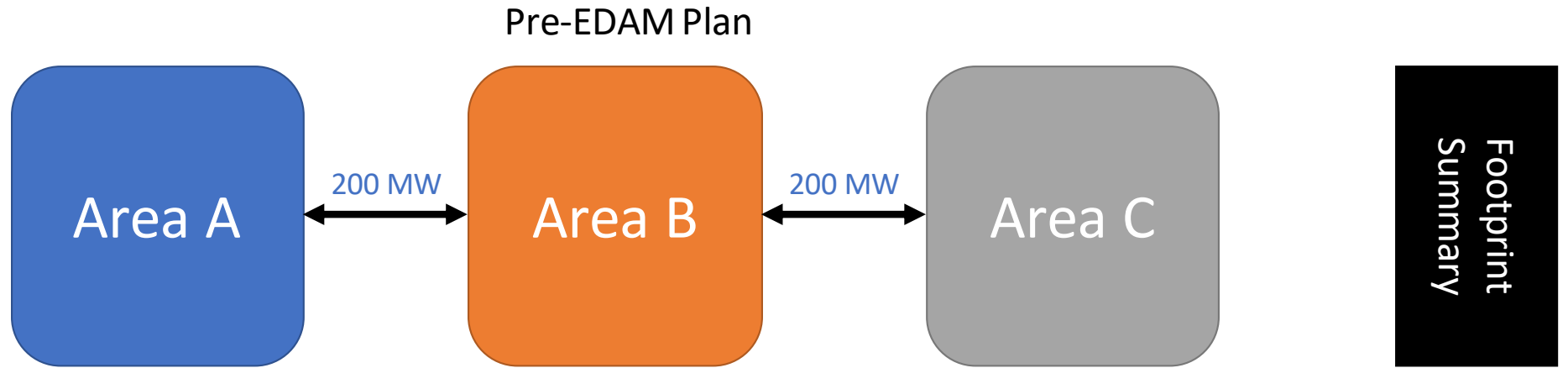
Avail. Capacity	1,000 MW → 750	1,000 MW	1,000 MW	2,750 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
<i>Bilateral Transfer</i>	<i>+100 MW</i>	<i>+100/-100 MW</i>	<i>-100 MW</i>	
Requirements	950 MW	930 MW	895 MW	2,775 MW
RT Dispatch	+50 MW	+70 MW	?	-25 MW
RT Transaction	+70 MW	-70 MW	?	
Remaining	-130 MW	0 MW	105 MW	

Example 4 (2a): Key Questions

- On a purely bilateral basis, the ability to solve for the broader deficiency is more difficult
 - Type of contingent event will likely determine BA success in curing deficiency
- For EIM footprint entities, EIM can help solve in-hour deficiencies
 - Bilateral transactions still are necessary to solve next hour deficiencies
- How does the non-firm nature of EIM affect how entities respond?
- How would EDAM improve upon the bilateral / EIM construct during the operating day for reliability?
 - What would be required to achieve this?

Loss of Transmission Example

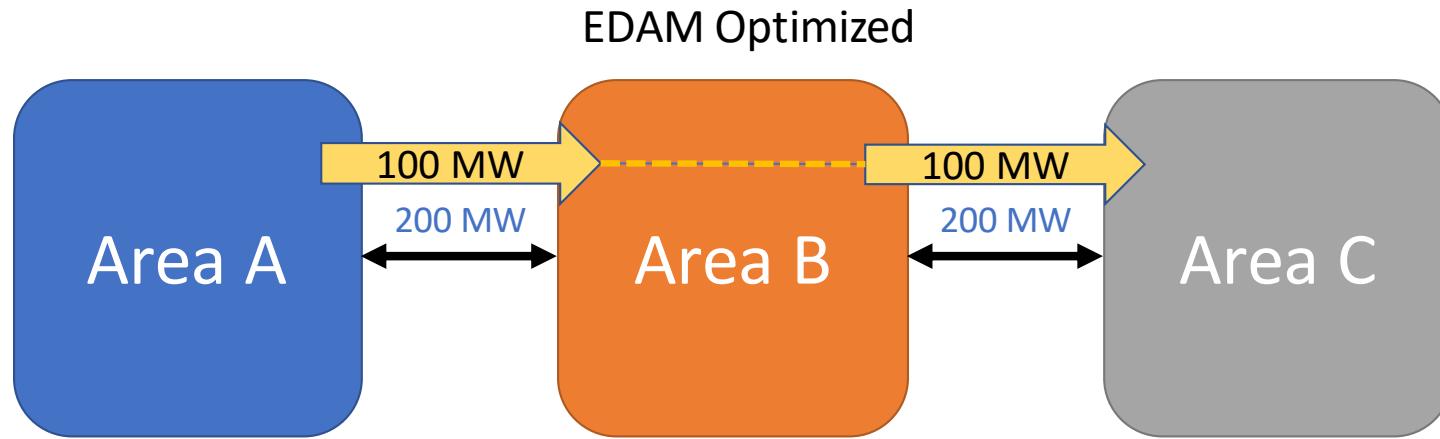
Example 5: Real-Time Loss of Transmission – Insufficient Capacity across Footprint



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	5 MW	225 MW

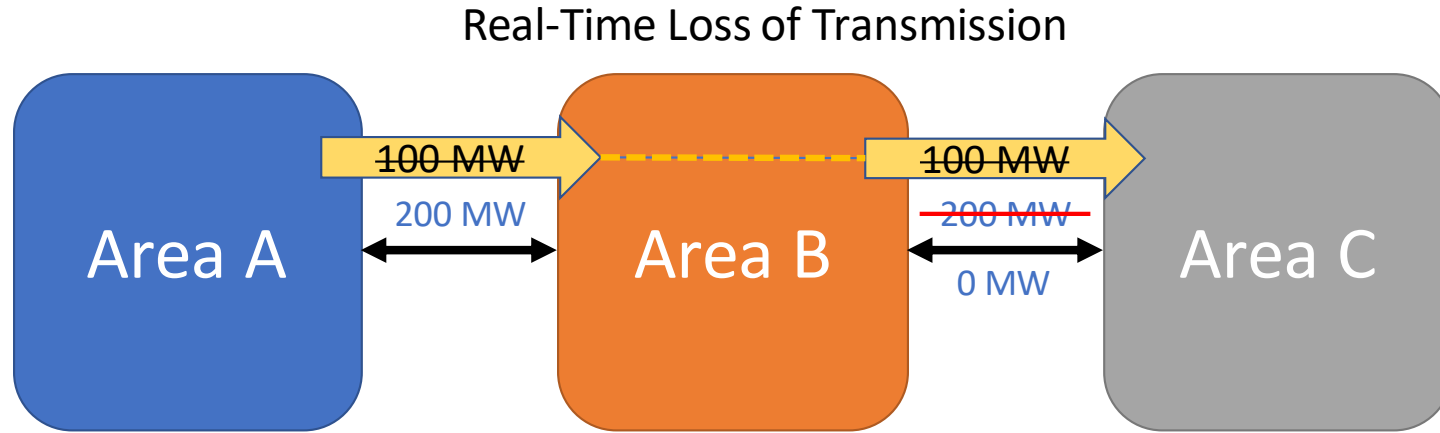
Example 5: Real-Time Loss of Transmission – Insufficient Capacity across Footprint (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	850 950 MW	930 MW	995 895 MW	2,775 MW
Remaining	50 MW	70 MW	105 MW	225 MW

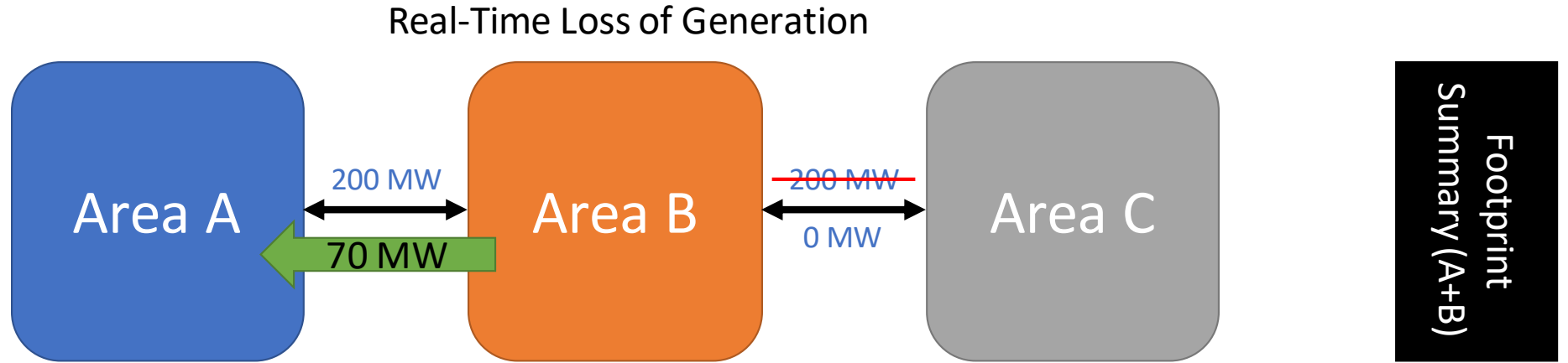
Example 5: Real-Time Loss of Transmission – Insufficient Capacity across Footprint (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
<i>EDAM Transfer</i>	<i>+100 MW</i>	<i>+100/-100 MW</i>	<i>-100 MW</i>	
Requirements	950 MW	930 MW	895 MW	2,775 MW
RT Dispatch	-100 MW	-	+100 MW	0 MW
Remaining	150 MW	70 MW	5 MW	225 MW

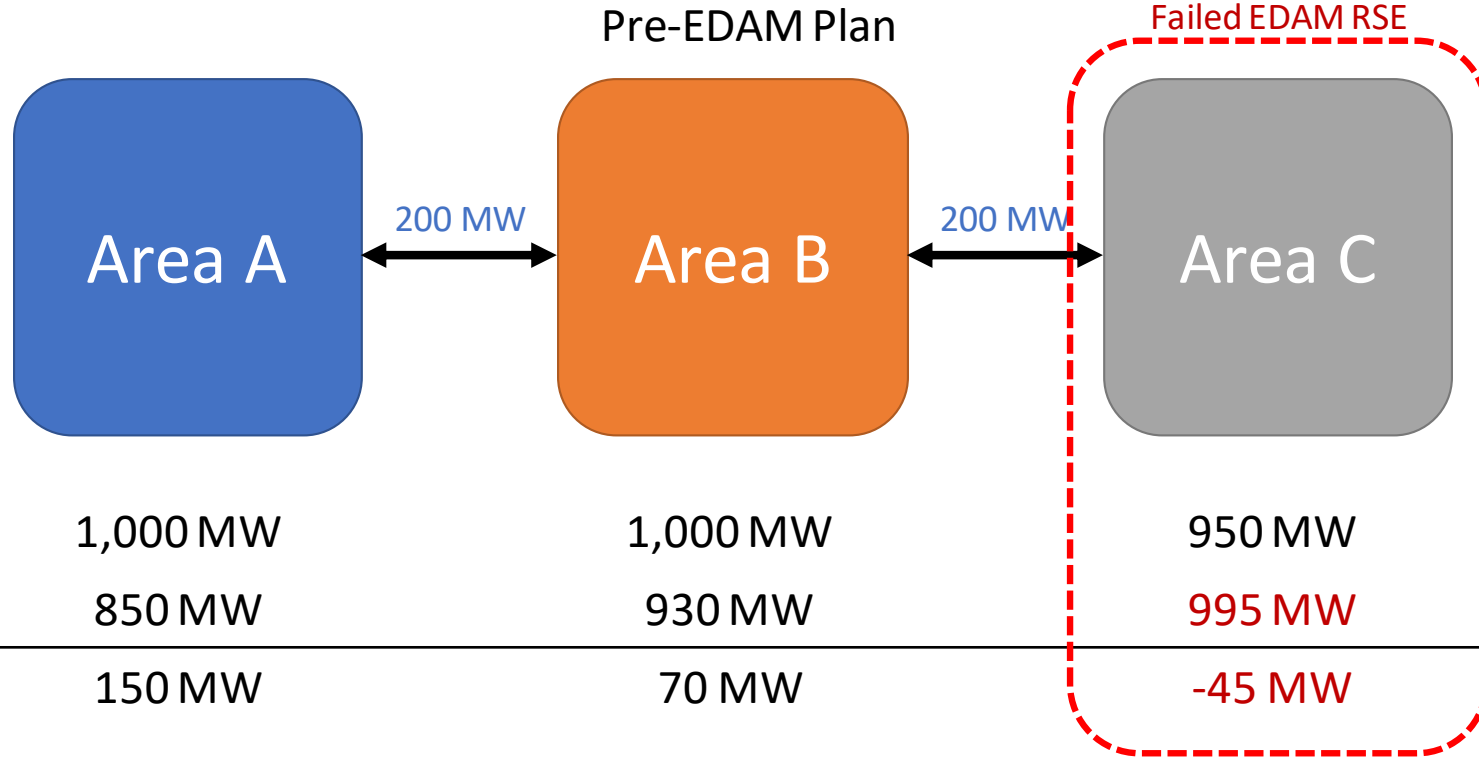
Example 5: Real-Time Loss of Transmission – Insufficient Capacity across Footprint (Cont'd)



Avail. Capacity	1,000 MW → 750	1,000 MW	1,000 MW	1,750 MW
DA Load+Reserve	850 MW	930 MW	995 MW	1,780 MW
EDAM Transfer	+100 MW	+100/ -100 MW	-100 MW	
Requirements	850 MW	930 MW	895 MW	1,780 MW
RT Dispatch	+150 MW	+70 MW	+100 MW	
RT Market Xfer	+70 MW	-70 MW	-	
Remaining	-30 MW	0 MW	5 MW	-30 MW

BA Does not Pass RSE, but
allowed to Participate in EDAM

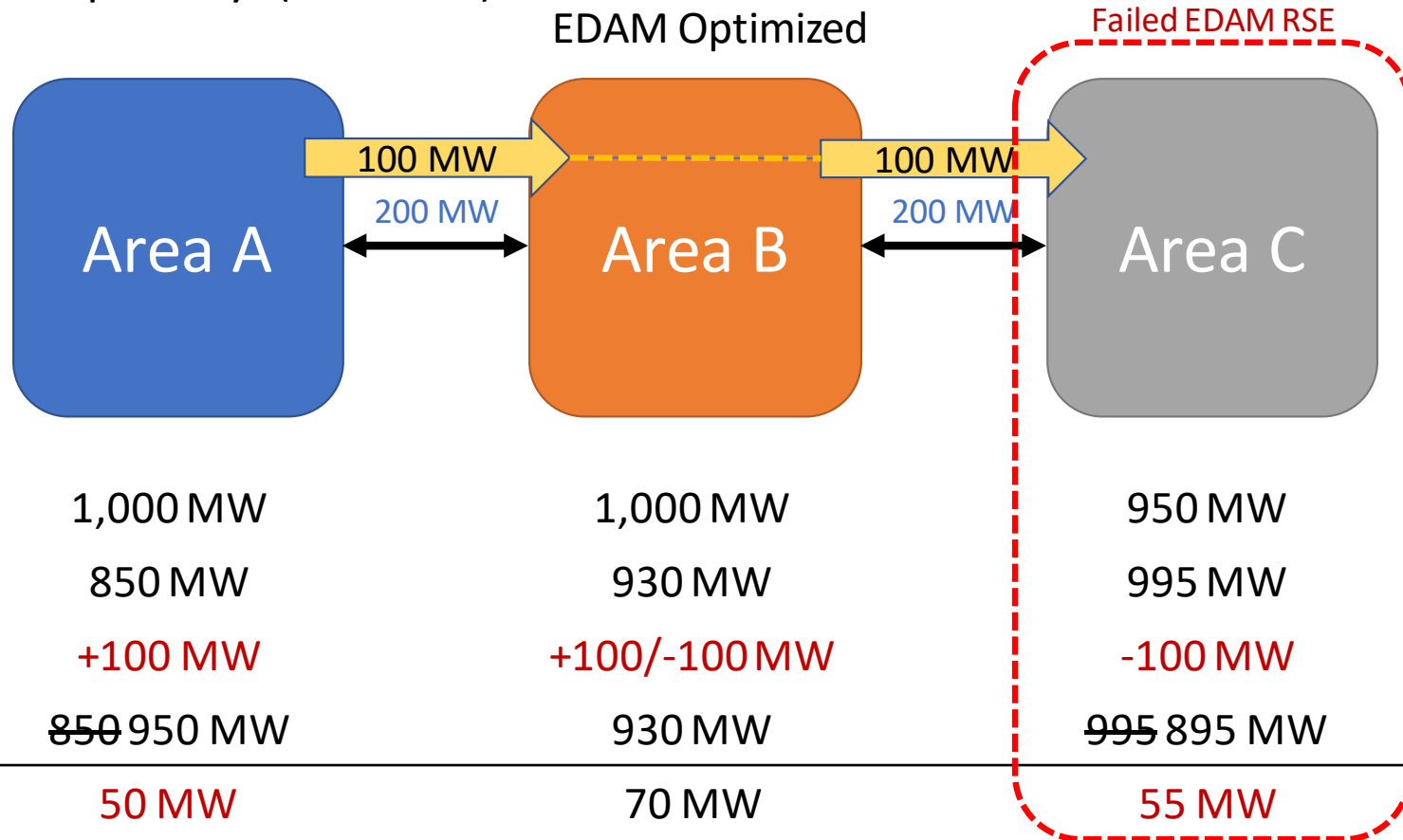
Example 6: Area C Fails RSE, Participates in EDAM, Loss of Generation & Insufficient Capacity



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	950 MW	2,950 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
Remaining	150 MW	70 MW	-45 MW	175 MW

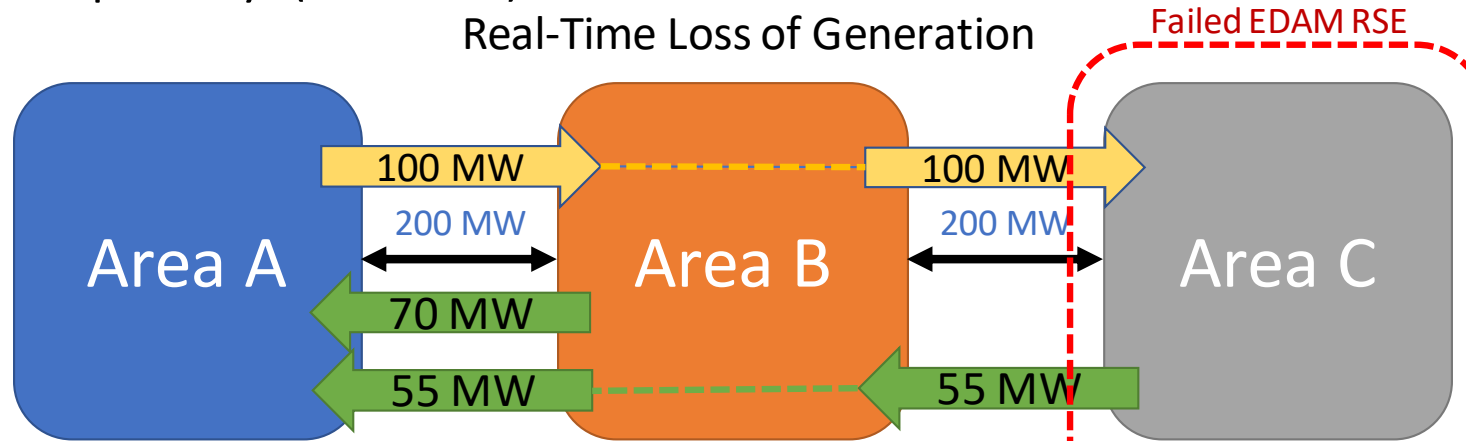
Example 6: Area C Fails RSE, Participates in EDAM, Loss of Generation & Insufficient Capacity (Cont'd)



Footprint
Summary

Avail. Capacity	1,000 MW	1,000 MW	950 MW	2,950 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	850 950 MW	930 MW	995 895 MW	2,775 MW
Remaining	50 MW	70 MW	55 MW	175 MW

Example 6: Area C Fails RSE, Participates in EDAM, Loss of Generation & Insufficient Capacity (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW → 750	1,000 MW	950 MW	2,750 MW
DA Load+Reserve	850 MW	930 MW	995 MW	2,775 MW
EDAM Transfer	+100 MW	+100/-100 MW	-100 MW	
Requirements	950 MW	930 MW	895 MW	2,775 MW
RT Dispatch	+50 MW	+70 MW	+55 MW	+175 MW
RT Market Xfer	+125 MW	-125/+55 MW	-55 MW	
Remaining	-75 MW	0 MW	0 MW	-75 MW

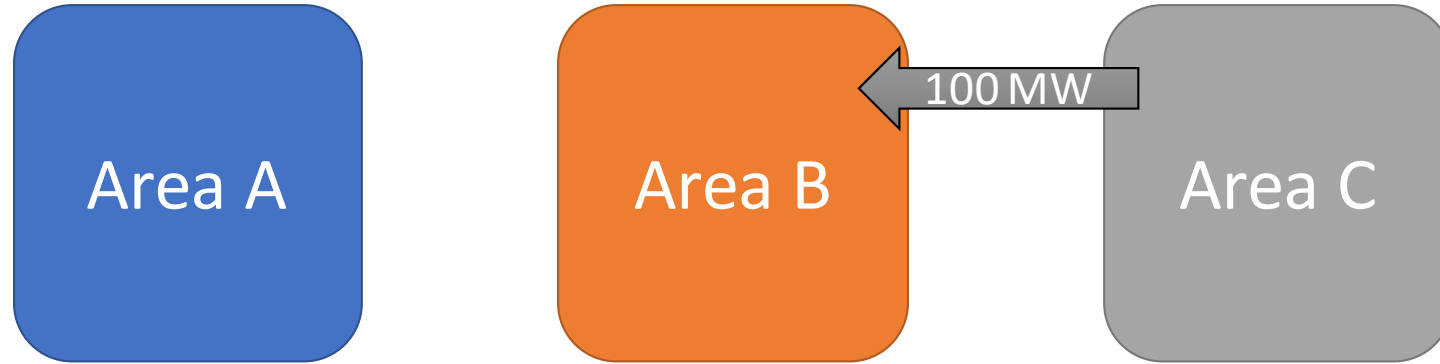
Example 6: Key Questions

- Should Area A be required to support firm transfers to Area C if Area C did not demonstrate sufficient resources to meet its load?
- Does this limit or change perspective on consequences of failure?
- How would this affect the firmness of EDAM transfers if a BA fails RSE but is allowed to participate?
- Are there limits and/or caveats to this?

Multiple BAs require short of requirements due to loss of RT Generation

Example 7: Real-Time Loss of Generation – Insufficient Capacity across Footprint, RSE plan built on import of dispatchable/optimizable capacity

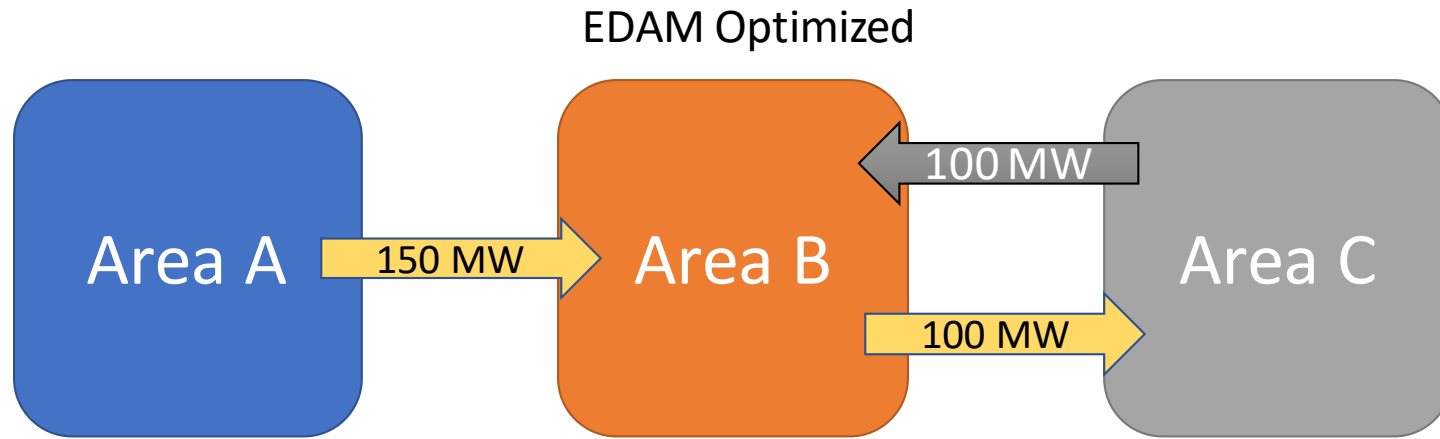
Pre-EDAM Plan



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
Remaining	150 MW	100 MW	100 MW	350 MW

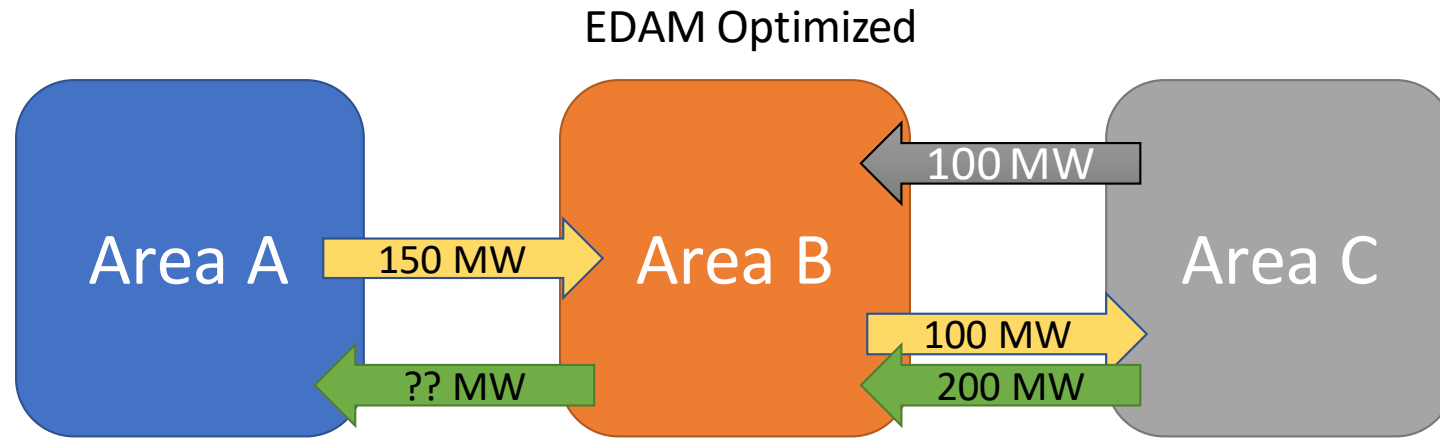
Example 7: Real-Time Loss of Generation – Insufficient Capacity across Footprint, RSE plan built on import of dispatchable/optimizable capacity (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW	1,000 MW	1,000 MW	3,000 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
EDAM Transfer	+150 MW	-150/+100 MW	-100 MW	
Requirements	850 1,000 MW	850 MW	995 800 MW	2,650 MW
Remaining	0 MW	150 MW	200 MW	350 MW

Example 7: Real-Time Loss of Generation – Insufficient Capacity across Footprint, RSE plan built on import of dispatchable/optimizable capacity (Cont'd)



Footprint Summary

Avail. Capacity	1,000 MW → 820	1,000 MW → 820	1,000 MW	2,640 MW
DA Load+Reserve	850 MW	900 MW	900 MW	2,650 MW
EDAM Transfer	+150 MW	-150/+100 MW	-100 MW	
Requirements	850 1,000 MW	850 MW	995 800 MW	2,650 MW
RT Dispatch	+0 MW	+150 MW	+200 MW	+350 MW
RT Market Xfer	+?? MW	-?/?+200 MW	-80 MW	?? MW
Remaining	? MW	? MW		-10 MW

Example 7: Key Questions

- How should load in one Area be prioritized relative to load in another Area when all areas pass RSE to the same standard?
 - Both Area A and Area B were sufficient
 - Neither Area A nor Area B had sufficient resources identified to cover the loss of generation each area experienced
- Would the answer change if one Area had not passed RSE? Why or why not?
- Would the answer change if one Area had sufficient resources to cover the loss of generation prior to EDAM run?
 - Does the contract status of the resources available to cover the loss of generation prior to EDAM run change this?
 - Would this change if the available resources to cover the loss of generation were not bid into EDAM but are registered as participating resources?
 - Would this change if the available resources to cover the loss of generation were not bid into EDAM but are registered as non-participating resources?